Township of Centre Wellington
Operations Centre
965 Gartshore Street, Fergus

Site Development Report

Appendix 1 - Site Investigations

RDHA BURNSIDE Centre Wellington

Appendix 1 - Investigation Reports

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Township of Centre Wellington Operations Centre - Space Needs Program

	Functional Area	Office Type PO-Private OO- Open	Number of Staff/ Work Stations	Workstn/ Office/ Rm Size Rqd (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	1.0 Administration Office Area on Ground Floor						
	Infrastructure Services						
1	Managing Director of Infrastructure Services	**PO**	1	200	1.4	280	Centre of building, enclosed semi-transparent glass walls
2	Manager of Environmental Services	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
2	Risk Management Official	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
2	Manager of Engineering	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
2	Manager of Public Works	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
5	Environmental Compliance & QMS Coord	**OO**	2	36	1.4	101	partial height cubical
5	Water Conservation Coordinator	**OO**	1	36	1.4	50	partial height cubical
5	Climate Change Coordinator	**OO**	1	36	1.4	50	partial height cubical
5	Energy Coordinator	**OO**	1	36	1.4	50	partial height cubical
5	Instrument and System Control Technician	**OO**	1	36	1.4	50	partial height cubical
6	Risk Management Inspector	**OO**	2	24	1.4	67	partial height cubical
5	Risk Management Coordinator	**OO**	2	36	1.4	101	partial height cubical
7	Risk Mgmt Co-op Student (year round)	**OO**	1	15	1.4	21	partial height cubical
3	GIS and Asset Management Supervisor	**OO**	1	100	1.4	140	partial height cubical
5	GIS Technician	**OO**	2	36	1.4	101	partial height cubical
5	Asset Management Technician	**OO**	1	36	1.4	50	partial height cubical
3	Capital Projects & Infrastructure Supervisor	**OO**	1	100	1.4	140	partial height cubical
4	Engineering Technologist - Rds/Bridge	**OO**	1	80	1.4	112	partial height cubical
4	Engineering Technologist - W/WW	**OO**	1	80	1.4	112	partial height cubical
4	Capital Project Manager	**OO**	1	80	1.4	112	partial height cubical
4	Capital Project Manager - W/WW	**OO**	1	80	1.4	112	partial height cubical
5	Construction Inspector	**OO**	1	36	1.4	50	partial height cubical
7	Public Works Co-op Student (Summer only)	**OO**	1	15	1.4	21	partial height cubical
5	Public Works Coordinator	**OO**	2	36	1.4	101	partial height cubical
	Corporate Services						
2	Manager of Information Technology	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
3	Supervisor of Information Technology	**OO**	1	100	1.4	140	partial height cubical
5	Application Support Analyst	**OO**	3	36	1.4	151	partial height cubical
5	Systems Analyst	**OO**	1	36	1.4	50	partial height cubical
5	Network Analyst	**OO**	1	36	1.4	50	partial height cubical
	Community Services						
2	Manager of Parks & Operations	**PO**	1	150	1.4	210	Centre of building, enclosed semi-transparent glass walls
4	Urban Forestry Coordinator	**OO**	1	80	1.4	112	partial height cubical
4	Landscape Technician / Inspector	**OO**	1	80	1.4	112	partial height cubical
5	Parks Capital Projects Coordinator	**OO**	1	36	1.4	50	partial height cubical
6	Horticulturalist	**OO**	1	24	1.4	34	partial height cubical
7	Parks Lead Hand - Fergus	**OO**	1	15	1.4	21	
7	Parks Lead Hand - Elora	**OO**	1	15	1.4	21	
7	Forestry Co-op Student	**OO**	1	15	1.4	21	
	Planning Department						
1	Managing Director	**PO**	1	200	1.4	280	Centre of building, enclosed semi-transparent glass walls.
2	Chief Building Official	**PO**	1	150	1.4	210	
2	Deputy Chief Building Official	**PO**	1	150	1.4	210	
2	Manager Planning Services	**PO**	1	150	1.4	210	
2	Manager of Economic Development	**OO**	1	150	1.4	210	
4	Senior Development Planner	**OO**	1	80	1.4	112	
4	Economic Development	**OO**	3	80	1.4	336	
4	Engineering Technologist	**OO**	6	80	1.4	672	
4	Examiners	**OO**	2	80	1.4	224	
5	Permit Clerks	**OO**	6	36	1.4	302	
5	Coordinators	**OO**	2	36	1.4	101	
7	Planning Co-op Student	**OO**	1	15	1.4	21	
5	Building Officials	**OO**	14	36	1.4	706	Prefer to have dedicated workspace for each building official and include storage cabinet/drawers. Have workspace located close to mudroom and vehicle parking

	Functional Area	Office Type PO-Private OO- Open	Number of Staff/ Work Stations	Workstn/ Office/ Rm Size Rqd (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	Common Ground Floor Admin Office Areas						
	Printer/plotter/fax/stationary/office supplies (1)	**PO**	1	300	1.4	420	high table in centre of room with cabinets below. Office equip and storage and counters w/ cabinets along the walls
	Small Meeting Rooms (1) (8 people)	**PO**	1	200	1.4	280	Require 1 room, centre of building
	1 on 1 Meeting rm / phone rm (1) (2 people)	**PO**	1	80	1.4	112	Require 1 room, centre of building
	Small Mtg Rm (1) (6 people)	**OO**	1	200	1.4	280	open meeting area, centre of building
	Office Washrms (2) for 54 staff (incls future)	**PO**	2	313	1.4	876	2 Accessible washrooms (M/F), centre of building
	Miscellaneous Storage Room	**OO**	1	300	1.4	420	
	Docking / Charging Station for Phones	**OO**	1	20	1.4	28	Against the wall
	Dedicated Use Ground Floor Office Areas						
	SCADA System	**PO**	1	40	1.4	56	Centre of building. In a secure enclosed room with access restrictions
	Water Services Reference Library	**OO**	1	25	1.4	35	Book shelves against the wall
	Records Storage (Ground Floor)						
	Files & Drawing Storage / Reference Library	**PO**	1	375	1.4	525	Centre of building. Shelving for boxes and space for drawings Combine active filing for all departments with the Building Departments Property Files. Room size to be confirmed to accommodate these changes
	Archives Records Storage (Secure)	**PO**	1	600	1.4	840	Centre of building, high density files, secure ground floor rm, fire rated w/ special fire suppression, shared w/ IT server rm.
	IT Server / Communications Room	**PO**	1	300	1.4	420	Fire rated, tornado proof, special HVAC & fire suppression, secure rm, shared w/ archive records strg. Static dissipating flooring required.
	IT Storage/Workshop Room	**PO**	1	450	1.4	630	Include table for working on equipment
	Janitors Room for Ground Floor Office Area	**PO**	1	80	1.4	112	Centre of building
	Electrical Room for Ground Floor Office Area	**PO**	1	300	1.4	420	Centre of building
	Mechanical Room for Ground Floor Office Area	**PO**	1	500	1.4	700	Centre of building
	SUB-TOTAL		**84**			**13,594**	

	Functional Area	Office Type PO-Private OO- Open	Number of Staff/ Work Stations	Workstn/ Office/ Rm Size Rqd (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	2.0 Touchdown Station Office Area						
	Infrastructure Services Operators						
8	Operator/Field Staff - PW Roads	**OO**	19				
8	Operator/Field Staff - Water Services	**OO**	8				
8	Special Projects Operators	**OO**	2				
	Community Services Staff						
8	Parks Co-op / Seasonal Operators	**OO**	19				
8	Horticulturalist Seasonal Assistant	**OO**	1				
8	Total Touchdown Station for all Dept to Share	**OO**	15	15	1.4	315	49 Staff to share 15 touchdown stations
	Reception Area						
	Entrance Vestibule & Lobby Waiting Area	**OO**	1	400	1.4	560	Need to seat 4 visitors, have a double door vestibule
	Public Washrooms (1)	**PO**	1	75	1.4	105	1 combined unisex Accessible washrm
	Reception Counter	**OO**	1	64	1.4	90	The recep counter isn't staffed so the admin staff offices must be close to the public recep counter.
	Small Meeting Room (1) (6 people)	**PO**	1	150	1.4	210	Want access to meeting rm from recep area (for public)
5	Admin Payroll & Acts Clerk (Wtr / WW)	**OO**	1	36	1.4	50	partial height cubical
5	Admin Payroll & Acts Clerk (PW)	**OO**	2	36	1.4	101	partial height cubical
	Administration Mail Boxes/Cabinets	**OO**	1	30	1.4	42	
	Planning Permit Desk	**OO**	1	64	1.4	90	Dedicated Customer Service desk for Building/Planning separate from main reception.
5	Water Admin Support Staff	**OO**	1	36	1.4	50	partial height cubical
	SUB-TOTAL		**54**			**1,613**	

	Functional Area	Office Type PO-Private OO- Open	Number of Staff/ Rooms	Room Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	3.0 Employee Amenities						
	Common Areas on Second Floor						
	Male Washroom/locker room/showers/laundry	**PO**	50	1049	1.25	1,311	Sized for 50 males. Joint laundry area required for combined male & female
	Female Washrm/locker rm/showers/laundry	**PO**	15	486	1.25	608	Size for 5 females, adjacent to a meeting room area that can be converted to add space for 10 more females in a future phase
	Mud Room	**PO**		150	1.25	188	To wash boots and area outside for operators to clean their boots with a hose
	Lunch Room (1) (55 people)	**PO**	55	1,295	1.25	1,619	Sized for 55 plus 2 2 touchdn stns, 2 fridges, 2 m.waves, 2 coffee makers, 1 dishwshr, 1 sink, 1 toaster oven, strg cabinets, counter
	Outdoor Patio (1) (20 people)		30	725	1.25		Sized for 30 + BBQ
	Training Rm / Large mtg rm (1)	**PO**	50	1,470	1.25	1,838	mobile partition divider. Include a touchdown work station and coffee station with sink in each divided rm. Sized to allow for an expanded 50 person training room.
	Employee Entrance (suits & boots)			150	1.25	188	Close to change rooms and lunch room
	First Aid/Wellness Room	**PO**		100	1.25	125	Include couch, sink, cabinets, counter top, phone, Defibrillator & First Aid kit
	SUB-TOTAL					**5,875**	
	TOTAL (ADMIN/OFFICE SPACE)		**138**			**21,082**	

	Functional Area	Office Type PO-Private OO- Open	Number of Staff/ Rooms	Workstn/ Office/ Rm Size Rqd (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	4.0 Supervisors Shop Office Area (enclosed area within Operations wing with storage mezzanine above for tires)						
	Infrastructure Services						
3	Supervisor of Water Services	**OO**	1	100	1.4	140	partial height cubicle in overall enclosed office area w/ view of garage through large glass window. Storage mezzanine above
3	Supervisor of Customer Svc & Special Projs	**OO**	1	100	1.4	140	partial height cubicle in overall enclosed office area w/ view of garage through large glass window. Storage mezzanine above
3	Supervisor of PW (Fergus Roads Foreman)	**OO**	1	100	1.4	140	partial height cubicle in overall enclosed office area w/ view of garage through large glass window. Storage mezzanine above
	Small Meeting Area in shop office (4 people)	**OO**	1	150	1.4	210	Open area, no walls, in shop office
	Lab/Sample Preparation Area	**OO**	1	100	1.4	140	in shop office. Sink, desk, fridge, 5ft counter, files, eye wash station at sink
	Printer station / fax / 2 touchdown stations	**OO**	1	70	1.4	98	in shop office
	PPE / Clothing Storage	**PO**	1	100	1.4	140	lockable room
	Shop Cleaning Supplies Room	**PO**	1	80	1.4	112	
	Electrical Room for Shop Area	**PO**	1	300	1.4	420	
	Mechanical Room for Shop Area	**PO**	1	500	1.4	700	
	SUB-TOTAL		**3**			**2,240**	

	Functional Area	Number of Rooms	Room Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	5.0 Operator's Shared Workshop Area for all Dept's (Roads, Water & Parks) with Mezzanine above for Storage					
	Shared work benches (6)	1	180	1.4	252	With small grinder & drill press
	Dedicated Mechanics work benches (2)	1	60	1.4	84	
	Open Work Area	1	150	1.3	195	Require a 2 Ton hoist
	Material storage	1	300	1.3	390	2 ft deep shelving
	Tools & Parts	1	200	1.3	260	
	Stand up meeting desk for work assignments	1	150	1.4	210	
	Machine Shop & Welding Shop	1	360	1.3	468	
	Wash Sink	1	10	1.4	14	
	SUB-TOTAL				**1,873**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	6.0 Mechanics Maintenance Shop	1	1,320	1	1,320	Bay size - 24' x 55'. Put adjacent to shared workshop.
	Office for mechanics					Closed Office with workstations
	Public Works Mechanic Lead Hand					
	Public Works Mechanic					
	Consumable auto parts/materials					
	Tool Crib, Misc. Storage					
	Maintenance Library and Work Station					
	Fluids Pump Room					
	Compressor Room					
	SUB-TOTAL				**1,320**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	7.0 Mechanics Heavy Vehicles Maintenance Bays					
	Heavy vehicle maintenance bays	2	1,320	1	2,640	Side by side w/ 5 T overhead crane running the whole length of that side of the shop to allow adjacent bays to use crane. Bay size - 24' x 55' with OH door wide enough to allow plow truck in with the wing down
	SUB-TOTAL				**2,640**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	8.0 Garage Materials and Equipment Storage Area					
	Shared miscellaneous garage storage area		1,320	1	1,320	Bay size - 24'x55' heated to 10C. To be locate beside the heavy equipment maintenance bays
	SUB-TOTAL				**1,320**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	9.0 Work Vehicle Storage - Warm Bays					
	Warm Bays	10	1,320	1	13,200	Drive through vehicle storageincluding two bays for Vac Trucks. Bay size - 24'x55' heated to 10C. Use double length drive through bays 24'x110' Include infrastructure to add electric charging stations in the future Welding plugs throughout the shop area
	SUB-TOTAL				**13,200**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	10.0 Manual Vehicle Wash Building					
	Vehicle Wash Bay	1	1,320	1	1,320	Bay size - 24'x55' heated to 10C. Wash bay to be at the far end of the garage. Want roof water run-off to collect in underground tanks, in the yard, for use in the wash bay
	Water Supply for Water Truck (see 12.0 Yard)					Beside Wash Building
	SUB-TOTAL				**1,320**	

	Functional Area	Number of Bays	Bay Size Required (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	11.0 Work Vehicle Storage - Cool Bays in a separate pole barn (unheated) building					
	Combined vehicle storage & sign storage	6	450	1	2,700	Closed in with OH doors on each bay - the opening should not face west to avoid snow
	SUB-TOTAL				**2,700**	
	TOTAL (SHOP SPACE)				**26,613**	

	Grand TOTAL Indoor Space				**47,695**	

	Functional Area	Number of Units	Required Area (sq.ft.)	Circulation Ratio	Total Required Area (sq.ft.)	Comments
	12.0 Yard Storage					
	Current Employee & Visitor Parking	110	31,318	1.25	39,147	Design for current employees plus 16 visitors and spares and 4 barrier-free, plus staff expansion to accommodate 110 staff plus visitor and accessible parking
	Outdoor wash pad for trucks beside wash building		1,250	1.25	1,563	
	Indoor Loading Salt Storage Building		20,000	1.05	21,000	5,000T to be built in phase 2. Assumed a 28 ft. high concrete perimeter wall supporting the salt
	Brine Making and Storage Room		920	1.05	966	To be built in phase 2 adjacent to salt loading
	Stockpile for Road Sweeper Sand		1,000	1.25	1,250	
	Gravel pile		4,900	1.25	6,125	stored on granular surface
	Topsoil pile		4,900	1.25	6,125	stored on earth
	Concrete Storage Bunkers	8	500	1.25	5,000	wood chips, stone, clear stone, etc.
	Waste Yard Bins	4	250	1.25	1,250	scrap, cast metal, appliances, steel, tires
	Back-up Generator	1	240	1.25	300	on a concrete pad
	Vehicle Staging Outside Fleet Maint.	6	3,278	1.25	4,097	Beside Maintenance Shop
	Work Vehicle Parking	50	16,275	1.25	20,344	Includes Parks & Forestry Need to account for Building Inspector vehicles
	Fueling storage and dispensing		2,000	1.25	2,500	Above ground coloured diesel with 1 dispensing pump for 1 tank
	Attachments		1,040	1.25	1,300	
	Truck Water Supply beside Wash Building		1,250	1.25	1,563	
	Greenhouses	2	1,332	1.2	3,197	adjacent to employee parking for safe public access
	Greenhouse Future	2	1,332	1.2	3,197	To be built in phase 2
	Truck Loading area for plants beside greenhouses	1	1,250	1.25	1,563	Temporary staging prior to planting
	New Tree Storage Area	1	11,564	1	11,564	Temporary staging prior to planting
	Open Yard Space for Misc. Materials		10,000	1.25	12,500	
	Transport/Courier Truck Unloading Area		1,200	1.25	1,500	In the yard close to indoor Material Storage
	Outdoor Patio (1) (35 people)	35	725	1.25	906	Sized for 30 + BBQ
	Grand TOTAL Yard Space				**146,955**	

Legend of Office Types & Sizes:

1 Managing Director - 10x20 Private Office
2 Manager - 10x15 Private Office
3 Supervisor - 10x10 U Open Office
4 Eng / Tech Staff (w/ plans) - 8x10 U Open
5 Admin / Tech / Coord / RMO - 6x6 L Open
6 Inspec / horticulturalist - 6x4 L Open
7 Dedicated Touchdown station - 6x2.5 Open
8 Shared Touchdown station - 6x2.5 Open

Callon Dietz

12 September 2022

Dear HT Lam,

RE: Fergus OPS Boundary and Topographic Survey
CALLON DIETZ PROJECT 22-24957 (Plan of Survey E-1646)

Having completed the above noted project please see the following notes below regarding the survey.

TOPOGRAPHIC SURVEY: A full topographic survey was completed on the subject and surrounding lands. Every effort was made to tie in existing utilities and locate marks placed by OneCall, however a SUE (Subsurface Utility Engineering) investigation was not completed as part of this project and the location of existing utilities should be verified prior to construction. Vertical benchmarks were established near the site. Their location, elevation, and description are noted on the plan.

FENCES: Several fences were found around the property. Ties between the fences and the boundary of the parcel have been given.

BOUNDARY AND MONUMENTATION: The corners of the property are monumented as illustrated. All monumentation shown as found has been verified. The measurements are in reasonable agreement with the underlying and surrounding plans.

EASEMENTS: There were no easements on the parcel register for this property.

OTHER ITEMS: There were several buildings on the property, their location is shown on the face of the plan.

Warmest Regards,
Jake Surgenor, O.L.S.

Arborist Report
Centre Wellington Operations Centre
965 Gartshore St.
Fergus, ON,

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February 2023
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0	Yes	Yes	HT Lam – R.J. Burnside & Associates Limited
0	Yes	Yes	Mark Kabbes – R.J. Burnside & Associates Limited

Record of Revisions

Revision	Date	Description
0	November 2022	Submission for Zoning Application
1	February 2023	Submission for Coordination

R.J. Burnside & Associates Limited

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Disclaimer

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Township of Centre Wellington (the Township) to prepare an Arborist Report and Tree Protection Plan for the proposed operations centre located at 965 Gartshore Street, Fergus. This report is in support of the proposed Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA).

The locations of trees on the site and on immediately adjacent lands (e.g., the road right-of-way) as well as their qualitative and quantitative measurements were determined and assessed in context with the proposed construction.

The intent of the report is to identify impacts to trees that may result from the proposed construction, associated grading, servicing, and other elements of the development.

2.0 Study Area

The study area is located on a 7.97 ha parcel of farmland located within the Township of Centre Wellington. The site sits northeast of the boundary for the Town of Fergus on Gartshore Street. The site is bounded by Gartshore Street to the northeast, agricultural lands to the west and southwest, Harper Crescent Park to the south, a municipal well located directly northeast, and a municipal water tower located south. There is an existing farmhouse on the property that is proposed to be retained throughout the duration of the project. Located within the southeast corner of the site, closest to the water tower property, is a plantation of a variety of native and non-native deciduous and coniferous trees that the Township of Centre Wellington has proposed to preserve and protect the area for future use as an arboretum. This area is outlined in Figure T-1.

3.0 Methodology

The tree inventory and assessment were completed on July 19, 2022. Tree data and locations were collected using ESRI Collector during the site investigation.

The methodology used to assess the trees is provided in Appendix B.

The following data were collected for each tree on private property (onsite or immediately adjacent), and on public land (i.e., road ROW) that could be impacted by the development. The following data was collected for each tree:

- Species;
- Diameter at Breast Height - DBH (cm);
- Minimum Tree Protection Zone - MTPZ (m);
- Condition (Good, Fair, Poor, or Dead); and
- Additional comments (to supplement condition or location notes).

Preservation recommendations (i.e., preserve or remove) are provided in separate columns in the data based on the existing condition and proposed development impacts.

A final preservation recommendation is determined based on the recommendations regarding existing condition and the proposed development. A tree is recommended for preservation if it has been assigned a fair or good condition rating and can be incorporated into the development. A tree is recommended for removal if it has been assigned a poor condition rating and / or will be significantly impacted by or is a conflict with the proposed development.

Tree assessment data including MTPZ size is provided in Appendix A. This data is also provided with the locations of individual trees within the study area are provided in the Figures. Limitations of this tree assessment are provided in Appendix C.

4.0 Proposed Development

The project proposes an Operations Centre for the Township of Centre Wellington. The project is proposed to occur in three phases. The operations building will include a phase one gross floor area (GFA) of 3,560 m^2 (38,320 ft^2). It also contains a 250 m^2 (2,702 ft^2) vehicle storage pole barn and a single greenhouse of 124 m^2. Phase 2 includes 1,226 m^2 (13,197 ft^2) of additional GFA in the operations building as well as a 1,951 m^2 (21,000 ft^2) salt and storage shed including interior loading. Phase 3 includes an additional 250 m^2 (2691 ft^2) of GFA to the operations building. A second greenhouse directly adjacent to the primary greenhouse will be considered in future phases. The development will cover most of the site and include an operations building, greenhouses, vehicle storage, pole barn, salt and sand shed, bunkers, bins, and ample outdoor parking. There is no intention to accommodate snow storage or snow disposal, all snow storage is strictly related to snow kept on site. There are three proposed entrances to the site, which are all located along Gartshore Street. The west corner of the site is within the Grand River Conservation Authority's (GRCA) regulation limit and a 100 m well setback.

5.0 Findings

A variety of planted deciduous and coniferous trees are found on the subject property. Tree species include Norway Maple (*Acer platanoides*), Red Maple (*Acer rubrum),* Sugar Maple (*Acer saccharum*), Ohio Buckeye (*Aesculus glabra*), Horsechestnut (*Aesculus hippocastanum*), Smooth Serviceberry (*Amelanchier laevis*), European White Birch (*Betula pendula*), Northern Catalpa (*Catalpa speciosa*), Common Hackberry (*Celtis occidentalis*), Katsura Tree (*Cercidiphyllum japonicum*), Eastern Redbud *(Cercis canadensis*), Yellow Wood (*Cladrastis lutea*), Beaked Hazel (*Corylus cornuta*), European Beech (*Fagus sylvatica*), European Ash (*Fraxinus excelsior*), Gingko (*Gingko biloba*), Thornless Honey Locust (*Gleditsia tricanthos var. inermis*), Kentucky Coffee Tree (*Gymnocladus dioicus*), Witch Hazel (*Hamamelis virginiana*), Black Walnut (*Juglans nigra*), English Walnut (*Juglans regia*), Tamarack (*Larix laricina*), Sweetgum

(*Liquidambar styraciflua*), Tulip Tree (*Liriodendron tulipifera*), Cucumber Tree (*Magnolia acuminata*), Wild Crabapple (*Malus coronaria*), White Mulberry (*Morus alba*), Ironwood (*Ostrya virginiana*), Colorado Blue Spruce (*Picea pungens 'Glauca'*) Red Spruce (*Picea rubens*), Red Pine (*Pinus resinosa*), Scots Pine (*Pinus sylvestris*), Sycamore (*Platanus occidentalis*), Eastern Cottonwood (*Populus deltoides ssp. deltoides*), Black Cherry (*Prunus serotina*), Douglas Fir (*Pseudotsuga menziesii var. menziesii*), Ornamental Pear (*Pyrus calleryana*), Bur Oak (*Quercus macrocarpa*), Chinquapin Oak (*Quercus muehlenbergii*), English Oak (*Quercus robur*), White Willow (*Salix alba*), Bebb's Willow (*Salix bebbiana*), European Mountain Ash (*Sorbus aucuparia*), Common Lilac (*Syringa vulgaris*), Canada Yew (*Taxus canadensis*), Eastern White Cedar (*Thuja occidentalis*), Little Leaf Linden (*Tillia cordata*), and White Elm (*Ulmus americana*).

The Cucumber Magnolia (species magnolia acuminata) is not protected under the Endangered Species Act (2007) since it comes from a horticultural source and is outside of its native range. No removal or impacts to this tree are required since it will be located in the retained tree collection at the southeast portion of the site.

All trees documented in this report have been tagged for inventory purposes. The tagged number value of each tree is noted in the comment's column in Appendix A and the figure set.

A total of 331 trees were individually assessed. The following subsections regarding trees to be preserved and trees to be removed are based off preliminary engineering drawings. These recommendations can be subject to change throughout the detailed design process.

5.1 Trees Recommended for Preservation

A total of 247 trees included in the assessment are recommended for preservation. These trees are setback from the construction or can be protected and have a good or fair condition.

Tree protection fencing is recommended to be installed to reduce impact to trees from construction where construction is proposed within the project site. The location of the fencing is illustrated in Drawing TPP-01 and TPP-02, and the tree protection fencing detail can be located on TPP-03.

5.2 Trees Recommended for Removal

A total of 84 trees are recommended for removal. These trees either conflict with the proposed development elements or significant impacts to root zones will occur (i.e., root severance and compaction) due to the implementation of the plan or have been given a poor rating based on its condition on the date of inventory.

There are a total of ten (10) trees recommended for removal based on being in poor/dead condition; T9, T34, T105, T107, T163, T211, T213, T217, T223, T302, T314 and T327.

There are a total of seventy-one (71) trees recommended for removal due to conflicts with their location within the proposed new development. These trees are; T12, T13, T14, T15, T16, T42, T43, T45, T46, T48, T49, T50, T51, T52, T53, T54, T154 T64, T118, T119, T120, T123, T124, T136, T137, T138, T149, T150, T151, T152, T153, T155, T156, T167, T168, T169, T170, T171, T172, T173, T174, T175, T185, T186, T187, T188, T189, T195, T196, T200, T214, T215, T216, T218, T219, T220, T221, T222, T224, T225, T226, T227, T228, T231, T232, T233, T234, T235, T236, T237, and T316

The Township of Centre Wellington has additionally been undergoing a program where they have been overseeing the removal of all ash trees due to the rapid spread of Emerald Ash Borer disease (EAB). There are two (2) Ash species *(Fraxinus spp.)* on site; T27 and T175, both have been noted for removal.

Trees that require removal are a mix of native and non-native species, as per the Ontario Plant List (Newmaster, 1997).

- Native species, total removals (57); and
- Non-native species, total removals (27).

Table 1 provides a breakdown of trees by DBH.

Table 1: DBH Breakdown of Trees Recommended for Removal

Tree DBH Range	Total Number of Trees within DBH Range
1 – 9	2
10 – 20	40
21 – 30	14
31 – 40	13
41 – 50	4
51 +	11
Total	**84**

The County of Wellington has a Conservation and Sustainable Use of Woodlands By-law (5115-09) that defines a “woodlands” as having 250 trees or more, with over 20 cm in diameter, per hectare. Due to this definition the project site does not fall under the definition of a “woodlands” and no permitting approvals will be required to the County of Wellington for tree impacts or removals.

6.0 Tree Replacement and Compensation Guidelines

The Township of Centre Wellington has no private tree by-laws; however, tree removals located on Township property will need to be compensated at a 2:1 rate. As per these Township compensation requirements, 168 trees will need to be replanted on site to accommodate the 64 trees currently noted for removal. The planting locations and planting details are to be addressed in the forthcoming landscape drawing set.

7.0 Recommendations and Requirements

- To reduce the risk of contravening the Migratory Bird Convention Act, timing constraints shall be applied to avoid any limited vegetation clearing (including grubbing) during the breeding bird period broadly from April 1 to August 31 for most species (regardless of the calendar year).
- Active nests (nests with eggs or young birds) of protected migratory birds, including Species at Risk (SAR) protected under the Endangered Species Act (ESA), cannot be destroyed at any time of the year. The destruction of inactive nests for some species may also be prohibited (e.g., Barn Swallow, Osprey, Great Blue Heron).
- If the construction activities are such that continuing construction in the area would result in harm to wildlife, construction activities in that location shall temporarily stop and a qualified ecologist shall be contacted for directions.
- Trees should be felled so that they fall into the development footprint to avoid damage to retained trees, including both trunks and roots.
- All retained trees should be reviewed following construction to determine if additional mitigative measures such as pruning is required to reduce risk to occupants and pedestrians.

8.0 Summary

Tree preservation and removal has been identified in this Arborist Report and the Tree Protection Plans. Measures to ensure protection of the trees prior to and during the construction period are detailed to minimize impacts to preserved trees. Tree planting compensation for removed trees is to be detailed in the landscape drawing set.

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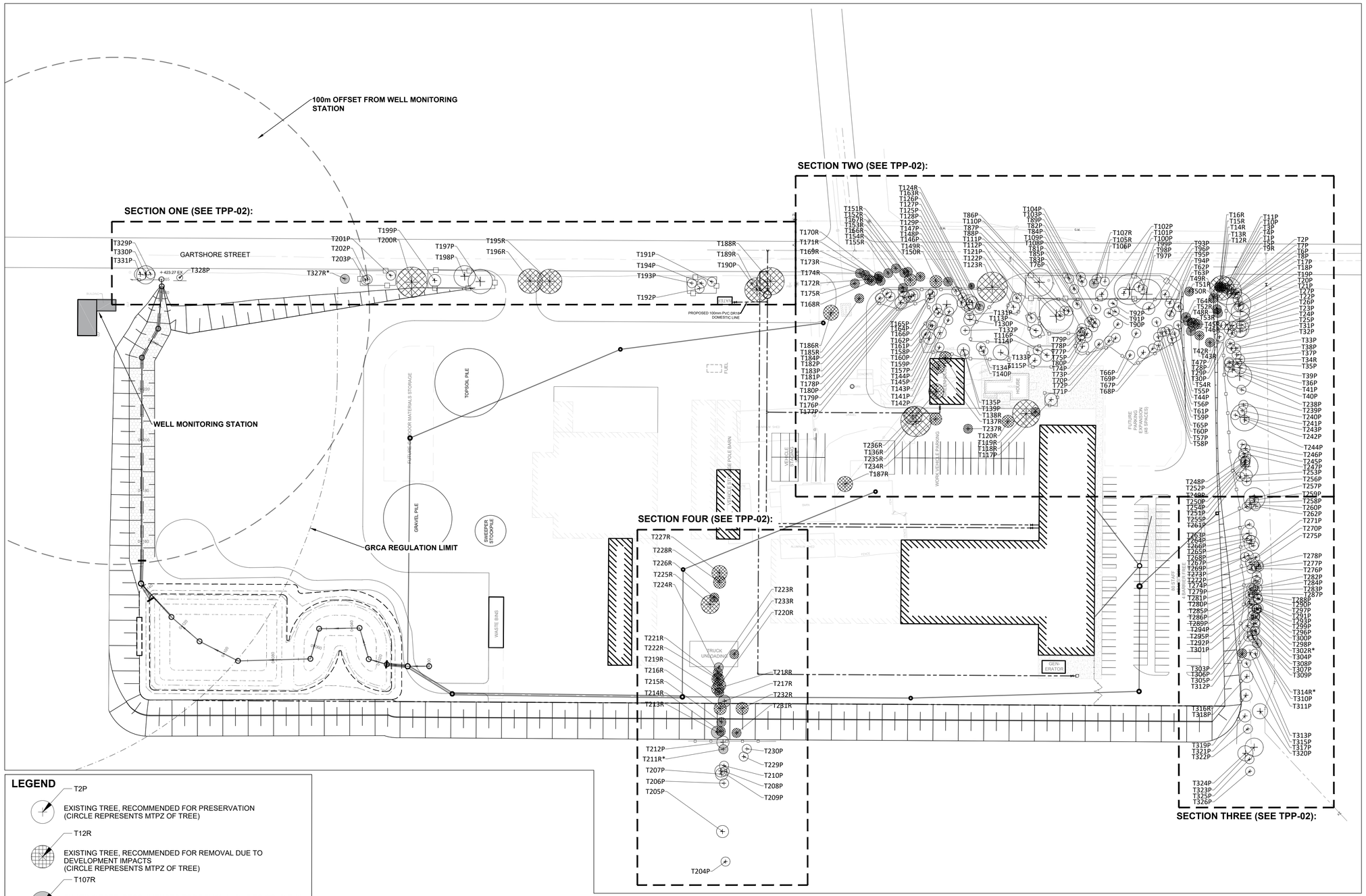
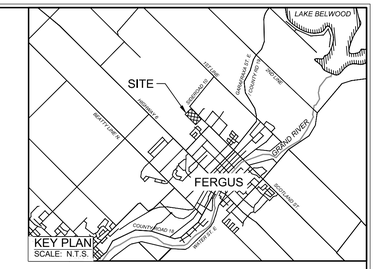
[THE DIFFERENCE IS OUR PEOPLE]

Figures





PROPERTY LINE
TOP OF BANK
EXISTING DITCHLINE
EDGE OF GRAVEL
WATER VALVE
PROPOSED GRADE — 277.00
EXISTING GRADE — 423.87 EX
MATCH GRADE — 277.00 EX
EXISTING TREE
PROPOSED TREE
BENCHMARK — SITE BM
PROPOSED BUILDING
PROPOSED SAN MH
PROPOSED STM CBMH
PROPOSED STM CB
PROPOSED STM MH
PROPOSED PERCENT GRADE — 1.31%
PROPOSED SWM POND
PROPOSED SLOPE
PROPOSED HEADWALL
SIB

LEGEND

T2P — EXISTING TREE, RECOMMENDED FOR PRESERVATION (CIRCLE REPRESENTS MTPZ OF TREE)

T12R — EXISTING TREE, RECOMMENDED FOR REMOVAL DUE TO DEVELOPMENT IMPACTS (CIRCLE REPRESENTS MTPZ OF TREE)

T107R — EXISTING TREE, RECOMMENDED FOR REMOVAL DUE TO CONDITION (CIRCLE REPRESENTS MTPZ OF TREE)

T314R* — EXISTING TREE OFF PROPERTY, RECOMMENDED FOR REMOVAL DUE TO CONDITION AT THE DECISION OF TOWNSHIP (CIRCLE REPRESENTS MTPZ OF TREE)

TREE PROTECTION FENCING

Notes
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2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.
01	ISSUED FOR CLIENT REVIEW	23/02/03	FG

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1 MACDONALD SQUARE
ELORA, ON
N0B 1S0

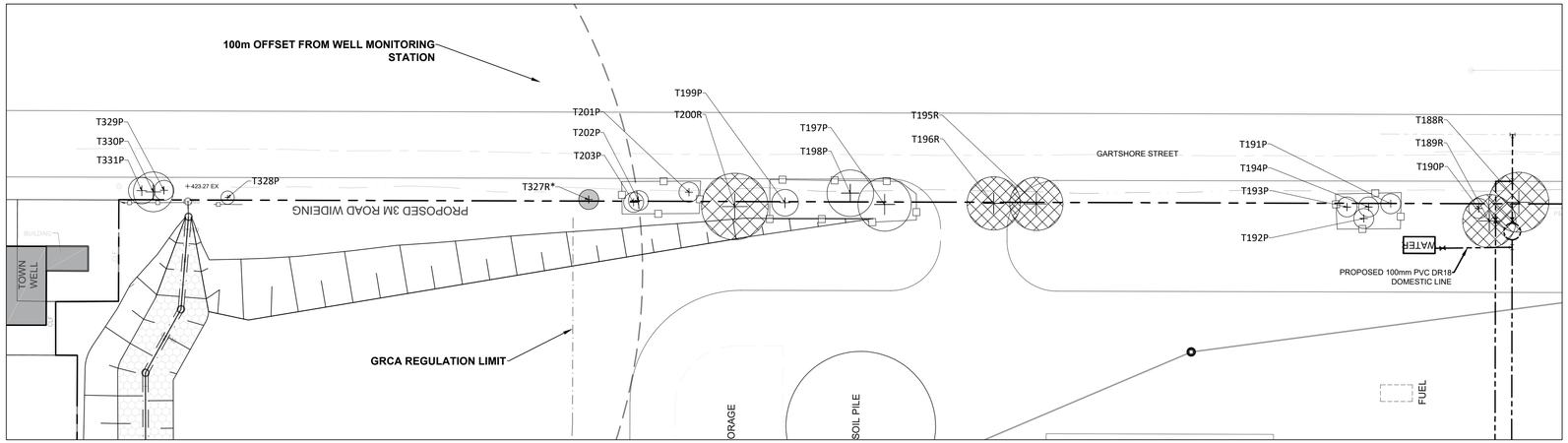
Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE

TREE PROTECTION PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
MV	KB	MV	KB	22/09/14	TPP-01
Project No. 300055234.0000		Contract No.		Revision No. 0	
Scale 1:750		0 10 20 40m			

© 2014 Corporation of the Township of Centre Wellington Operations Centre Project\CAD\Civil\TREE PROTECTION PLAN.dwg Date Printed: February 11, 2015 - 10:30 AM

SECTION ONE:



LEGEND

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- T12R — EXISTING TREE, RECOMMENDED FOR REMOVAL DUE TO DEVELOPMENT IMPACTS (CIRCLE REPRESENTS MTPZ OF TREE)
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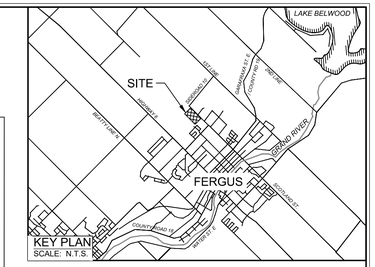
- TREE PROTECTION FENCING



LEGEND

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- TOP OF BANK
- EXISTING DITCHLINE
- EDGE OF GRAVEL
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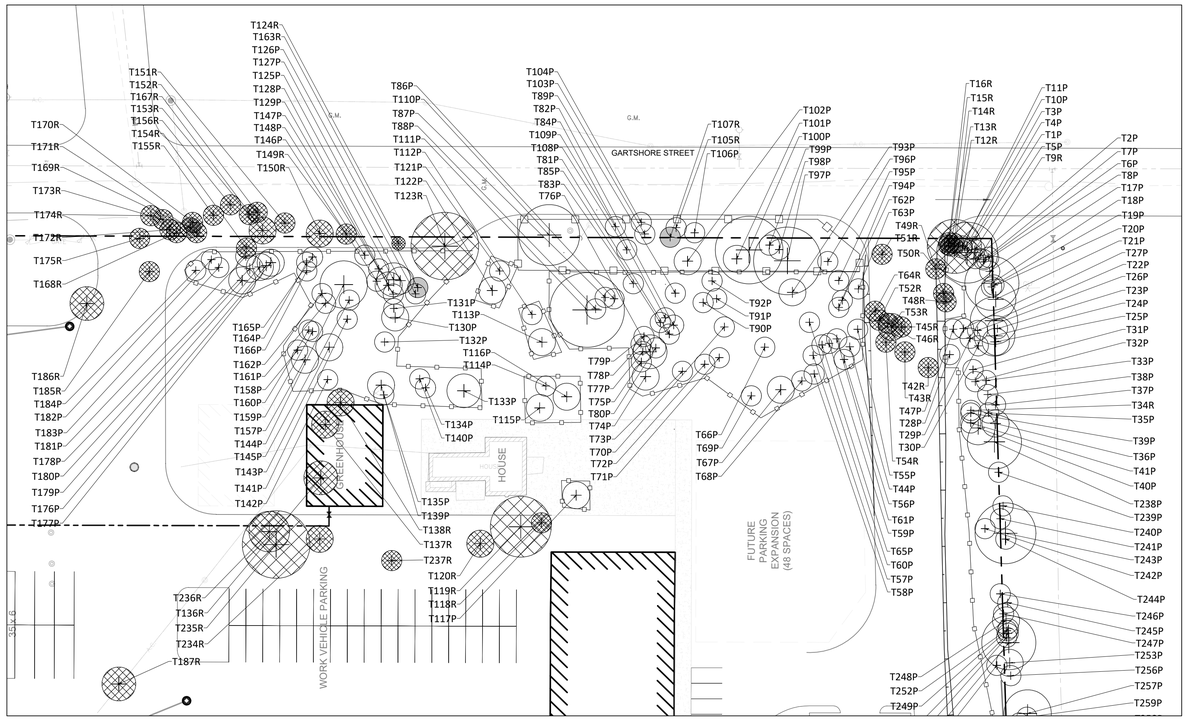
- PROPOSED GRADE — 277.00
- EXISTING GRADE — 423.87 EX
- MATCH GRADE — 277.00 EX
- EXISTING TREE
- PROPOSED TREE
- BENCHMARK — SITE BM
- PROPOSED BUILDING
- PROPOSED SAN MH
- PROPOSED STM CBMH
- PROPOSED STM CB
- PROPOSED STM MH
- PROPOSED PERCENT GRADE — 1.31%
- PROPOSED SWM POND
- PROPOSED SLOPE
- PROPOSED HEADWALL
- SIB

SECTION TWO:



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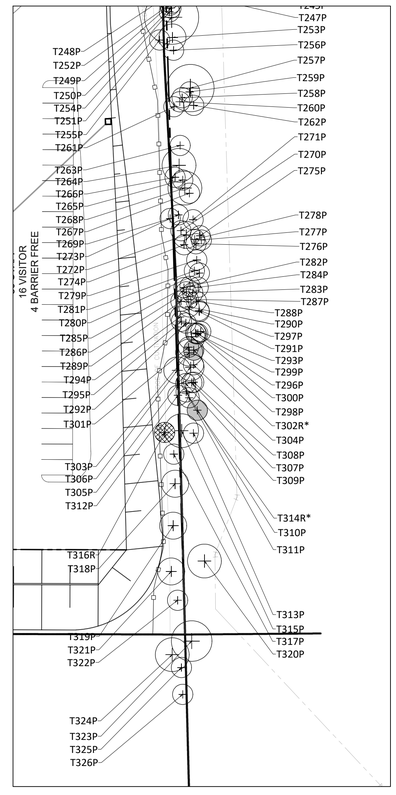

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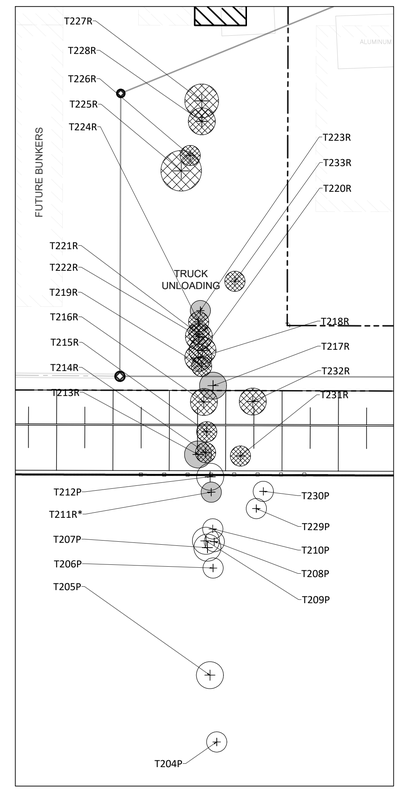

TREE PROTECTION NOTES:

THERE SHALL BE NO CONSTRUCTION, GRADE ALTERATIONS, DISPOSAL, PARKING OF VEHICLES OR MACHINERY, STORAGE, OR DISTURBANCE OF ANY KIND WITHIN THE TREE PROTECTION FENCING.
TREE PROTECTION FENCING SHALL BE INSTALLED PRIOR TO ANY CONSTRUCTION ACTIVITY AND IS TO REMAIN IN PLACE AND IN GOOD CONDITION, PERIODICALLY INSPECTED THROUGHOUT THE CONSTRUCTION PHASE.

MIGRATORY BIRDS PROTECTION NOTE:

REMOVAL OF WOODY VEGETATION (TREES AND SHRUBS) SHOULD OCCUR OUTSIDE OF THE MIGRATORY BIRD BREEDING SEASON, TYPICALLY OCCURRING FROM APRIL 1 TO AUGUST 31.
IF THIS IS NOT POSSIBLE, A PRE-CONSTRUCTION NEST SURVEY SHALL BE COMPLETED NO GREATER THAN 3 DAYS PRIOR TO THE PROPOSED SITE PREPARATION AND CLEARING ACTIVITIES BY A QUALIFIED BIOLOGIST.
IF NESTING SPECIES ARE IDENTIFIED, AN APPROPRIATE SPECIES-SPECIFIC BUFFER SHALL BE APPLIED UNTIL THE NEST IS NO LONGER ACTIVE.

Notes
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ELORA, ON
N0B 1S0

Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE

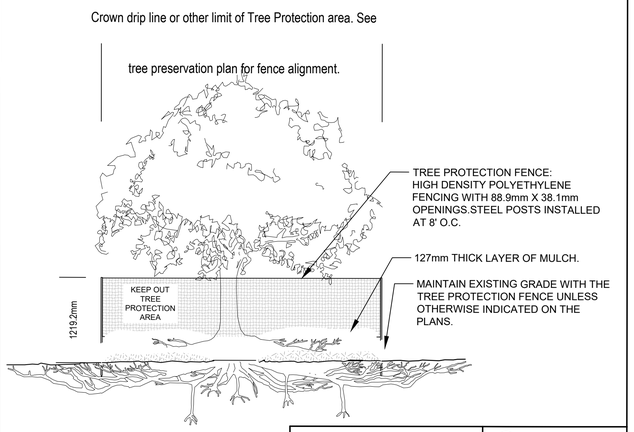
TREE PROTECTION PLAN

Drawn	Checked	Designed	Checked	Date	Drawing No.
MV	KB	MV	KB	22/09/14	TPP-02
Project No. 300055234.0000		Contract No.		Revision No. 0	
Scale 1:500					

File: \\jbburnside\Shared Data\Projects\300055234 Centre Wellington Operations Centre_Production\Design\300055234-TPP02-PROTECTION PLAN.dwg Date Plotted: February 11, 2015 - 9:31 AM

NOTES:

1. NO PRUNING SHALL BE PREFORMED EXCEPT BY AN APPROVED ARBORIST.
2. NO EQUIPMENT SHALL OPERATE INSIDE THE PROTECTIVE FENCING INCLUDING DURING FENCE INSTALLATION AND REMOVAL.
3. SEE SITE PREPARATION PLAN FOR ANY MODIFICATIONS WITH THE TREE PROTECTION AREA.



TREE PROTECTION FENCING
NTS

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RJB T-01

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T1	Liquidambar styraciflua	Sweetgum	89	5.4	Fair	Tagged 115 - open wound 2m from base of trunk spanning approximately 1m vertically, deadwood throughout crown	Preserve	Preserve	Preserve
T2	Prunus serotina	Black Cherry	18	1.8	Fair	Tagged 116 - dead leader, one dominant branch with deadwood throughout	Preserve	Preserve	Preserve
T3	Acer saccharum	Sugar Maple	8	1.2	Good	Tagged 117	Preserve	Preserve	Preserve
T4	Acer saccharum	Sugar Maple	26	1.8	Good	Tagged 118 - fork in trunk approx .5m from base of trunk	Preserve	Preserve	Preserve
T5	Prunus serotina	Black Cherry	12	1.8	Fair-Poor	Tagged 119 - light suppression	Preserve	Preserve	Preserve
T6	Prunus serotina	Black Cherry	21	1.8	Good-Fair	Tagged 120	Preserve	Preserve	Preserve
T7	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 121	Preserve	Preserve	Preserve
T8	Acer saccharum	Sugar Maple	8	1.2	Fair	Tagged 122	Preserve	Preserve	Preserve
T9	Pinus sylvestris	Scots Pine	9	1.2	Poor	Tagged 123	Remove	Remove	Remove
T10	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 124	Preserve	Preserve	Preserve
T11	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 125	Preserve	Preserve	Preserve
T12	Acer saccharum	Sugar Maple	80	4.8	Fair	Tagged 126 - poor branch attachments apparent throughout crown, hanging deadwood	Preserve	Remove	Remove
T13	Gleditsia triacanthos	Honey Locust	16	1.8	Fair	Tagged 127	Preserve	Remove	Remove
T14	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 128	Preserve	Remove	Remove
T15	Acer saccharum	Sugar Maple	23	1.8	Good	Tagged 130	Preserve	Remove	Remove
T16	Gleditsia triacanthos	Honey Locust	18	1.8	Fair-Poor	Tagged 130 - light suppression approx 1m from base of crown up	Preserve	Remove	Remove
T17	Acer saccharum	Sugar Maple	22	1.8	Good-Fair	Tagged 131 - bark damaged entirely at the base of root flare	Preserve	Preserve	Preserve
T18	Acer saccharum	Sugar Maple	71	4.8	Good-Fair	Tagged 132	Preserve	Preserve	Preserve
T19	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 133 - evidence of chain link fence in bark, fork in trunk approx 1 m from flare	Preserve	Preserve	Preserve
T20	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 134	Preserve	Preserve	Preserve
T21	Prunus serotina	Black Cherry	57	3.6	Good-Fair	Tagged 135	Preserve	Preserve	Preserve
T22	Acer saccharum	Sugar Maple	68	4.2	Good-Fair	Tagged 136	Preserve	Preserve	Preserve
T23	Acer saccharum	Sugar Maple	12	1.8	Fair	Tagged 137	Preserve	Preserve	Preserve
T24	Acer saccharum	Sugar Maple	60	3.6	Fair-Poor	Tagged 138 - 3 stemmed, 2 of three stems dead	Preserve	Preserve	Preserve
T25	Acer saccharum	Sugar Maple	30	2.4	Good-Fair	Tagged 139	Preserve	Preserve	Preserve
T26	Aesculus hippocastanum	Horsechestnut	26	1.8	Good-Fair	Tagged 140 - large split up from trunk flare 2 m up	Preserve	Preserve	Preserve
T27	Fraxinus excelsior	European Ash	14	1.8	Fair-Poor	Tagged 141 - signs of EAB throughout trunks base	Preserve	Preserve	Remove*
T28	Betula pendula	European White Birch	18	1.8	Good	Tagged 142	Preserve	Preserve	Preserve
T29	Gleditsia triacanthos	Honey Locust	18	1.8	Good	Tagged 143	Preserve	Preserve	Preserve
T30	Gleditsia triacanthos	Honey Locust	22	1.8	Fair	Tagged 144	Preserve	Preserve	Preserve
T31	Gleditsia triacanthos	Honey Locust	14	1.8	Good-Fair	Tagged 145	Preserve	Preserve	Preserve
T32	Gleditsia triacanthos	Honey Locust	25	1.8	Fair	Tagged 146	Preserve	Preserve	Preserve
T33	Aesculus hippocastanum	Horsechestnut	12	1.8	Fair	Tagged 147 - fork in trunk near base of trunk flare, poor branch attachment	Preserve	Preserve	Preserve
T34	Pinus sylvestris	Scots Pine	13	1.8	Poor	Tagged 148	Remove	Remove	Remove
T35	Thuja occidentalis	Eastern White Cedar	11	1.8	Fair	Tagged 149	Preserve	Preserve	Preserve
T36	Acer saccharum	Sugar Maple	37	2.4	Good-Fair	Tagged 150	Preserve	Preserve	Preserve
T37	Gleditsia triacanthos	Honey Locust	12	1.8	Good-Fair	Tagged 151	Preserve	Preserve	Preserve
T38	Acer saccharum	Sugar Maple	27	1.8	Fair	Tagged 152	Preserve	Preserve	Preserve
T39	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 153	Preserve	Preserve	Preserve
T40	Acer saccharum	Sugar Maple	42	3	Good-Fair	Tagged 154	Preserve	Preserve	Preserve
T41	Pseudotsuga menziesii var. menziesii	Douglas Fir	19	1.8	Good-Fair	Tagged 155	Preserve	Preserve	Preserve
T42	Celtis occidentalis	Northern Hackberry	10	1.8	Good-Fair	Tagged 156	Preserve	Remove	Remove
T43	Catalpa speciosa	Northern Catalpa	18	1.8	Fair	Tagged 157 - multi stemmed x3 at root flare	Preserve	Remove	Remove
T44	Quercus rubra	Red Oak	11	1.8	Good	Tagged 158	Preserve	Preserve	Preserve
T45	Platanus occidentalis	Sycamore	17	1.8	Fair	Tagged 159	Preserve	Remove	Remove
T46	Platanus occidentalis	Sycamore	15	1.8	Fair	Tagged 160 - multi stemmed x3	Preserve	Remove	Remove
T47	Cladrastis lutea	Yellow Wood	12	1.8	Good-Fair	Tagged 161	Preserve	Preserve	Preserve
T48	Juglans nigra	Black Walnut	12	1.8	Good	Tagged 162	Preserve	Remove	Remove
T49	Tilia cordata	Little Leaf Linden	15	1.8	Good	Tagged 163	Preserve	Remove	Remove
T50	Liquidambar styraciflua	Sweetgum	15	1.8	Good-Fair	Tagged 164 - multi stemmed	Preserve	Remove	Remove
T51	Salix alba	White Willow	26	1.8	Good-Fair	Tagged 165	Preserve	Remove	Remove
T52	Cercis canadensis	Redbud	11	1.8	Fair	Tagged 166	Preserve	Remove	Remove
T53	Gymnocladus dioicus	Kentucky Coffeetree	34	2.4	Good	Tagged 167	Preserve	Remove	Remove
T54	Acer rubrum	Red Maple	10	1.8	Good	Tagged 168	Preserve	Remove	Remove
T55	Betula pendula	European White Birch	22	1.8	Good	Tagged 169	Preserve	Preserve	Preserve
T56	Quercus rubra	Red Oak	12	1.8	Good	Tagged 170	Preserve	Preserve	Preserve
T57	Magnolia acuminata	Cucumber Tree	23	1.8	Good	Tagged 171	Preserve	Preserve	Preserve
T58	Liriodendron tulipifera	Tulip Tree	14	1.8	Good	Tagged 172	Preserve	Preserve	Preserve
T59	Picea pungens 'Glauca'	Colorado Blue Spruce	11	1.8	Good	Tagged 173	Preserve	Preserve	Preserve
T60	Quercus rubra	Red Oak	16	1.8	Good	Tagged 174	Preserve	Preserve	Preserve
T61	Fagus sylvatica	European Beech	14	1.8	Fair	Tagged 175	Preserve	Preserve	Preserve
T62	Picea rubens	Red Spruce	20	1.8	Good	Not tagged	Preserve	Preserve	Preserve
T63	Betula pendula	European White Birch	17	1.8	Good-Fair	Tagged 176	Preserve	Preserve	Preserve
T64	Picea rubens	Red Spruce	18	1.8	Fair	Tagged 177	Preserve	Remove	Remove
T65	Ostrya virginiana	Ironwood	10	1.8	Good-Fair	Tagged 178 - multi stemmed x8 (all small stems)	Preserve	Preserve	Preserve
T66	Liriodendron tulipifera	Tulip Tree	19	1.8	Good	Tagged 179	Preserve	Preserve	Preserve
T67	Gleditsia triacanthos	Honey Locust	39	2.4	Fair	Tagged 180 - significant deadwood throughout crown	Preserve	Preserve	Preserve
T68	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 181	Preserve	Preserve	Preserve
T69	Salix alba	White Willow	14	1.8	Fair-Poor	Tagged 182 - significant die back, appears new growth has suckered from existing stump and created new multi stems	Preserve	Preserve	Preserve
T70	Fagus sylvatica	European Beech	24	1.8	Good-Fair	Tagged 183	Preserve	Preserve	Preserve
T71	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 184	Preserve	Preserve	Preserve
T72	Betula pendula	European White Birch	19	1.8	Good	Tagged 185	Preserve	Preserve	Preserve
T73	Betula pendula	European White Birch	19	1.8	Good	Tagged 186	Preserve	Preserve	Preserve
T74	Larix laricina	Tamarack	39	2.4	Good-Fair	Tagged 187	Preserve	Preserve	Preserve
T75	Magnolia grandiflora	Magnolia	15	1.8	Good-Fair	Tagged 188	Preserve	Preserve	Preserve
T76	Larix laricina	Tamarack	41	3	Good	Tagged 189	Preserve	Preserve	Preserve
T77	Thuja occidentalis	Eastern White Cedar	28	1.8	Good	Tagged 190	Preserve	Preserve	Preserve
T78	Ginkgo biloba	Ginkgo	20	1.8	Good	Tagged 191	Preserve	Preserve	Preserve
T79	Larix laricina	Tamarack	22	1.8	Good-Fair	Tagged 192	Preserve	Preserve	Preserve
T80	Larix laricina	Tamarack	16	1.8	Fair	Tagged 193 - no dominant leader	Preserve	Preserve	Preserve
T81	Picea glauca	White Spruce	25	1.8	Good	Tagged 194	Preserve	Preserve	Preserve
T82	Picea glauca	White Spruce	22	1.8	Good-Fair	Tagged 195	Preserve	Preserve	Preserve
T83	Picea glauca	White Spruce	21	1.8	Good-Fair	Tagged 196	Preserve	Preserve	Preserve
T84	Picea glauca	White Spruce	24	1.8	Good-Fair	Tagged 197	Preserve	Preserve	Preserve
T85	Picea abies	Norway Spruce	26	1.8	Good-Fair	Tagged 198	Preserve	Preserve	Preserve
T86	Picea glauca	White Spruce	19	1.8	Good	Tagged 199	Preserve	Preserve	Preserve
T87	Picea glauca	White Spruce	17	1.8	Good	Tagged 201	Preserve	Preserve	Preserve
T88	Picea pungens 'Glauca'	Colorado Blue Spruce	19	1.8	Good	Tagged 202	Preserve	Preserve	Preserve
T89	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 203	Preserve	Preserve	Preserve
T90	Quercus muehlenbergii	Chinquapin Oak	10	1.8	Good	Tagged 204	Preserve	Preserve	Preserve
T91	Salix bebbiana	Bebb Willow	10	1.8	Fair	Tagged 205	Preserve	Preserve	Preserve
T92	Celtis occidentalis	Northern Hackberry	10	1.8	Good	Tagged 206	Preserve	Preserve	Preserve
T93	Larix laricina	Tamarack	31	2.4	Good-Fair	Tagged 207	Preserve	Preserve	Preserve
T94	Picea pungens 'Glauca'	Colorado Blue Spruce	18	1.8	Good-Fair	Tagged 208	Preserve	Preserve	Preserve
T95	Thuja occidentalis	Eastern White Cedar	12	1.8	Good	Tagged 209	Preserve	Preserve	Preserve
T96	Pinus resinosa	Red Pine	21	1.8	Good-Fair	Tagged 210	Preserve	Preserve	Preserve
T97	Acer saccharum	Sugar Maple	94	6	Fair	Tagged 211 - large significant rot through centre of trunk	Preserve	Preserve	Preserve
T98	Acer saccharum	Sugar Maple	14	1.8	Good-Fair	Tagged 212	Preserve	Preserve	Preserve
T99	Acer saccharum	Sugar Maple	13	1.8	Good	Tagged 213	Preserve	Preserve	Preserve
T100	Acer saccharum	Sugar Maple	97	6	Fair-Poor	Tagged 214 - significant rot at base of trunk approx 2m up, signs of infestation (fine saw-dust like substance around base of trunk)	Preserve	Preserve	Preserve
T101	Gleditsia triacanthos	Honey Locust	31	2.4	Good	Tagged 215	Preserve	Preserve	Preserve
T102	Prunus serotina	Black Cherry	30	2.4	Good-Fair	Tagged 216 - multi stemmed	Preserve	Preserve	Preserve
T103	Acer saccharum	Sugar Maple	19	1.8	Good	Tagged 217	Preserve	Preserve	Preserve
T104	Pinus sylvestris	Scots Pine	11	1.8	Fair-Poor	Tagged 218 - significant light suppression, dieback throughout	Preserve	Preserve	Preserve
T105	Acer saccharum	Sugar Maple	19	1.8	Poor	Tagged 219	Remove	Remove	Remove
T106	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 220	Preserve	Preserve	Preserve
T107	Pinus sylvestris	Scots Pine	18	1.8	Poor	Tagged 221 - significant die back, little to no crown coverage	Remove	Remove	Remove
T108	Acer saccharum	Sugar Maple	22	1.8	Good	Tagged 222	Preserve	Preserve	Preserve
T109	Prunus serotina	Black Cherry	21	1.8	Good-Fair	Tagged 223 - uneven crown distribution	Preserve	Preserve	Preserve
T110	Acer saccharum	Sugar Maple	89	5.4	Fair	Tagged 224 - rot apparent throughout crown, hollowed out centre with honey locust sapling sprouting	Preserve	Preserve	Preserve
T111	Acer saccharum	Sugar Maple	102	6.62	Good-Fair	Tagged 225	Preserve	Preserve	Preserve
T112	Juglans regia	English Walnut	18	1.8	Good-Fair	Tagged 226 - dual stemmed approx 50cm from root flare with poor branch attachment	Preserve	Preserve	Preserve
T113	Thuja occidentalis	Eastern White Cedar	39	2.4	Good-Fair	Tagged 227	Preserve	Preserve	Preserve
T114	Taxus canadensis	Canada Yew	20	1.8	Fair	Tagged 228 - significant multi stems,	Preserve	Preserve	Preserve
T115	Pinus resinosa	Red Pine	40	2.4	Fair	Tagged 229 - dieback starting from top of crown down, no leader	Preserve	Preserve	Preserve
T116	Salix bebbiana	Bebb Willow	35	2.4	Fair	Tagged 230 - multi stemmed	Preserve	Preserve	Preserve
T117	Quercus robur	English Oak	36	2.4	Good-Fair	Tagged 231	Preserve	Preserve	Preserve
T118	Cercis canadensis	Redbud	17	1.8	Fair	Tagged 232 - light suppression, poor branch attachment, multi stemmed	Preserve	Remove	Remove
T119	Acer platanoides	Norway Maple	83	5.4	Good-Fair	Tagged 233 - poor branch attachment, included bark	Preserve	Remove	Remove
T120	Pinus sylvestris	Scots Pine	36	2.4	Good-Fair	Tagged 234	Preserve	Remove	Remove
T121	Celtis occidentalis	Northern Hackberry	22	1.8	Good-Fair	Tagged 235	Preserve	Preserve	Preserve
T122	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Fair	Tagged 236	Preserve	Preserve	Preserve
T123	Acer rubrum	Red Maple	94	6	Fair	Tagged 237 - Poor branch attachments, subtle signs of rot	Preserve	Remove	Remove
T124	Quercus macrocarpa	Bur Oak	9	1.2	Good	Tagged 238	Preserve	Remove	Remove
T125	Quercus robur	English Oak	42	3	Good	Tagged 239	Preserve	Preserve	Preserve

Notes
1. This drawing is the exclusive property of R. J. Burnside & Associates Limited. The reproduction of any part without prior written consent of this office is strictly prohibited.
2. The contractor shall verify all dimensions, levels, and datums on site and report any discrepancies or omissions to this office prior to construction.
3. This drawing is to be read and understood in conjunction with all other plans and documents applicable to this project.

NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.
01	ISSUED FOR CLIENT REVIEW	23/02/03	FG

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Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE
TREE INVENTORY DATA

Drawn	Checked	Designed	Checked	Date	Drawing No.
MV	KB	MV	KB	22/09/14	TPP-03
Project No. 300055234.0000		Contract No.		Revision No. 0	
Scale NOT TO SCALE					

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Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T126	Picea pungens 'Glauca'	Colorado Blue Spruce	28	1.8	Good-Fair	Tagged 240	Preserve	Preserve	Preserve
T127	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Good-Fair	Tagged 241	Preserve	Preserve	Preserve
T128	Picea pungens 'Glauca'	Colorado Blue Spruce	39	2.4	Good-Fair	Tagged 242	Preserve	Preserve	Preserve
T129	Picea pungens 'Glauca'	Colorado Blue Spruce	21	1.8	Fair	Tagged 243 - light suppressed	Preserve	Preserve	Preserve
T130	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Fair	Tagged 244	Preserve	Preserve	Preserve
T131	Picea pungens 'Glauca'	Colorado Blue Spruce	15	1.8	Good-Fair	Tagged 245	Preserve	Preserve	Preserve
T132	Picea pungens 'Glauca'	Colorado Blue Spruce	25	1.8	Good-Fair	Tagged 246	Preserve	Preserve	Preserve
T133	Betula pendula	European White Birch	50	3	Good-Fair	Tagged 247 - nails in trunk approx 1.75m from base of trunk	Preserve	Preserve	Preserve
T134	Corylus cornuta	Beaked Hazel	19	1.8	Good-Fair	Tagged 248	Preserve	Preserve	Preserve
T135	Catalpa speciosa	Northern Catalpa	28	1.8	Good-Fair	Tagged 249	Preserve	Preserve	Preserve
T136	Quercus rubra	Red Oak	46	3	Good-Fair	Tagged 250	Preserve	Remove	Remove
T137	Pinus sylvestris	Scots Pine	33	2.4	Fair	Tagged 251 - no leader	Preserve	Remove	Remove
T138	Pinus sylvestris	Scots Pine	37	2.4	Fair	Tagged 252 - forked approx 2m from trunk flare	Preserve	Remove	Remove
T139	Picea abies	Norway Spruce	32	2.4	Good-Fair	Tagged 253	Preserve	Preserve	Preserve
T140	Hamamelis virginiana	Witch Hazel	18	1.8	Fair	Tagged 254 - multi stemmed, poor branch attachment	Preserve	Preserve	Preserve
T141	Pyrus calleryana	Ornamental Pear	18	1.8	Good-Fair	Tagged 255 - multi stemmed, under hydro wires	Preserve	Preserve	Preserve
T142	Morus alba	White Mulberry	13	1.8	Fair	Tagged 256 - mature sucker growth from consistently pruned trunk, multi stemmed	Preserve	Preserve	Preserve
T143	Acer platanoides	Norway Maple	33	2.4	Fair	Tagged 257 - significant wound spanning approx 3 m up trunk, poor codominant leader	Preserve	Preserve	Preserve
T144	Acer saccharum	Sugar Maple	61	4.2	Good-Fair	Tagged 258	Preserve	Preserve	Preserve
T145	Celtis occidentalis	Northern Hackberry	10	1.8	Fair-Poor	Tagged 259 - significant light suppression, unbalanced crown	Preserve	Preserve	Preserve
T146	Amelanchier laevis	Smooth Serviceberry	14	1.8	Good-Fair	Tagged 260 - multi stemmed	Preserve	Preserve	Preserve
T147	Quercus macrocarpa	Bur Oak	15	1.8	Good-Fair	Tagged 261	Preserve	Preserve	Preserve
T148	Morus alba	White Mulberry	21	1.8	Fair	Tagged 262 - multi stemmed, poor branch attachment	Preserve	Preserve	Preserve
T149	Acer platanoides	Norway Maple	16	1.8	Good-Fair	Tagged 263	Preserve	Remove	Remove
T150	Acer saccharum	Sugar Maple	40	2.4	Fair	Tagged 264 - large wound with visible rot on trunk	Preserve	Remove	Remove
T151	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 265	Preserve	Remove	Remove
T152	Acer saccharum	Sugar Maple	20	1.8	Fair	Tagged 266	Preserve	Remove	Remove
T153	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 267	Preserve	Remove	Remove
T154	Acer saccharum	Sugar Maple	21	1.8	Fair-Poor	Tagged 268 - dual stemmed	Preserve	Remove	Remove
T155	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 269	Preserve	Remove	Remove
T156	Acer saccharum	Sugar Maple	13	1.8	Fair	Tagged 270	Preserve	Remove	Remove
T157	Picea abies	Norway Spruce	32	2.4	Fair	Tagged 271	Preserve	Preserve	Preserve
T158	Picea abies	Norway Spruce	29	1.8	Fair	Tagged 272	Preserve	Preserve	Preserve
T159	Picea abies	Norway Spruce	27	1.8	Fair	Tagged 273	Preserve	Preserve	Preserve
T160	Picea abies	Norway Spruce	28	1.8	Fair	Tagged 274	Preserve	Preserve	Preserve
T161	Picea abies	Norway Spruce	29	1.8	Fair	Tagged 275	Preserve	Preserve	Preserve
T162	Picea abies	Norway Spruce	17	1.8	Fair	Tagged 276 - light suppression, significant crown dieback	Preserve	Preserve	Preserve
T163	Picea abies	Norway Spruce	17	1.8	Poor	Tagged 277 - no leader	Remove	Remove	Remove
T164	Picea abies	Norway Spruce	18	1.8	Fair	Tagged 278 - light suppression	Preserve	Preserve	Preserve
T165	Picea abies	Norway Spruce	21	1.8	Fair	Tagged 279 - significant crown dieback	Preserve	Preserve	Preserve
T166	Picea abies	Norway Spruce	29	1.8	Fair-Poor	Tagged 280	Preserve	Preserve	Preserve
T167	Celtis occidentalis	Northern Hackberry	30	2.4	Good-Fair	Tagged 281	Preserve	Remove	Remove
T168	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 282	Preserve	Remove	Remove
T169	Acer saccharum	Sugar Maple	19	1.8	Good	Tagged 283	Preserve	Remove	Remove
T170	Acer saccharum	Sugar Maple	11	1.8	Good	Tagged 284	Preserve	Remove	Remove
T171	Acer saccharum	Sugar Maple	12	1.8	Good	Tagged 285	Preserve	Remove	Remove
T172	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 286	Preserve	Remove	Remove
T173	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 287	Preserve	Remove	Remove
T174	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 288 - forked trunk at flare, included bark	Preserve	Remove	Remove
T175	Fraxinus excelsior	European Ash	23	1.8	Good-Fair	Tagged 289 - limited signs of EAB infestation throughout trunk	Preserve	Remove	Remove
T176	Pinus strobus	Eastern White Pine	32	2.4	Good-Fair	Tagged 289	Preserve	Preserve	Preserve
T177	Pinus strobus	Eastern White Pine	30	2.4	Fair	Tagged 290	Preserve	Preserve	Preserve
T178	Pinus strobus	Eastern White Pine	34	2.4	Good-Fair	Tagged 292	Preserve	Preserve	Preserve
T179	Pinus strobus	Eastern White Pine	36	2.4	Fair	Tagged 291 - forked at trunk flare	Preserve	Preserve	Preserve
T180	Pinus strobus	Eastern White Pine	39	2.4	Good	Tagged 293	Preserve	Preserve	Preserve
T181	Pinus sylvestris	Scots Pine	21	1.8	Fair	Tagged 294	Preserve	Preserve	Preserve
T182	Pinus strobus	Eastern White Pine	22	1.8	Fair	Tagged 295	Preserve	Preserve	Preserve
T183	Pinus strobus	Eastern White Pine	25	1.8	Fair	Tagged 296	Preserve	Preserve	Preserve
T184	Pinus sylvestris	Scots Pine	23	1.8	Fair	Tagged 297 - no leader sparse crown	Preserve	Preserve	Preserve
T185	Pinus resinosa	Red Pine	28	1.8	Good-Fair	Tagged 298	Preserve	Remove	Remove
T186	Gleditsia triacanthos	Honey Locust	45	3	Good-Fair	Tagged 299	Preserve	Remove	Remove
T187	Sorbus aucuparia	European Mountain Ash	41	3	Fair	Tagged 300	Preserve	Remove	Remove
T188	Acer saccharum	Sugar Maple	81	5.4	Fair-Poor	Tagged 301 - large wound from what appears to be a split fork in the trunk,	Preserve	Remove	Remove
T189	Acer saccharum	Sugar Maple	74	4.8	Fair	Tagged 302 - large scale fungal growth, rot within hollowed out knots	Preserve	Remove	Remove
T190	Prunus serotina	Black Cherry	12	1.8	Fair	Tagged 303 - forked trunk, significant light suppression	Preserve	Preserve	Preserve
T191	Prunus serotina	Black Cherry	23	1.8	Good-Fair	Tagged 304 - included bark and poor branch attachment	Preserve	Preserve	Preserve
T192	Prunus serotina	Black Cherry	18	1.8	Good-Fair	Tagged 305	Preserve	Preserve	Preserve
T193	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 306	Preserve	Preserve	Preserve
T194	Prunus serotina	Black Cherry	29	1.8	Fair	Tagged 307	Preserve	Preserve	Preserve
T195	Acer saccharum	Sugar Maple	78	4.8	Fair	Tagged 308 - large wound spanning trunk vertically, signs of rot at branch height	Preserve	Remove	Remove
T196	Acer saccharum	Sugar Maple	76	4.8	Fair	Tagged 309 - forked trunk at branch height, included bark visible, hollowed out knots showing signs of rot	Preserve	Remove	Remove
T197	Acer saccharum	Sugar Maple	77	4.8	Fair-Poor	Tagged 310 - fungal growth, signs of rot, large wounds present,	Preserve	Preserve	Preserve
T198	Acer saccharum	Sugar Maple	62	4.2	Good-Fair	Tagged 311	Preserve	Preserve	Preserve
T199	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 312	Preserve	Preserve	Preserve
T200	Acer saccharum	Sugar Maple	94	6	Fair	Tagged 313 - signs of rot, poor branch attachments	Preserve	Remove	Remove

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T201	Acer saccharum	Sugar Maple	10	1.8	Good	Tagged 314	Preserve	Preserve	Preserve
T202	Prunus serotina	Black Cherry	14	1.8	Fair	Tagged 315	Preserve	Preserve	Preserve
T203	Prunus serotina	Black Cherry	20	1.8	Good-Fair	Tagged 316	Preserve	Preserve	Preserve
T204	Prunus serotina	Black Cherry	29	1.8	Fair-Poor	Tagged 317	Preserve	Preserve	Preserve
T205	Prunus serotina	Black Cherry	38	2.4	Fair	Tagged 318	Preserve	Preserve	Preserve
T206	Prunus serotina	Black Cherry	17	1.8	Good-Fair	Tagged 319	Preserve	Preserve	Preserve
T207	Prunus serotina	Black Cherry	34	2.4	Fair	Tagged 320 - dual stemmed, included bark and poor branch attachment	Preserve	Preserve	Preserve
T208	Prunus serotina	Black Cherry	10	1.8	Fair	Tagged 321	Preserve	Preserve	Preserve
T209	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 322 - dieback throughout crown	Preserve	Preserve	Preserve
T210	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 323 - signs of rot	Preserve	Preserve	Preserve
T211	Prunus serotina	Black Cherry	19	1.8	Poor	Tagged 324	Remove	Remove	Remove
T212	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 325	Preserve	Preserve	Preserve
T213	Prunus serotina	Black Cherry	32	2.4	Poor	Tagged 326	Remove	Remove	Remove
T214	Prunus serotina	Black Cherry	11	1.8	Fair-Poor	Tagged 327 - dieback throughout crown	Preserve	Remove	Remove
T215	Prunus serotina	Black Cherry	25	1.8	Fair	Tagged 328	Preserve	Remove	Remove
T216	Prunus serotina	Black Cherry	32	2.4	Good-Fair	Tagged 329 - wounds at base of trunk flare	Preserve	Remove	Remove
T217	Prunus serotina	Black Cherry	35	2.4	Poor	Tagged 330 - bare crown	Remove	Remove	Remove
T218	Sorbus aucuparia	European Mountain Ash	34	2.4	Good-Fair	Tagged 331 - dual stemmed, wounds apparent at trunk flare	Preserve	Remove	Remove
T219	Sorbus aucuparia	European Mountain Ash	10	1.8	Good-Fair	Tagged 332	Preserve	Remove	Remove
T220	Prunus serotina	Black Cherry	39	2.4	Fair	Tagged 333	Preserve	Remove	Remove
T221	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 334	Preserve	Remove	Remove
T222	Acer saccharum	Sugar Maple	30	2.4	Good-Fair	Tagged 335	Preserve	Remove	Remove
T223	Prunus serotina	Black Cherry	25	1.8	Poor	Tagged 336	Remove	Remove	Remove
T224	Sorbus aucuparia	European Mountain Ash	23	1.8	Good-Fair	Tagged 337	Preserve	Remove	Remove
T225	Acer saccharum	Sugar Maple	52	3.6	Good-Fair	Tagged 338	Preserve	Remove	Remove
T226	Acer saccharum	Sugar Maple	17	1.8	Good-Fair	Tagged 339	Preserve	Remove	Remove
T227	Acer saccharum	Sugar Maple	44	3	Good-Fair	Tagged 340	Preserve	Remove	Remove
T228	Acer saccharum	Sugar Maple	33	2.4	Good-Fair	Tagged 341	Preserve	Remove	Remove
T229	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 342	Preserve	Preserve	Preserve
T230	Sorbus aucuparia	European Mountain Ash	19	1.8	Good-Fair	Tagged 343	Preserve	Preserve	Preserve
T231	Sorbus aucuparia	European Mountain Ash	29	1.8	Fair	Tagged 344	Preserve	Remove	Remove
T232	Prunus serotina	Black Cherry	36	2.4	Good-Fair	Tagged 345	Preserve	Remove	Remove
T233	Prunus serotina	Black Cherry	14	1.8	Fair-Poor	Tagged 346 - trunk looks to have fallen horizontally and is now bowed	Preserve	Remove	Remove
T234	Picea abies	Norway Spruce	35	2.4	Good-Fair	Tagged 347	Preserve	Remove	Remove
T235	Populus deltoides ssp. deltoides	Eastern Cottonwood	91	6	Good-Fair	Tagged 348	Preserve	Remove	Remove
T236	Picea glauca	White Spruce	52	3.6	Good-Fair	Tagged 349	Preserve	Remove	Remove
T237	Syringa vulgaris	Common Lilac	16	1.8	Fair	Tagged 350	Preserve	Remove	Remove
T238	Acer saccharum	Sugar Maple	75	4.8	Fair	Tagged 351 - used as footings for tree fort, signs of nails and screws in trunk	Preserve	Preserve	Preserve
T239	Aesculus glabra	Ohio Buckeye	24	1.8	Good-Fair	Tagged 352	Preserve	Preserve	Preserve
T240	Acer saccharum	Sugar Maple	16	1.8	Fair	Tagged 353 - tri-stemmed at trunk flare, poor branch attachment	Preserve	Preserve	Preserve
T241	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 354	Preserve	Preserve	Preserve
T242	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 355	Preserve	Preserve	Preserve
T243	Acer saccharum	Sugar Maple	82	5.4	Fair	Tagged 356 - signs of rot throughout trunk, deadwood in crown	Preserve	Preserve	Preserve
T244	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 357 - fork in trunk approx .5m from flare, wounds around flare	Preserve	Preserve	Preserve
T245	Acer saccharum	Sugar Maple	15	1.8	Fair	Tagged 358 - poor branch attachments	Preserve	Preserve	Preserve
T246	Sorbus aucuparia	European Mountain Ash	15	1.8	Fair	Tagged 359 - multi stemmed	Preserve	Preserve	Preserve
T247	Acer saccharum	Sugar Maple	29	1.8	Good-Fair	Tagged 360	Preserve	Preserve	Preserve
T248	Acer saccharum	Sugar Maple	31	2.4	Fair	Tagged 361	Preserve	Preserve	Preserve
T249	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 362	Preserve	Preserve	Preserve
T250	Acer saccharum	Sugar Maple	21	1.8	Fair	Tagged 363	Preserve	Preserve	Preserve
T251	Acer saccharum	Sugar Maple	79	4.8	Fair	Tagged 364	Preserve	Preserve	Preserve
T252	Acer saccharum	Sugar Maple	22	1.8	Fair	Tagged 365 - codominant stems twisting around each other	Preserve	Preserve	Preserve
T253	Acer saccharum	Sugar Maple	32	2.4	Fair	Tagged 366	Preserve	Preserve	Preserve
T254	Sorbus aucuparia	European Mountain Ash	10	1.8	Good	Tagged 367	Preserve	Preserve	Preserve
T255	Acer saccharum	Sugar Maple	10	1.8	Good	Tagged 368	Preserve	Preserve	Preserve
T256	Prunus serotina	Black Cherry	28	1.8	Fair	Tagged 369	Preserve	Preserve	Preserve
T257	Acer saccharum	Sugar Maple	68	4.2	Fair	Tagged 370 - large wound spanning trunk with black ooze	Preserve	Preserve	Preserve
T258	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 371	Preserve	Preserve	Preserve
T259	Acer platanoides	Norway Maple	25	1.8	Good-Fair	Tagged 372	Preserve	Preserve	Preserve
T260	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 373	Preserve	Preserve	Preserve
T261	Acer saccharum	Sugar Maple	24	1.8	Good-Fair	Tagged 374	Preserve	Preserve	Preserve
T262	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 375	Preserve	Preserve	Preserve
T263	Acer saccharum	Sugar Maple	24	1.8	Fair	Tagged 376 - dieback starting from leader at top of crown	Preserve	Preserve	Preserve
T264	Acer saccharum	Sugar Maple	50	3	Good-Fair	Tagged 377	Preserve	Preserve	Preserve
T265	Acer saccharum	Sugar Maple	21	1.8	Fair	Tagged 378 - uneven crown distribution	Preserve	Preserve	Preserve
T266	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 379	Preserve	Preserve	Preserve
T267	Acer platanoides	Norway Maple	23	1.8	Good-Fair	Tagged 380	Preserve	Preserve	Preserve
T268	Acer platanoides	Norway Maple	41	3	Good-Fair	Tagged 381	Preserve	Preserve	Preserve
T269	Pinus resinosa	Red Pine	20	1.8	Good-Fair	Tagged 382	Preserve	Preserve	Preserve
T270	Acer saccharum	Sugar Maple	19	1.8	Fair	Tagged 383	Preserve	Preserve	Preserve
T271	Acer saccharum	Sugar Maple	12	1.8	Fair-Poor	Tagged 384 - dieback in crown, dead leader	Preserve	Preserve	Preserve
T272	Acer saccharum	Sugar Maple	32	2.4	Fair	Tagged 385	Preserve	Preserve	Preserve
T273	Acer platanoides	Norway Maple	19	1.8	Good-Fair	Tagged 386	Preserve	Preserve	Preserve
T274	Acer saccharum	Sugar Maple	22	1.8	Good-Fair	Tagged 387	Preserve	Preserve	Preserve
T275	Ulmus americana	White Elm	14	1.8	Good-Fair	Tagged 388	Preserve	Preserve	Preserve
T276	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 389	Preserve	Preserve	Preserve
T277	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 390	Preserve	Preserve	Preserve
T278	Acer saccharum	Sugar Maple	13	1.8	Good-Fair	Tagged 391	Preserve	Preserve	Preserve
T279	Acer saccharum	Sugar Maple	21	1.8	Good-Fair	Tagged 392	Preserve	Preserve	Preserve
T280	Acer saccharum	Sugar Maple	10	1.8	Fair	Tagged 393 - dieback throughout crown	Preserve	Preserve	Preserve
T281	Acer saccharum	Sugar Maple	13	1.8	Fair-Poor	Tagged 394	Preserve	Preserve	Preserve
T282	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 395	Preserve	Preserve	Preserve
T283	Acer platanoides	Norway Maple	10	1.8	Fair	Tagged 396	Preserve	Preserve	Preserve
T284	Acer platanoides	Norway Maple	10	1.8	Fair-Poor	Tagged 397	Preserve	Preserve	Preserve
T285	Acer saccharum	Sugar Maple	12	1.8	Fair	Tagged 398	Preserve	Preserve	Preserve

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NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.
01	ISSUED FOR CLIENT REVIEW	23/02/03	FG

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N0B 1S0

Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE
TREE INVENTORY DATA

Drawn	Checked	Designed	Checked	Date	Drawing No.
MV	KB	MV	KB	22/09/14	TPP-04
Project No. 3000052234.0000		Contract No.		Revision No. 0	
Scale NOT TO SCALE					

File: \\burnside\Shared Data\Projects\2234 Centre Wellington Operations Centre\TPP\Drawings\2234 TREE PROTECTION Plan.dwg Date Plotted: February 13, 2023 - 9:56 AM

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T286	Acer saccharum	Sugar Maple	26	1.8	Good-Fair	Tagged 399	Preserve	Preserve	Preserve
T287	Acer platanoides	Norway Maple	12	1.8	Good-Fair	Tagged 400	Preserve	Preserve	Preserve
T288	Acer saccharum	Sugar Maple	15	1.8	Good-Fair	Tagged 401	Preserve	Preserve	Preserve
T289	Acer saccharum	Sugar Maple	29	1.8	Good-Fair	Tagged 402	Preserve	Preserve	Preserve
T290	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 403	Preserve	Preserve	Preserve
T291	Acer platanoides	Norway Maple	20	1.8	Fair	Tagged 404 - uneven crown distribution	Preserve	Preserve	Preserve
T292	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 405	Preserve	Preserve	Preserve
T293	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 406 - dual stemmed	Preserve	Preserve	Preserve
T294	Acer platanoides	Norway Maple	11	1.8	Fair	Tagged 407	Preserve	Preserve	Preserve
T295	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 408	Preserve	Preserve	Preserve
T296	Acer platanoides	Norway Maple	13	1.8	Good-Fair	Tagged 409	Preserve	Preserve	Preserve
T297	Acer platanoides	Norway Maple	11	1.8	Fair	Tagged 410	Preserve	Preserve	Preserve
T298	Acer saccharum	Sugar Maple	39	2.4	Good-Fair	Tagged 411	Preserve	Preserve	Preserve
T299	Acer platanoides	Norway Maple	14	1.8	Fair	Tagged 412 - poor branch attachments and growth into other branches	Preserve	Preserve	Preserve
T300	Acer platanoides	Norway Maple	12	1.8	Good-Fair	Tagged 413	Preserve	Preserve	Preserve
T301	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 414	Preserve	Preserve	Preserve
T302	Acer platanoides	Norway Maple	25	1.8	Dead		Remove	Remove	Remove
T303	Acer platanoides	Norway Maple	31	2.4	Good-Fair	Tagged 415	Preserve	Preserve	Preserve
T304	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 416	Preserve	Preserve	Preserve
T305	Acer platanoides	Norway Maple	30	2.4	Good-Fair	Tagged 417	Preserve	Preserve	Preserve
T306	Acer platanoides	Norway Maple	33	2.4	Good-Fair	Tagged 418	Preserve	Preserve	Preserve
T307	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 419	Preserve	Preserve	Preserve
T308	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 420	Preserve	Preserve	Preserve
T309	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 421	Preserve	Preserve	Preserve
T310	Acer saccharum	Sugar Maple	24	1.8	Good-Fair	Tagged 422	Preserve	Preserve	Preserve
T311	Acer saccharum	Sugar Maple	23	1.8	Fair	Tagged 423	Preserve	Preserve	Preserve
T312	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 424	Preserve	Preserve	Preserve
T313	Acer platanoides	Norway Maple	14	1.8	Good-Fair	Tagged 425	Preserve	Preserve	Preserve
T314	Acer platanoides	Norway Maple	27	1.8	Dead		Remove	Remove	Remove
T315	Acer saccharum	Sugar Maple	45	3	Fair	Tagged 426	Preserve	Preserve	Preserve
T316	Pinus resinosa	Red Pine	14	1.8	Good-Fair	Tagged 427	Preserve	Remove	Remove
T317	Pinus resinosa	Red Pine	16	1.8	Good-Fair	Tagged 428	Preserve	Preserve	Preserve
T318	Sorbus aucuparia	European Mountain Ash	36	2.4	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T319	Sorbus aucuparia	European Mountain Ash	38	2.4	Fair	Tagged 429	Preserve	Preserve	Preserve
T320	Acer platanoides	Norway Maple	43	3	Good-Fair	Tagged 430	Preserve	Preserve	Preserve
T321	Acer platanoides	Norway Maple	31	2.4	Good-Fair	Tagged 431	Preserve	Preserve	Preserve
T322	Malus coronaria	Wild Crabapple	28	1.8	Fair	Not tagged	Preserve	Preserve	Preserve
T323	Prunus serotina	Black Cherry	52	3.6	Fair	Tagged 432	Preserve	Preserve	Preserve
T324	Prunus serotina	Black Cherry	43	3	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T325	Malus coronaria	Wild Crabapple	28	1.8	Fair	Not tagged	Preserve	Preserve	Preserve
T326	Sorbus aucuparia	European Mountain Ash	27	1.8	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T327	*Sorbus spp.*	Sorbus Species	17	3.6	Poor	Severe trunk decay, twisted stems	Remove	Preserve	Remove
T328	*Thuja occidentalis*	Eastern White Cedar	6	2.4	Good	Crooked trunk moderate	Preserve	Preserve	Preserve
T329	*Thuja occidentalis*	Eastern White Cedar	14	3	Good		Preserve	Preserve	Preserve
T330	*Thuja occidentalis*	Eastern White Cedar	57	7.2	Good		Preserve	Preserve	Preserve
T331	*Thuja occidentalis*	Eastern White Cedar	32	4.8	Good		Preserve	Preserve	Preserve

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NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.
01	ISSUED FOR ZBA	22/10/21	FG

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N0B 1S0

Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE

TREE INVENTORY DATA

Drawn	Checked	Designed	Checked	Date	Drawing No.
KB	MV	MV	KB	22/09/14	TPP-05
Project No.		Contract No.		Revision No.	
300055234.0000				0	
Scale					
NOT TO SCALE					

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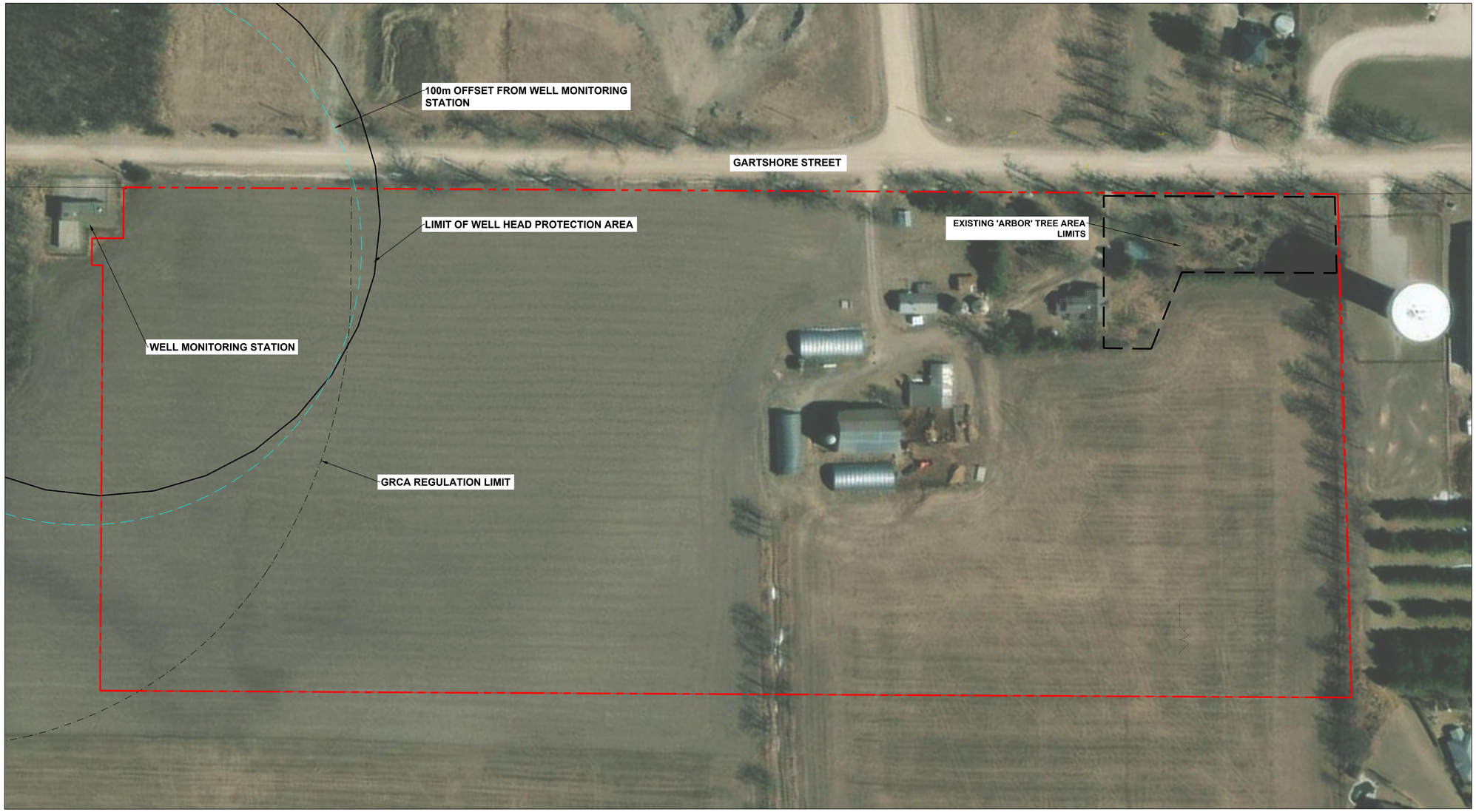
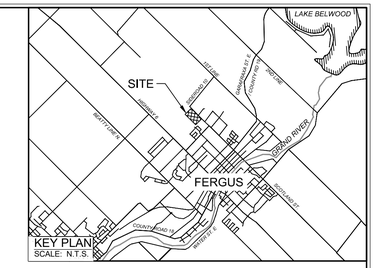
FIGURE:





LEGEND

PROPERTY LINE

GRCA REGULATION LIMIT

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NOT FOR CONSTRUCTION

No.	Issue / Revision	Date	Auth.

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Drawing Title
CENTRE WELLINGTON OPERATIONS CENTRE

EXISTING "ARBOR" AREA FIGURE

Drawn	Checked	Designed	Checked	Date	Drawing No.
MV	KB	MV	KB	22/09/14	T-1
Project No. 300055234.0000		Contract No.		Revision No. 0	
Scale 1:750					

0 10 20 40m

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[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Tree Assessment Data

Project Number: 300055234
Tree Assessment Data
Centre Wellington Operations Centre

Data Collected by R.J. Burnside and Associates
on July 19, 2022

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T1	Liquidambar styraciflua	Sweetgum	89	5.4	Fair	Tagged 115 - open wound 2m from base of trunk spanning approximately 1m vertically, deadwood throughout crown	Preserve	Preserve	Preserve
T2	Prunus serotina	Black Cherry	18	1.8	Fair	Tagged 116 - dead leader, one dominant branch with deadwood throughout	Preserve	Preserve	Preserve
T3	Acer saccharum	Sugar Maple	8	1.2	Good	Tagged 117	Preserve	Preserve	Preserve
T4	Acer saccharum	Sugar Maple	26	1.8	Good	Tagged 118 - fork in trunk approx .5m from base of trunk	Preserve	Preserve	Preserve
T5	Prunus serotina	Black Cherry	12	1.8	Fair-Poor	Tagged 119 - light suppression	Preserve	Preserve	Preserve
T6	Prunus serotina	Black Cherry	21	1.8	Good-Fair	Tagged 120	Preserve	Preserve	Preserve
T7	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 121	Preserve	Preserve	Preserve
T8	Acer saccharum	Sugar Maple	8	1.2	Fair	Tagged 122	Preserve	Preserve	Preserve
T9	Pinus sylvestris	Scots Pine	9	1.2	Poor	Tagged 123	Remove	Remove	Remove
T10	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 124	Preserve	Preserve	Preserve
T11	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 125	Preserve	Preserve	Preserve
T12	Acer saccharum	Sugar Maple	80	4.8	Fair	Tagged 126 - poor branch attachments apparent throughout crown, hanging deadwood	Preserve	Remove	Remove
T13	Gleditsia triacanthos	Honey Locust	16	1.8	Fair	Tagged 127	Preserve	Remove	Remove
T14	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 128	Preserve	Remove	Remove
T15	Acer saccharum	Sugar Maple	23	1.8	Good	Tagged 130	Preserve	Remove	Remove
T16	Gleditsia triacanthos	Honey Locust	18	1.8	Fair-Poor	Tagged 130 - light suppression approx 1m from base of crown up	Preserve	Remove	Remove
T17	Acer saccharum	Sugar Maple	22	1.8	Good-Fair	Tagged 131 - bark damaged entirely at the base of root flare	Preserve	Preserve	Preserve
T18	Acer saccharum	Sugar Maple	71	4.8	Good-Fair	Tagged 132	Preserve	Preserve	Preserve
T19	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 133 - evidence of chain link fence in bark, fork in trunk approx 1 m from flare	Preserve	Preserve	Preserve
T20	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 134	Preserve	Preserve	Preserve
T21	Prunus serotina	Black Cherry	57	3.6	Good-Fair	Tagged 135	Preserve	Preserve	Preserve
T22	Acer saccharum	Sugar Maple	68	4.2	Good-Fair	Tagged 136	Preserve	Preserve	Preserve
T23	Acer saccharum	Sugar Maple	12	1.8	Fair	Tagged 137	Preserve	Preserve	Preserve
T24	Acer saccharum	Sugar Maple	60	3.6	Fair-Poor	Tagged 138 - 3 stemmed, 2 of three stems dead	Preserve	Preserve	Preserve
T25	Acer saccharum	Sugar Maple	30	2.4	Good-Fair	Tagged 139	Preserve	Preserve	Preserve
T26	Aesculus hippocastanum	Horsechestnut	26	1.8	Good-Fair	Tagged 140 - large split up from trunk flare 2 m up	Preserve	Preserve	Preserve
T27	Fraxinus excelsior	European Ash	14	1.8	Fair-Poor	Tagged 141 - signs of EAB throughout trunks base	Preserve	Preserve	Remove*
T28	Betula pendula	European White Birch	18	1.8	Good	Tagged 142	Preserve	Preserve	Preserve
T29	Gleditsia triacanthos	Honey Locust	18	1.8	Good	Tagged 143	Preserve	Preserve	Preserve
T30	Gleditsia triacanthos	Honey Locust	22	1.8	Fair	Tagged 144	Preserve	Preserve	Preserve
T31	Gleditsia triacanthos	Honey Locust	14	1.8	Good-Fair	Tagged 145	Preserve	Preserve	Preserve

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Project Number: 300055234
Tree Assessment Data
Centre Wellington Operations Centre

Data Collected by R.J. Burnside and Associates
on July 19, 2022

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T32	Gleditsia triacanthos	Honey Locust	25	1.8	Fair	Tagged 146	Preserve	Preserve	Preserve
T33	Aesculus hippocastanum	Horsechestnut	12	1.8	Fair	Tagged 147 - fork in trunk near base of trunk flare, poor branch attachment	Preserve	Preserve	Preserve
T34	Pinus sylvestris	Scots Pine	13	1.8	Poor	Tagged 148	Remove	Remove	Remove
T35	Thuja occidentalis	Eastern White Cedar	11	1.8	Fair	Tagged 149	Preserve	Preserve	Preserve
T36	Acer saccharum	Sugar Maple	37	2.4	Good-Fair	Tagged 150	Preserve	Preserve	Preserve
T37	Gleditsia triacanthos	Honey Locust	12	1.8	Good-Fair	Tagged 151	Preserve	Preserve	Preserve
T38	Acer saccharum	Sugar Maple	27	1.8	Fair	Tagged 152	Preserve	Preserve	Preserve
T39	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 153	Preserve	Preserve	Preserve
T40	Acer saccharum	Sugar Maple	42	3	Good-Fair	Tagged 154	Preserve	Preserve	Preserve
T41	Pseudotsuga menziesii var. menziesii	Douglas Fir	19	1.8	Good-Fair	Tagged 155	Preserve	Preserve	Preserve
T42	Celtis occidentalis	Northern Hackberry	10	1.8	Good-Fair	Tagged 156	Preserve	Remove	Remove
T43	Catalpa speciosa	Northern Catalpa	18	1.8	Fair	Tagged 157 - multi stemmed x3 at root flare	Preserve	Remove	Remove
T44	Quercus rubra	Red Oak	11	1.8	Good	Tagged 158	Preserve	Preserve	Preserve
T45	Platanus occidentalis	Sycamore	17	1.8	Fair	Tagged 159	Preserve	Remove	Remove
T46	Platanus occidentalis	Sycamore	15	1.8	Fair	Tagged 160 - multi stemmed x3	Preserve	Remove	Remove
T47	Cladrastis lutea	Yellow Wood	12	1.8	Good-Fair	Tagged 161	Preserve	Preserve	Preserve
T48	Juglans nigra	Black Walnut	12	1.8	Good	Tagged 162	Preserve	Remove	Remove
T49	Tilia cordata	Little Leaf Linden	15	1.8	Good	Tagged 163	Preserve	Remove	Remove
T50	Liquidambar styraciflua	Sweetgum	15	1.8	Good-Fair	Tagged 164 - multi stemmed	Preserve	Remove	Remove
T51	Salix alba	White Willow	26	1.8	Good-Fair	Tagged 165	Preserve	Remove	Remove
T52	Cercis canadensis	Redbud	11	1.8	Fair	Tagged 166	Preserve	Remove	Remove
T53	Gymnocladus dioicus	Kentucky Coffeetree	34	2.4	Good	Tagged 167	Preserve	Remove	Remove
T54	Acer rubrum	Red Maple	10	1.8	Good	Tagged 168	Preserve	Remove	Remove
T55	Betula pendula	European White Birch	22	1.8	Good	Tagged 169	Preserve	Preserve	Preserve
T56	Quercus rubra	Red Oak	12	1.8	Good	Tagged 170	Preserve	Preserve	Preserve
T57	Magnolia acuminata	Cucumber Tree	23	1.8	Good	Tagged 171	Preserve	Preserve	Preserve
T58	Liriodendron tulipifera	Tulip Tree	14	1.8	Good	Tagged 172	Preserve	Preserve	Preserve
T59	Picea pungens 'Glauca'	Colorado Blue Spruce	11	1.8	Good	Tagged 173	Preserve	Preserve	Preserve
T60	Quercus rubra	Red Oak	16	1.8	Good	Tagged 174	Preserve	Preserve	Preserve
T61	Fagus sylvatica	European Beech	14	1.8	Fair	Tagged 175	Preserve	Preserve	Preserve
T62	Picea rubens	Red Spruce	20	1.8	Good	Not tagged	Preserve	Preserve	Preserve
T63	Betula pendula	European White Birch	17	1.8	Good-Fair	Tagged 176	Preserve	Preserve	Preserve
T64	Picea rubens	Red Spruce	18	1.8	Fair	Tagged 177	Preserve	Remove	Remove
T65	Ostrya virginiana	Ironwood	10	1.8	Good-Fair	Tagged 178 - multi stemmed x8 (all small stems)	Preserve	Preserve	Preserve
T66	Liriodendron tulipifera	Tulip Tree	19	1.8	Good	Tagged 179	Preserve	Preserve	Preserve
T67	Gleditsia triacanthos	Honey Locust	39	2.4	Fair	Tagged 180 - significant deadwood throughout crown	Preserve	Preserve	Preserve
T68	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 181	Preserve	Preserve	Preserve

BURNSIDE

Project Number: 300055234
Tree Assessment Data
Centre Wellington Operations Centre

Data Collected by R.J. Burnside and Associates
on July 19, 2022

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T69	Salix alba	White Willow	14	1.8	Fair-Poor	Tagged 182 - significant die back, appears new growth has suckered from existing stump and created new multi stems	Preserve	Preserve	Preserve
T70	Fagus sylvatica	European Beech	24	1.8	Good-Fair	Tagged 183	Preserve	Preserve	Preserve
T71	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 184	Preserve	Preserve	Preserve
T72	Betula pendula	European White Birch	19	1.8	Good	Tagged 185	Preserve	Preserve	Preserve
T73	Betula pendula	European White Birch	19	1.8	Good	Tagged 186	Preserve	Preserve	Preserve
T74	Larix laricina	Tamarack	39	2.4	Good-Fair	Tagged 187	Preserve	Preserve	Preserve
T75	Magnolia grandiflora	Magnolia	15	1.8	Good-Fair	Tagged 188	Preserve	Preserve	Preserve
T76	Larix laricina	Tamarack	41	3	Good	Tagged 189	Preserve	Preserve	Preserve
T77	Thuja occidentalis	Eastern White Cedar	28	1.8	Good	Tagged 190	Preserve	Preserve	Preserve
T78	Ginkgo biloba	Ginkgo	20	1.8	Good	Tagged 191	Preserve	Preserve	Preserve
T79	Larix laricina	Tamarack	22	1.8	Good-Fair	Tagged 192	Preserve	Preserve	Preserve
T80	Larix laricina	Tamarack	16	1.8	Fair	Tagged 193 - no dominant leader	Preserve	Preserve	Preserve
T81	Picea glauca	White Spruce	25	1.8	Good	Tagged 194	Preserve	Preserve	Preserve
T82	Picea glauca	White Spruce	22	1.8	Good-Fair	Tagged 195	Preserve	Preserve	Preserve
T83	Picea glauca	White Spruce	21	1.8	Good-Fair	Tagged 196	Preserve	Preserve	Preserve
T84	Picea glauca	White Spruce	24	1.8	Good-Fair	Tagged 197	Preserve	Preserve	Preserve
T85	Picea abies	Norway Spruce	26	1.8	Good-Fair	Tagged 198	Preserve	Preserve	Preserve
T86	Picea glauca	White Spruce	19	1.8	Good	Tagged 199	Preserve	Preserve	Preserve
T87	Picea glauca	White Spruce	17	1.8	Good	Tagged 201	Preserve	Preserve	Preserve
T88	Picea pungens 'Glauca'	Colorado Blue Spruce	19	1.8	Good	Tagged 202	Preserve	Preserve	Preserve
T89	Cercidiphyllum japonicum	Katsura Tree	18	1.8	Good	Tagged 203	Preserve	Preserve	Preserve
T90	Quercus muehlenbergii	Chinquapin Oak	10	1.8	Good	Tagged 204	Preserve	Preserve	Preserve
T91	Salix bebbiana	Bebb Willow	10	1.8	Fair	Tagged 205	Preserve	Preserve	Preserve
T92	Celtis occidentalis	Northern Hackberry	10	1.8	Good	Tagged 206	Preserve	Preserve	Preserve
T93	Larix laricina	Tamarack	31	2.4	Good-Fair	Tagged 207	Preserve	Preserve	Preserve
T94	Picea pungens 'Glauca'	Colorado Blue Spruce	18	1.8	Good-Fair	Tagged 208	Preserve	Preserve	Preserve
T95	Thuja occidentalis	Eastern White Cedar	12	1.8	Good	Tagged 209	Preserve	Preserve	Preserve
T96	Pinus resinosa	Red Pine	21	1.8	Good-Fair	Tagged 210	Preserve	Preserve	Preserve
T97	Acer saccharum	Sugar Maple	94	6	Fair	Tagged 211 - large significant rot through centre of trunk	Preserve	Preserve	Preserve
T98	Acer saccharum	Sugar Maple	14	1.8	Good-Fair	Tagged 212	Preserve	Preserve	Preserve
T99	Acer saccharum	Sugar Maple	13	1.8	Good	Tagged 213	Preserve	Preserve	Preserve
T100	Acer saccharum	Sugar Maple	97	6	Fair-Poor	Tagged 214 - significant rot at base of trunk approx 2m up, signs of infestation (fine saw-dust like substance around base of trunk)	Preserve	Preserve	Preserve
T101	Gleditsia triacanthos	Honey Locust	31	2.4	Good	Tagged 215	Preserve	Preserve	Preserve
T102	Prunus serotina	Black Cherry	30	2.4	Good-Fair	Tagged 216 - multi stemmed	Preserve	Preserve	Preserve
T103	Acer saccharum	Sugar Maple	19	1.8	Good	Tagged 217	Preserve	Preserve	Preserve
T104	Pinus sylvestris	Scots Pine	11	1.8	Fair-Poor	Tagged 218 - significant light suppression, dieback throughout	Preserve	Preserve	Preserve

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Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T105	Acer saccharum	Sugar Maple	19	1.8	Poor	Tagged 219	Remove	Remove	Remove
T106	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 220	Preserve	Preserve	Preserve
T107	Pinus sylvestris	Scots Pine	18	1.8	Poor	Tagged 221 - significant die back, little to no crown coverage	Remove	Remove	Remove
T108	Acer saccharum	Sugar Maple	22	1.8	Good	Tagged 222	Preserve	Preserve	Preserve
T109	Prunus serotina	Black Cherry	21	1.8	Good-Fair	Tagged 223 - uneven crown distribution	Preserve	Preserve	Preserve
T110	Acer saccharum	Sugar Maple	89	5.4	Fair	Tagged 224 - rot apparent throughout crown, hollowed out centre with honey locust sapling sprouting	Preserve	Preserve	Preserve
T111	Acer saccharum	Sugar Maple	102	6.62	Good-Fair	Tagged 225	Preserve	Preserve	Preserve
T112	Juglans regia	English Walnut	18	1.8	Good-Fair	Tagged 226 - dual stemmed approx 50cm from root flare with poor branch attachment	Preserve	Preserve	Preserve
T113	Thuja occidentalis	Eastern White Cedar	39	2.4	Good-Fair	Tagged 227	Preserve	Preserve	Preserve
T114	Taxus canadensis	Canada Yew	20	1.8	Fair	Tagged 228 - significant multi stems,	Preserve	Preserve	Preserve
T115	Pinus resinosa	Red Pine	40	2.4	Fair	Tagged 229 - dieback starting from top of crown down, no leader	Preserve	Preserve	Preserve
T116	Salix bebbiana	Bebb Willow	35	2.4	Fair	Tagged 230 - multi stemmed	Preserve	Preserve	Preserve
T117	Quercus robur	English Oak	36	2.4	Good-Fair	Tagged 231	Preserve	Preserve	Preserve
T118	Cercis canadensis	Redbud	17	1.8	Fair	Tagged 232 - light suppression, poor branch attachment, multi stemmed	Preserve	Remove	Remove
T119	Acer platanoides	Norway Maple	83	5.4	Good-Fair	Tagged 233 - poor branch attachment, included bark	Preserve	Remove	Remove
T120	Pinus sylvestris	Scots Pine	36	2.4	Good-Fair	Tagged 234	Preserve	Remove	Remove
T121	Celtis occidentalis	Northern Hackberry	22	1.8	Good-Fair	Tagged 235	Preserve	Preserve	Preserve
T122	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Fair	Tagged 236	Preserve	Preserve	Preserve
T123	Acer rubrum	Red Maple	94	6	Fair	Tagged 237 - Poor branch attachments, subtle signs of rot	Preserve	Remove	Remove
T124	Quercus macrocarpa	Bur Oak	9	1.2	Good	Tagged 238	Preserve	Remove	Remove
T125	Quercus robur	English Oak	42	3	Good	Tagged 239	Preserve	Preserve	Preserve
T126	Picea pungens 'Glauca'	Colorado Blue Spruce	28	1.8	Good-Fair	Tagged 240	Preserve	Preserve	Preserve
T127	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Good-Fair	Tagged 241	Preserve	Preserve	Preserve
T128	Picea pungens 'Glauca'	Colorado Blue Spruce	39	2.4	Good-Fair	Tagged 242	Preserve	Preserve	Preserve
T129	Picea pungens 'Glauca'	Colorado Blue Spruce	21	1.8	Fair	Tagged 243 - light suppressed	Preserve	Preserve	Preserve
T130	Picea pungens 'Glauca'	Colorado Blue Spruce	31	2.4	Fair	Tagged 244	Preserve	Preserve	Preserve
T131	Picea pungens 'Glauca'	Colorado Blue Spruce	15	1.8	Good-Fair	Tagged 245	Preserve	Preserve	Preserve
T132	Picea pungens 'Glauca'	Colorado Blue Spruce	25	1.8	Good-Fair	Tagged 246	Preserve	Preserve	Preserve
T133	Betula pendula	European White Birch	50	3	Good-Fair	Tagged 247 - nails in trunk approx 1.75m from base of trunk	Preserve	Preserve	Preserve
T134	Corylus cornuta	Beaked Hazel	19	1.8	Good-Fair	Tagged 248	Preserve	Preserve	Preserve
T135	Catalpa speciosa	Northern Catalpa	28	1.8	Good-Fair	Tagged 249	Preserve	Preserve	Preserve
T136	Quercus rubra	Red Oak	46	3	Good-Fair	Tagged 250	Preserve	Remove	Remove
T137	Pinus sylvestris	Scots Pine	33	2.4	Fair	Tagged 251 - no leader	Preserve	Remove	Remove

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Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T138	Pinus sylvestris	Scots Pine	37	2.4	Fair	Tagged 252 - forked approx 2m from trunk flare	Preserve	Remove	Remove
T139	Picea abies	Norway Spruce	32	2.4	Good-Fair	Tagged 253	Preserve	Preserve	Preserve
T140	Hamamelis virginiana	Witch Hazel	18	1.8	Fair	Tagged 254 - multi stemmed, poor branch attachment	Preserve	Preserve	Preserve
T141	Pyrus calleryana	Ornamental Pear	18	1.8	Good-Fair	Tagged 255 - multi stemmed, under hydro wires	Preserve	Preserve	Preserve
T142	Morus alba	White Mulberry	13	1.8	Fair	Tagged 256 - mature sucker growth from consistently pruned trunk, multi stemmed	Preserve	Preserve	Preserve
T143	Acer platanoides	Norway Maple	33	2.4	Fair	Tagged 257 - significant wound spanning approx 3 m up trunk, poor codominant leader	Preserve	Preserve	Preserve
T144	Acer saccharum	Sugar Maple	61	4.2	Good-Fair	Tagged 258	Preserve	Preserve	Preserve
T145	Celtis occidentalis	Northern Hackberry	10	1.8	Fair-Poor	Tagged 259 - significant light suppression, unbalanced crown	Preserve	Preserve	Preserve
T146	Amelanchier laevis	Smooth Serviceberry	14	1.8	Good-Fair	Tagged 260 - multi stemmed	Preserve	Preserve	Preserve
T147	Quercus macrocarpa	Bur Oak	15	1.8	Good-Fair	Tagged 261	Preserve	Preserve	Preserve
T148	Morus alba	White Mulberry	21	1.8	Fair	Tagged 262 - multi stemmed, poor branch attachment	Preserve	Preserve	Preserve
T149	Acer platanoides	Norway Maple	16	1.8	Good-Fair	Tagged 263	Preserve	Remove	Remove
T150	Acer saccharum	Sugar Maple	40	2.4	Fair	Tagged 264 - large wound with visible rot on trunk	Preserve	Remove	Remove
T151	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 265	Preserve	Remove	Remove
T152	Acer saccharum	Sugar Maple	20	1.8	Fair	Tagged 266	Preserve	Remove	Remove
T153	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 267	Preserve	Remove	Remove
T154	Acer saccharum	Sugar Maple	21	1.8	Fair-Poor	Tagged 268 - dual stemmed	Preserve	Remove	Remove
T155	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 269	Preserve	Remove	Remove
T156	Acer saccharum	Sugar Maple	13	1.8	Fair	Tagged 270	Preserve	Remove	Remove
T157	Picea abies	Norway Spruce	32	2.4	Fair	Tagged 271	Preserve	Preserve	Preserve
T158	Picea abies	Norway Spruce	29	1.8	Fair	Tagged 272	Preserve	Preserve	Preserve
T159	Picea abies	Norway Spruce	27	1.8	Fair	Tagged 273	Preserve	Preserve	Preserve
T160	Picea abies	Norway Spruce	28	1.8	Fair	Tagged 274	Preserve	Preserve	Preserve
T161	Picea abies	Norway Spruce	29	1.8	Fair	Tagged 275	Preserve	Preserve	Preserve
T162	Picea abies	Norway Spruce	17	1.8	Fair	Tagged 276 - light suppression, significant crown dieback	Preserve	Preserve	Preserve
T163	Picea abies	Norway Spruce	17	1.8	Poor	Tagged 277 - no leader	Remove	Remove	Remove
T164	Picea abies	Norway Spruce	18	1.8	Fair	Tagged 278 - light suppression	Preserve	Preserve	Preserve
T165	Picea abies	Norway Spruce	21	1.8	Fair	Tagged 279 - significant crown dieback	Preserve	Preserve	Preserve
T166	Picea abies	Norway Spruce	29	1.8	Fair-Poor	Tagged 280	Preserve	Preserve	Preserve
T167	Celtis occidentalis	Northern Hackberry	30	2.4	Good-Fair	Tagged 281	Preserve	Remove	Remove
T168	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 282	Preserve	Remove	Remove
T169	Acer saccharum	Sugar Maple	19	1.8	Good	Tagged 283	Preserve	Remove	Remove
T170	Acer saccharum	Sugar Maple	11	1.8	Good	Tagged 284	Preserve	Remove	Remove

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T171	Acer saccharum	Sugar Maple	12	1.8	Good	Tagged 285	Preserve	Remove	Remove
T172	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 286	Preserve	Remove	Remove
T173	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 287	Preserve	Remove	Remove
T174	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 288 - forked trunk at flare, included bark	Preserve	Remove	Remove
T175	Fraxinus excelsior	European Ash	23	1.8	Good-Fair	Tagged 289 - limited signs of EAB infestation throughout trunk	Preserve	Remove	Remove
T176	Pinus strobus	Eastern White Pine	32	2.4	Good-Fair	Tagged 289	Preserve	Preserve	Preserve
T177	Pinus strobus	Eastern White Pine	30	2.4	Fair	Tagged 290	Preserve	Preserve	Preserve
T178	Pinus strobus	Eastern White Pine	34	2.4	Good-Fair	Tagged 292	Preserve	Preserve	Preserve
T179	Pinus strobus	Eastern White Pine	36	2.4	Fair	Tagged 291 - forked at trunk flare	Preserve	Preserve	Preserve
T180	Pinus strobus	Eastern White Pine	39	2.4	Good	Tagged 293	Preserve	Preserve	Preserve
T181	Pinus sylvestris	Scots Pine	21	1.8	Fair	Tagged 294	Preserve	Preserve	Preserve
T182	Pinus strobus	Eastern White Pine	22	1.8	Fair	Tagged 295	Preserve	Preserve	Preserve
T183	Pinus strobus	Eastern White Pine	25	1.8	Fair	Tagged 296	Preserve	Preserve	Preserve
T184	Pinus sylvestris	Scots Pine	23	1.8	Fair	Tagged 297 - no leader sparse crown	Preserve	Preserve	Preserve
T185	Pinus resinosa	Red Pine	28	1.8	Good-Fair	Tagged 298	Preserve	Remove	Remove
T186	Gleditsia triacanthos	Honey Locust	45	3	Good-Fair	Tagged 299	Preserve	Remove	Remove
T187	Sorbus aucuparia	European Mountain Ash	41	3	Fair	Tagged 300	Preserve	Remove	Remove
T188	Acer saccharum	Sugar Maple	81	5.4	Fair-Poor	Tagged 301 - large wound from what appears to be a split fork in the trunk,	Preserve	Remove	Remove
T189	Acer saccharum	Sugar Maple	74	4.8	Fair	Tagged 302 - large scale fungal growth, rot within hollowed out knots	Preserve	Remove	Remove
T190	Prunus serotina	Black Cherry	12	1.8	Fair	Tagged 303 - forked trunk, significant light suppression	Preserve	Preserve	Preserve
T191	Prunus serotina	Black Cherry	23	1.8	Good-Fair	Tagged 304 - included bark and poor branch attachment	Preserve	Preserve	Preserve
T192	Prunus serotina	Black Cherry	18	1.8	Good-Fair	Tagged 305	Preserve	Preserve	Preserve
T193	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 306	Preserve	Preserve	Preserve
T194	Prunus serotina	Black Cherry	29	1.8	Fair	Tagged 307	Preserve	Preserve	Preserve
T195	Acer saccharum	Sugar Maple	78	4.8	Fair	Tagged 308 - large wound spanning trunk vertically, signs of rot at branch height	Preserve	Remove	Remove
T196	Acer saccharum	Sugar Maple	76	4.8	Fair	Tagged 309 - forked trunk at branch height, included bark visible, hollowed out knots showing signs of rot	Preserve	Remove	Remove
T197	Acer saccharum	Sugar Maple	77	4.8	Fair-Poor	Tagged 310 - fungal growth, signs of rot, large wounds present,	Preserve	Preserve	Preserve
T198	Acer saccharum	Sugar Maple	62	4.2	Good-Fair	Tagged 311	Preserve	Preserve	Preserve
T199	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 312	Preserve	Preserve	Preserve
T200	Acer saccharum	Sugar Maple	94	6	Fair	Tagged 313 - signs of rot, poor branch attachments	Preserve	Remove	Remove
T201	Acer saccharum	Sugar Maple	10	1.8	Good	Tagged 314	Preserve	Preserve	Preserve
T202	Prunus serotina	Black Cherry	14	1.8	Fair	Tagged 315	Preserve	Preserve	Preserve
T203	Prunus serotina	Black Cherry	20	1.8	Good-Fair	Tagged 316	Preserve	Preserve	Preserve

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T204	Prunus serotina	Black Cherry	29	1.8	Fair-Poor	Tagged 317	Preserve	Preserve	Preserve
T205	Prunus serotina	Black Cherry	38	2.4	Fair	Tagged 318	Preserve	Preserve	Preserve
T206	Prunus serotina	Black Cherry	17	1.8	Good-Fair	Tagged 319	Preserve	Preserve	Preserve
T207	Prunus serotina	Black Cherry	34	2.4	Fair	Tagged 320 - dual stemmed, included bark and poor branch attachment	Preserve	Preserve	Preserve
T208	Prunus serotina	Black Cherry	10	1.8	Fair	Tagged 321	Preserve	Preserve	Preserve
T209	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 322 - dieback throughout crown	Preserve	Preserve	Preserve
T210	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 323 - signs of rot	Preserve	Preserve	Preserve
T211	Prunus serotina	Black Cherry	19	1.8	Poor	Tagged 324	Remove	Remove	Remove
T212	Prunus serotina	Black Cherry	30	2.4	Fair	Tagged 325	Preserve	Preserve	Preserve
T213	Prunus serotina	Black Cherry	32	2.4	Poor	Tagged 326	Remove	Remove	Remove
T214	Prunus serotina	Black Cherry	11	1.8	Fair-Poor	Tagged 327 - dieback throughout crown	Preserve	Remove	Remove
T215	Prunus serotina	Black Cherry	25	1.8	Fair	Tagged 328	Preserve	Remove	Remove
T216	Prunus serotina	Black Cherry	32	2.4	Good-Fair	Tagged 329 - wounds at base of trunk flare	Preserve	Remove	Remove
T217	Prunus serotina	Black Cherry	35	2.4	Poor	Tagged 330 - bare crown	Remove	Remove	Remove
T218	Sorbus aucuparia	European Mountain Ash	34	2.4	Good-Fair	Tagged 331 - dual stemmed, wounds apparent at trunk flare	Preserve	Remove	Remove
T219	Sorbus aucuparia	European Mountain Ash	10	1.8	Good-Fair	Tagged 332	Preserve	Remove	Remove
T220	Prunus serotina	Black Cherry	39	2.4	Fair	Tagged 333	Preserve	Remove	Remove
T221	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 334	Preserve	Remove	Remove
T222	Acer saccharum	Sugar Maple	30	2.4	Good-Fair	Tagged 335	Preserve	Remove	Remove
T223	Prunus serotina	Black Cherry	25	1.8	Poor	Tagged 336	Remove	Remove	Remove
T224	Sorbus aucuparia	European Mountain Ash	23	1.8	Good-Fair	Tagged 337	Preserve	Remove	Remove
T225	Acer saccharum	Sugar Maple	52	3.6	Good-Fair	Tagged 338	Preserve	Remove	Remove
T226	Acer saccharum	Sugar Maple	17	1.8	Good-Fair	Tagged 339	Preserve	Remove	Remove
T227	Acer saccharum	Sugar Maple	44	3	Good-Fair	Tagged 340	Preserve	Remove	Remove
T228	Acer saccharum	Sugar Maple	33	2.4	Good-Fair	Tagged 341	Preserve	Remove	Remove
T229	Prunus serotina	Black Cherry	23	1.8	Fair	Tagged 342	Preserve	Preserve	Preserve
T230	Sorbus aucuparia	European Mountain Ash	19	1.8	Good-Fair	Tagged 343	Preserve	Preserve	Preserve
T231	Sorbus aucuparia	European Mountain Ash	29	1.8	Fair	Tagged 344	Preserve	Remove	Remove
T232	Prunus serotina	Black Cherry	36	2.4	Good-Fair	Tagged 345	Preserve	Remove	Remove
T233	Prunus serotina	Black Cherry	14	1.8	Fair-Poor	Tagged 346 - trunk looks to have fallen horizontally and is now bowed	Preserve	Remove	Remove
T234	Picea abies	Norway Spruce	35	2.4	Good-Fair	Tagged 347	Preserve	Remove	Remove
T235	Populus deltoides ssp. deltoides	Eastern Cottonwood	91	6	Good-Fair	Tagged 348	Preserve	Remove	Remove
T236	Picea glauca	White Spruce	52	3.6	Good-Fair	Tagged 349	Preserve	Remove	Remove
T237	Syringa vulgaris	Common Lilac	16	1.8	Fair	Tagged 350	Preserve	Remove	Remove
T238	Acer saccharum	Sugar Maple	75	4.8	Fair	Tagged 351 - used as footings for tree fort, signs of nails and screws in trunk	Preserve	Preserve	Preserve
T239	Aesculus glabra	Ohio Buckeye	24	1.8	Good-Fair	Tagged 352	Preserve	Preserve	Preserve
T240	Acer saccharum	Sugar Maple	16	1.8	Fair	Tagged 353 - tri-stemmed at trunk flare, poor branch attachment	Preserve	Preserve	Preserve
T241	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 354	Preserve	Preserve	Preserve

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T242	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 355	Preserve	Preserve	Preserve
T243	Acer saccharum	Sugar Maple	82	5.4	Fair	Tagged 356 - signs of rot throughout trunk, deadwood in crown	Preserve	Preserve	Preserve
T244	Acer saccharum	Sugar Maple	16	1.8	Good-Fair	Tagged 357 - fork in trunk approx .5m from flare, wounds around flare	Preserve	Preserve	Preserve
T245	Acer saccharum	Sugar Maple	15	1.8	Fair	Tagged 358 - poor branch attachments	Preserve	Preserve	Preserve
T246	Sorbus aucuparia	European Mountain Ash	15	1.8	Fair	Tagged 359 - multi stemmed	Preserve	Preserve	Preserve
T247	Acer saccharum	Sugar Maple	29	1.8	Good-Fair	Tagged 360	Preserve	Preserve	Preserve
T248	Acer saccharum	Sugar Maple	31	2.4	Fair	Tagged 361	Preserve	Preserve	Preserve
T249	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 362	Preserve	Preserve	Preserve
T250	Acer saccharum	Sugar Maple	21	1.8	Fair	Tagged 363	Preserve	Preserve	Preserve
T251	Acer saccharum	Sugar Maple	79	4.8	Fair	Tagged 364	Preserve	Preserve	Preserve
T252	Acer saccharum	Sugar Maple	22	1.8	Fair	Tagged 365 - codominant stems twisting around each other	Preserve	Preserve	Preserve
T253	Acer saccharum	Sugar Maple	32	2.4	Fair	Tagged 366	Preserve	Preserve	Preserve
T254	Sorbus aucuparia	European Mountain Ash	10	1.8	Good	Tagged 367	Preserve	Preserve	Preserve
T255	Acer saccharum	Sugar Maple	10	1.8	Good	Tagged 368	Preserve	Preserve	Preserve
T256	Prunus serotina	Black Cherry	28	1.8	Fair	Tagged 369	Preserve	Preserve	Preserve
T257	Acer saccharum	Sugar Maple	68	4.2	Fair	Tagged 370 - large wound spanning trunk with black ooze	Preserve	Preserve	Preserve
T258	Acer saccharum	Sugar Maple	20	1.8	Good-Fair	Tagged 371	Preserve	Preserve	Preserve
T259	Acer platanoides	Norway Maple	25	1.8	Good-Fair	Tagged 372	Preserve	Preserve	Preserve
T260	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 373	Preserve	Preserve	Preserve
T261	Acer saccharum	Sugar Maple	24	1.8	Good-Fair	Tagged 374	Preserve	Preserve	Preserve
T262	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 375	Preserve	Preserve	Preserve
T263	Acer saccharum	Sugar Maple	24	1.8	Fair	Tagged 376 - dieback starting from leader at top of crown	Preserve	Preserve	Preserve
T264	Acer saccharum	Sugar Maple	50	3	Good-Fair	Tagged 377	Preserve	Preserve	Preserve
T265	Acer saccharum	Sugar Maple	21	1.8	Fair	Tagged 378 - uneven crown distribution	Preserve	Preserve	Preserve
T266	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 379	Preserve	Preserve	Preserve
T267	Acer platanoides	Norway Maple	23	1.8	Good-Fair	Tagged 380	Preserve	Preserve	Preserve
T268	Acer platanoides	Norway Maple	41	3	Good-Fair	Tagged 381	Preserve	Preserve	Preserve
T269	Pinus resinosa	Red Pine	20	1.8	Good-Fair	Tagged 382	Preserve	Preserve	Preserve
T270	Acer saccharum	Sugar Maple	19	1.8	Fair	Tagged 383	Preserve	Preserve	Preserve
T271	Acer saccharum	Sugar Maple	12	1.8	Fair-Poor	Tagged 384 - dieback in crown, dead leader	Preserve	Preserve	Preserve
T272	Acer saccharum	Sugar Maple	32	2.4	Fair	Tagged 385	Preserve	Preserve	Preserve
T273	Acer platanoides	Norway Maple	19	1.8	Good-Fair	Tagged 386	Preserve	Preserve	Preserve
T274	Acer saccharum	Sugar Maple	22	1.8	Good-Fair	Tagged 387	Preserve	Preserve	Preserve
T275	Ulmus americana	White Elm	14	1.8	Good-Fair	Tagged 388	Preserve	Preserve	Preserve
T276	Acer saccharum	Sugar Maple	12	1.8	Good-Fair	Tagged 389	Preserve	Preserve	Preserve
T277	Acer saccharum	Sugar Maple	11	1.8	Good-Fair	Tagged 390	Preserve	Preserve	Preserve
T278	Acer saccharum	Sugar Maple	13	1.8	Good-Fair	Tagged 391	Preserve	Preserve	Preserve
T279	Acer saccharum	Sugar Maple	21	1.8	Good-Fair	Tagged 392	Preserve	Preserve	Preserve

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T280	Acer saccharum	Sugar Maple	10	1.8	Fair	Tagged 393 - dieback throughout crown	Preserve	Preserve	Preserve
T281	Acer saccharum	Sugar Maple	13	1.8	Fair-Poor	Tagged 394	Preserve	Preserve	Preserve
T282	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 395	Preserve	Preserve	Preserve
T283	Acer platanoides	Norway Maple	10	1.8	Fair	Tagged 396	Preserve	Preserve	Preserve
T284	Acer platanoides	Norway Maple	10	1.8	Fair-Poor	Tagged 397	Preserve	Preserve	Preserve
T285	Acer saccharum	Sugar Maple	12	1.8	Fair	Tagged 398	Preserve	Preserve	Preserve
T286	Acer saccharum	Sugar Maple	26	1.8	Good-Fair	Tagged 399	Preserve	Preserve	Preserve
T287	Acer platanoides	Norway Maple	12	1.8	Good-Fair	Tagged 400	Preserve	Preserve	Preserve
T288	Acer saccharum	Sugar Maple	15	1.8	Good-Fair	Tagged 401	Preserve	Preserve	Preserve
T289	Acer saccharum	Sugar Maple	29	1.8	Good-Fair	Tagged 402	Preserve	Preserve	Preserve
T290	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 403	Preserve	Preserve	Preserve
T291	Acer platanoides	Norway Maple	20	1.8	Fair	Tagged 404 - uneven crown distribution	Preserve	Preserve	Preserve
T292	Acer saccharum	Sugar Maple	18	1.8	Good-Fair	Tagged 405	Preserve	Preserve	Preserve
T293	Acer saccharum	Sugar Maple	19	1.8	Good-Fair	Tagged 406 - dual stemmed	Preserve	Preserve	Preserve
T294	Acer platanoides	Norway Maple	11	1.8	Fair	Tagged 407	Preserve	Preserve	Preserve
T295	Acer saccharum	Sugar Maple	10	1.8	Good-Fair	Tagged 408	Preserve	Preserve	Preserve
T296	Acer platanoides	Norway Maple	13	1.8	Good-Fair	Tagged 409	Preserve	Preserve	Preserve
T297	Acer platanoides	Norway Maple	11	1.8	Fair	Tagged 410	Preserve	Preserve	Preserve
T298	Acer saccharum	Sugar Maple	39	2.4	Good-Fair	Tagged 411	Preserve	Preserve	Preserve
T299	Acer platanoides	Norway Maple	14	1.8	Fair	Tagged 412 - poor branch attachments and growth into other branches	Preserve	Preserve	Preserve
T300	Acer platanoides	Norway Maple	12	1.8	Good-Fair	Tagged 413	Preserve	Preserve	Preserve
T301	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 414	Preserve	Preserve	Preserve
T302	Acer platanoides	Norway Maple	25	1.8	Dead		Remove	Remove	Remove
T303	Acer platanoides	Norway Maple	31	2.4	Good-Fair	Tagged 415	Preserve	Preserve	Preserve
T304	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 416	Preserve	Preserve	Preserve
T305	Acer platanoides	Norway Maple	30	2.4	Good-Fair	Tagged 417	Preserve	Preserve	Preserve
T306	Acer platanoides	Norway Maple	33	2.4	Good-Fair	Tagged 418	Preserve	Preserve	Preserve
T307	Acer saccharum	Sugar Maple	23	1.8	Good-Fair	Tagged 419	Preserve	Preserve	Preserve
T308	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 420	Preserve	Preserve	Preserve
T309	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 421	Preserve	Preserve	Preserve
T310	Acer saccharum	Sugar Maple	24	1.8	Good-Fair	Tagged 422	Preserve	Preserve	Preserve
T311	Acer saccharum	Sugar Maple	23	1.8	Fair	Tagged 423	Preserve	Preserve	Preserve
T312	Acer platanoides	Norway Maple	10	1.8	Good-Fair	Tagged 424	Preserve	Preserve	Preserve
T313	Acer platanoides	Norway Maple	14	1.8	Good-Fair	Tagged 425	Preserve	Preserve	Preserve
T314	Acer platanoides	Norway Maple	27	1.8	Dead		Remove	Remove	Remove
T315	Acer saccharum	Sugar Maple	45	3	Fair	Tagged 426	Preserve	Preserve	Preserve
T316	Pinus resinosa	Red Pine	14	1.8	Good-Fair	Tagged 427	Preserve	Remove	Remove
T317	Pinus resinosa	Red Pine	16	1.8	Good-Fair	Tagged 428	Preserve	Preserve	Preserve
T318	Sorbus aucuparia	European Mountain Ash	36	2.4	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T319	Sorbus aucuparia	European Mountain Ash	38	2.4	Fair	Tagged 429	Preserve	Preserve	Preserve
T320	Acer platanoides	Norway Maple	43	3	Good-Fair	Tagged 430	Preserve	Preserve	Preserve
T321	Acer platanoides	Norway Maple	31	2.4	Good-Fair	Tagged 431	Preserve	Preserve	Preserve
T322	Malus coronaria	Wild Crabapple	28	1.8	Fair	Not tagged	Preserve	Preserve	Preserve

Project Number: 300055234
Tree Assessment Data
Centre Wellington Operations Centre

Data Collected by R.J. Burnside and Associates
on July 19, 2022

Tree ID	Scientific Name	Species	DBH (cm)	MTPZ Radius (m)	Condition	Comments / Tree Tag Numbers	Recommendation (Condition)	Recommendation (Development)	Recommendation (Final)
T323	Prunus serotina	Black Cherry	52	3.6	Fair	Tagged 432	Preserve	Preserve	Preserve
T324	Prunus serotina	Black Cherry	43	3	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T325	Malus coronaria	Wild Crabapple	28	1.8	Fair	Not tagged	Preserve	Preserve	Preserve
T326	Sorbus aucuparia	European Mountain Ash	27	1.8	Good-Fair	Not tagged	Preserve	Preserve	Preserve
T327	*Sorbus spp.*	Sorbus Species	17	3.6	Poor	Severe trunk decay, twisted stems	Remove	Preserve	Remove
T328	*Thuja occidentalis*	Eastern White Cedar	6	2.4	Good	Crooked trunk moderate	Preserve	Preserve	Preserve
T329	*Thuja occidentalis*	Eastern White Cedar	14	3	Good		Preserve	Preserve	Preserve
T330	*Thuja occidentalis*	Eastern White Cedar	57	7.2	Good		Preserve	Preserve	Preserve
T331	*Thuja occidentalis*	Eastern White Cedar	32	4.8	Good		Preserve	Preserve	Preserve

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Appendix B

Tree Study Methodology

Tree Studies: Methodology

The list provided below represents all data that may be collected in the analysis of trees. Methodology descriptions should be reviewed with the column headings provided in the data. The columns represent the scope and extent of the tree assessment carried out.

Tree #: This number may be assigned by the tree assessor or predetermined by the surveyor or client. The number corresponds with the tree tag affixed to the tree, if tree tagging is part of the study's scope.

Species Name: Botanical name of the species.

Common Name: Commonly used English name.

DBH (cm): Diameter at Breast Height measured using DBH tape or tree caliper.

Crown Reserve (m): Average measurement of the diameter or width of the dripline (extent of branches from the trunk). Generally the trunk is trunk is the midpoint of this measurement. It is represented on the drawing(s) as a circle. This measurement may not be used in the subject jurisdiction.

TPZ (m): Tree protection zone required based on the required setback from the trunk, as designated by the agency (e.g. municipality). The TPZ is calculated by doubling the setback and including the trunk diameter to create a diameter of circle of protection around the tree.

HT (m): Estimated height from the base to the top of the tree.

Condition (G, F, P, D): A qualitative score of the combination of biological health and structural condition assigned as Good, Fair, Poor or Dead.

Preserve or Remove Reason: Reasons for recommended preservation or removal assigned in the tree study. Reasons for recommended removal may result from:

- Existing condition (critical deficiency such as severe crown dieback)
- Anticipated impacts of the proposed development (i.e., tree location is in conflict with construction element)
- Both existing condition and anticipated impacts

A checkmark is provided in the appropriate column.

Description of Reason: Rationale for the assignment of preservation or removal rationale based on analysis of collected data and proposed development.

Transplant Potential (G,F,P): Assignment of qualitative measure of reestablishment success of a tree when removed from its existing location and moved to another or removed and stored for replanting following construction. An assignment of Good, Fair or Poor is assigned based on a species' ability to reestablish, condition of the tree, new growing conditions, etc.

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Appendix C

Limitation of Tree Studies

Tree Studies: Limitations

This report, drawings and data (i.e., qualitative and quantitative measurements) are intended to inform the recipient and reviewer(s) of the report of the tree(s) condition at the time of the assessment. The assessment may be limited by the following constraints:

1. Access – tree is located offsite, or the onsite location is not reasonably accessed.

2. Weather – accumulated snow around the base or in branch attachments may obscure defects.

3. Season – biotic indications (e.g., foliage chlorosis or fungal fruiting bodies) are only obvious for a portion of the year.

4. Visual obstructions – Elements such as other trees' canopies can prevent the view of the entire tree.

The study is completed from the ground using a DBH tape or tree caliper. Non-invasive tools such as binoculars and a sounding hammer may be used to provide additional information about defects and characteristics. Excavation of the rootzone and other intensive analyses have not been completed unless stated.

It must be understood that trees may not manifest signs or symptoms (e.g., dieback) of some impacts (e.g., root compaction) immediately and so recent changes to the tree or its growing conditions prior to the assessment may not be apparent to the assessor. Also, changes to the tree condition resulting from damage, weather, infestations, defects, soil, decay, light, moisture, exposure, etc. may occur after the assessment.

No tree is without some level of risk, where a tree may fail and strike a target. Mitigation options, if provided, will not eliminate risk but are prescribed treatments to reduce risk based on the measured and assessed factors at the time of assessment, subject to site and assessment constraints.

Identification of the ownership of assessed trees (i.e., on-site or off-site) made in the report is based on the legal survey. The assessor of trees uses the point location of the tree provided on the survey and the limits of property to assign ownership in the report and associated materials.

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Centre Wellington Operations Centre Transportation Study
Township of Centre Wellington, ON

Township of Centre Wellington

Centre Wellington Operations Centre Transportation Study (Final Revised) Township of Centre Wellington, ON

Township of Centre Wellington

R.J. Burnside & Associates Limited
35 Perry Street
Woodstock ON N4S 3C4 CANADA

November 2022 (Revised May 2023)
300055234.0000

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1	March 2023	2nd Submission to Township of Centre Wellington
2	May 2023	3rd Submission to Township of Centre Wellington

R.J. Burnside & Associates Limited

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Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained to undertake a Transportation Study for a proposed new multi-department operations Centre at 965 Gartshore Street in the Township of Centre Wellington. The proposed facility will occupy approximately 20 acres and will occur in two phases. As Phase 2 of the facility will occur beyond the 20-year time period, it was not considered for this study and will be reviewed under a separate report. The focus of this report will be on Phase 1 and its impact to the surrounding road network. Phase 1 of the facility will include an exterior works yard, an outdoor operations area, garage buildings including heated and unheated storage bays, workshop space, maintenance bays and a greenhouse for a total of 3,560 m^2 (38,321 ft^2), 100 staff / visitor parking spaces, 34 work vehicle parking spaces, 6 vehicle staging parking spaces and is expected to be built-out by 2027. Three accesses are provided along Gartshore Street, including one full movement driveway, one inbound driveway and one outbound driveway.

This Transportation Study is a supporting study for moving forward with the site plan development for the Phase 1 of the new Operations Centre and to obtain the required re-zoning of the site.

The following is a summary of our key findings.

Traffic Operations

Overall, Phase 1 of the site will not require any improvements to external roads or intersections, through horizon period 2037. Under existing and future conditions, all intersections are and will operate with excess capacity, a level of service D or better and queues that are projected to be within their existing storage and link distances, with one exception as discussed below.

Under background traffic conditions, during the afternoon peak hour in 2032 and 2037 horizons, the southbound left turn queue at the intersection of Highway 6 / Gordon Street will extend by about 1 to 2 vehicles into the taper area for this lane. Under total traffic conditions, the impact on this queuing is forecasted to be minimal and therefore similar queuing operations are expected. To minimize the identified future queuing deficiency, it is recommended that the signal timing be optimized at this intersection. A sensitivity analysis was completed that confirms acceptable traffic operations with an optimized signal timing plan. It is recommended that the Township continue to monitor traffic operations at this intersection, to confirm the signal optimization requirements, as well as to confirm the interface of traffic operations at this location with traffic operations at the adjacent intersection at Highway 6 / Sideroad 19.

Geometric Considerations

Left Turn Warrant Analysis

Based on the *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads* (MTO, April 2020) criteria, under background 2032 conditions, the northbound left at Gordon Street / Gartshore Street intersection and the southbound left at Dickson Drive / Gartshore Street intersection will warrant an exclusive left turn lane with a 15 m storage. However, there will be no operation concerns at these locations. It is recommended that the Township monitor this intersection for future improvements.

Right Turn Warrant Analysis

The warrant for a right turn lane for unsignalized intersections follows the MTO guidelines (Geometric Design Standards for Ontario Highways), and for signalized intersections, the Highway Capacity Manual (HCM) guidelines were reviewed. Based on the two documentation's criteria, the northbound right turn volume at the Dickson Drive / Gartshore Street intersection will have a volume which meets the criteria under background 2032 conditions during the AM Peak Hour. This is due to the traffic generated by the future Dickson Drive industrial developments. The timing for implementing a future northbound right turn lane would be dependent on when the future Dickson Drive industrial developments are to be fully built-out. Phase 1 traffic will not contribute to this movement. However, the movement will not have any capacity and delay concerns. The Township should review this movement to implement a right turn lane or taper.

Site Plan Review

No additional lane requirements will be required due to new traffic from the site. Access and circulation analyses utilizing AutoTURN confirms that the site can accommodate all expected design vehicles. It is noted that future Phase 2 is a minor further expansion of Phase 1 proposed land uses utilizing the same accesses. Therefore, the site plan review of Phase 1 will also accommodate the additional traffic from Phase 2.

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Abbreviations

The following summarizes abbreviations that are utilized within this report:

- Burnside – R.J. Burnside & Associates Limited
- County - Wellington County
- Directions:
  - EB – Eastbound
  - SB – Southbound
  - NB – Northbound
  - WB – Westbound
- ITE – Institute of Transportation Engineers
- LOS – level of service
- LUC – Land Use Code
- MTO - Ministry of Transportation Ontario
- Township – Township of Centre Wellington
- Traffic Movements:
  - LT – shared left-through movement
  - LTR – shared left-through-right movement
  - LR – shared left-right movement
  - TR – shared through-right movement
- v/c – volume to capacity ratio

Disclaimer

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In the preparation of the various instruments of service contained herein, R.J. Burnside & Associates Limited was required to use and rely upon various sources of information (including but not limited to: reports, data, drawings, observations) produced by parties other than R.J. Burnside & Associates Limited. For its part R.J. Burnside & Associates Limited has proceeded based on the belief that the third party/parties in question produced this documentation using accepted industry standards and best practices and that all information was therefore accurate, correct, and free of errors at the time of consultation. As such, the comments, recommendations, and materials presented in this instrument of service reflect our best judgment in light of the information available at the time of preparation. R.J. Burnside & Associates Limited, its employees, affiliates and subcontractors accept no liability for inaccuracies or errors in the instruments of service provided to the client, arising from deficiencies in the aforementioned third-party materials and documents.

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1.0 Introduction

1.1 Background

The Township of Centre Wellington (the Client) currently has five operation facilities, including Fergus East, Elora, Pilkington, Fergus Waterworks and West Garafraxa works garages and offices. The current operations facilities within the Township are not sufficient to meet the needs of the growing population, cannot accommodate staff requirements and are not compliant with current guidelines and regulations (such as accessibility). As a result, the Township is proposing to develop a new multi-department operations centre at 965 Gartshore Street in the Township of Centre Wellington. The proposed facility will be developed on approximately 20 acres and will occur in two phases. The focus of this report will be on Phase 1 and its impact to the surrounding road network. As Phase 2 of the facility will occur beyond the 20-year time period, it was not considered for this study and will be review under a separate report.

Three accesses to the Operations Facility are proposed along Gartshore Street, comprised of one full movement driveway, one inbound-only driveway and one outbound-only driveway.

The location of the subject site is shown in Figure 1.

Figure 1: Site Location

This Transportation Study is a supporting study for moving forward with the site plan development for the Phase 1 of the new Operations Centre and to obtain the required re-zoning of the site.

2.0 Scope of Work

The scope of work for this study was confirmed with Wellington County (the County), the Township of Centre Wellington (the Township) and the Ministry of Transportation Ontario (MTO). The MTO has stated that the proposed facility is beyond their Permit Control Area and therefore, MTO's review, approval and permits are not required.

Analysis Scenarios	• Existing traffic conditions • 2032 background and total traffic conditions • 2037 background and total traffic conditions
Analysis Time Periods	• Weekday AM peak hour (7:00 AM to 9:00 AM) • Weekday PM peak hour (4:00 PM to 6:00 PM)
Analysis Intersections (Study Area)	• Gartshore Street / Garafraxa Street East (Wellington Road 19) • Gartshore Street / Gordon Street • Gordon Street / Highway 6 • Sideroad 15 / Highway 6 • Site Accesses / Gartshore Street

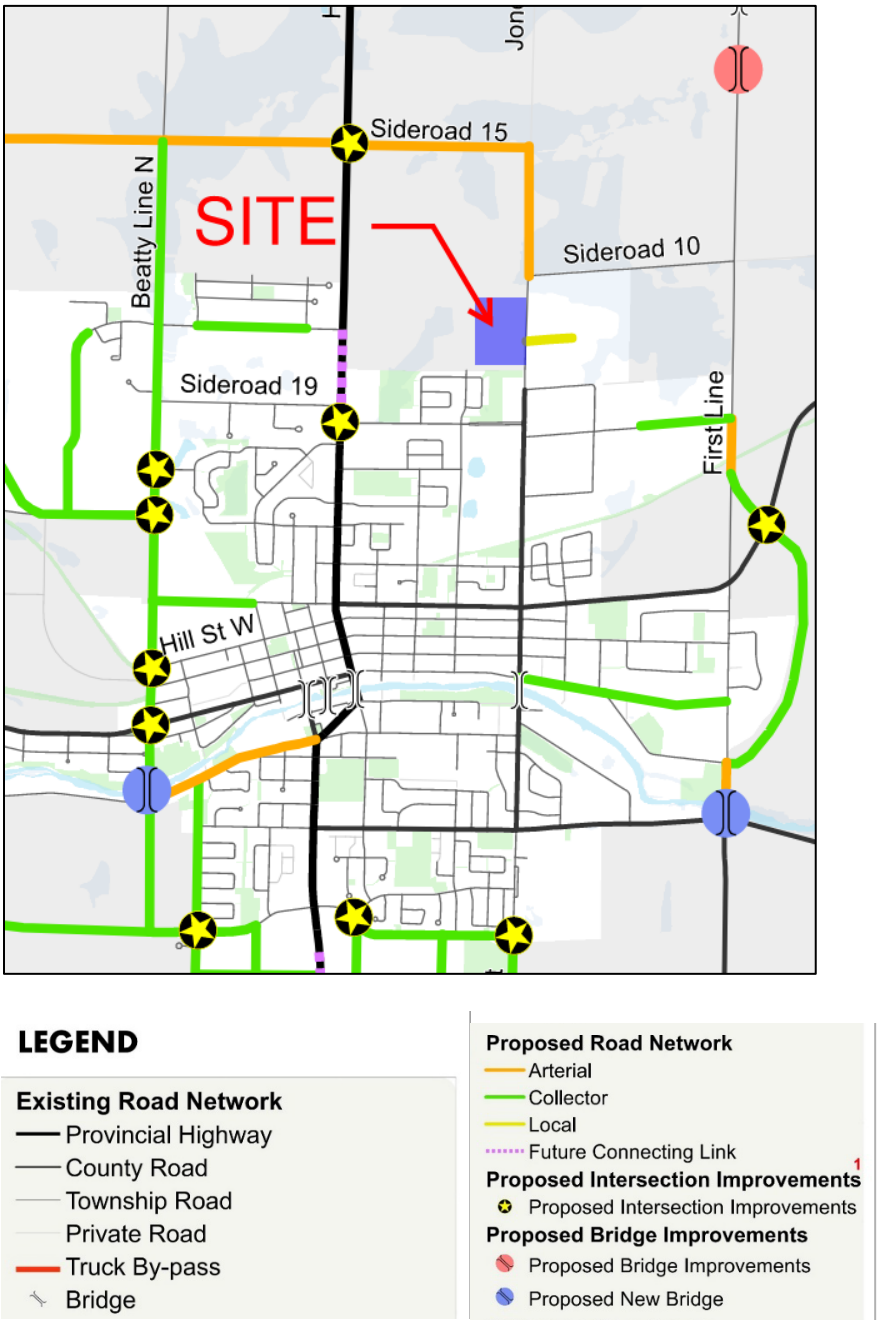
Also, the following documents were reviewed as relevant background information in this study:

- *Township of Centre Wellington Transportation Master Plan Final Report* (Township TMP), prepared by Township and WSP, dated January 2019.
- *Township Operations Centre Draft Report – Space Needs Assessment* (Space Needs Assessment Report), prepared by Township, dated April 28, 2021.
- *Township Operations Centre Space Needs Assessment and Recommendations*, prepared by Township, dated June 21, 2021.
- *Dickson Drive Extension Traffic Impact Study* (Dickson TIS), prepared by Triton Engineering Services Limited, dated January 2022.

The Township TMP identifies the preferred 2041 road network for Centre Wellington, which includes the extension of Gartshore Road as an arterial road to intersect at the intersection of Highway 6 / Sideroad 15, as shown in Figure 2 (excerpt from the Township TMP, Figure 35). This arterial road connection is a future consideration and is beyond the Urban Boundary in the current Official Plan. The ultimate location of this connection is to be finalized through a future Class Environmental Assessment. Therefore, this future modification to the road network is considered a long-term provision. This transportation study considers the road connections without this future arterial road connection, at least to accommodate Phase 1 of the Centre Wellington

Operations Centre. It is anticipated that the Township will continue through the planning process for the future modifications to the road network in this area, including the preparation of a transportation study that includes Phase 2 of the Centre Wellington Operations Centre, as well as other developments in this area.

Figure 2: Future Planned 2041 Road Network



Source: Township TMP, Figure 35

2.1 Intersection Analysis Methodology

Signalized and stop controlled intersection operations were assessed for intersections in the study area using the software program Synchro 11, which employs methodology from the *Highway Capacity Manual (HCM 2000, HCM 2010 and HCM 6)*, published by the Transportation Research Board National Research Council.

Synchro 11 can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections. The analysis utilizes the HCM 2000 methodology.

2.1.1 Signalized Intersection Analysis Performance Measures

Signalized intersection analysis considers 2 separate measures of performance:

- The capacity of all intersection movements, which is based on a volume to capacity ratio that is a measure of the degree of capacity utilized.
- The level of service (LOS) for all intersection movements, which is based on the average control delay per vehicle for the various movements through the intersection and overall. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between A and F, with F being the longest delay. The link between LOS and delay (in seconds) for signalized intersections is summarized below.

Level of Service	Control Delay per Vehicle(s)
A	≤10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

2.1.2 Unsignalized Intersection Performance Measures

Stop controlled intersection analysis considers 2 separate measures of performance:

- The capacity of the intersection's critical movements, which is based on a volume to capacity ratio.
- The level of service for the critical movements, which is based on the average control delay per vehicle for the various critical movements within the intersection. The link between LOS and delay (in seconds) for stop-controlled intersections is summarized below.

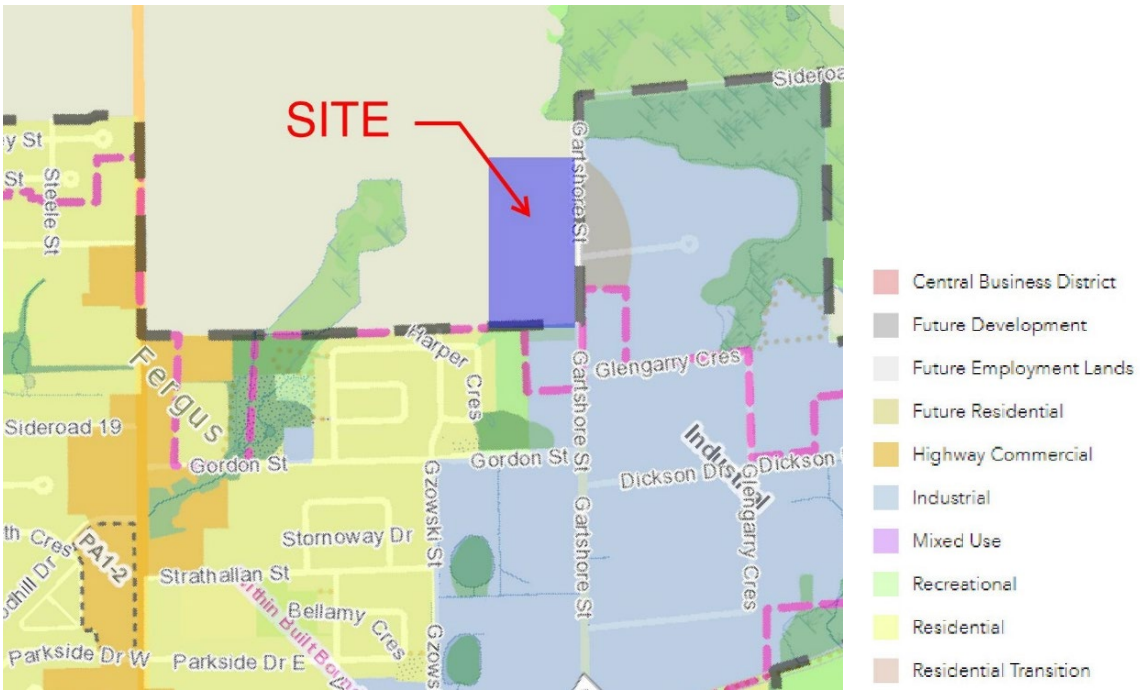
Level of Service	Control Delay per Vehicle(s)
A	0 – 10
B	> 10 – 15
C	> 15 – 25
D	> 25 – 35
E	> 35 – 50
F	> 50

3.0 Existing Conditions

3.1 Site Context

The community of Fergus is the largest community in the Township and has approximately 20,767 people (Statistics Canada, 2016). A significant percentage of the retail and restaurant businesses in Fergus are along Highway 6 (St. David Street North), which is the main north-south road in the community. The majority of industrial developments are located in the northeast part of the community, as shown on Schedule A-1 of the Official Plan (as illustrated in Figure 3), and the proposed development is also located in this area.

Figure 3: Township Official Plan Schedule A-1



Source: Township OP, Schedule A-1

The development property was predominantly farmlands, with an existing farmhouse building remaining located west of the Gartshore Street / Gregson Court intersection. The existing farmhouse may be retained as part of the development. The proposed development is bounded by Gartshore Street to the east, vacant lands to the north and west. South of the property is Harper Crescent Park and industrial developments.

3.2 Existing Road Network

The existing road network is described below.

Highway 6 / St. David Street North

Highway 6 / St. David Street North is a north-south roadway. North of Sideroad 19, the roadway is Highway 6, and it is a provincial highway under the MTO jurisdiction. South of Sideroad 19, the roadway is St. David Street North, and it is a connecting link arterial road under the Township jurisdiction. The Township TMP recommends that the connecting link designation be extended to Sideroad 18 in the future.

South of Sideroad 19, the roadway has a 3-lane urban cross section with a posted speed limit of 50 km/h. North of Sideroad 19, Highway 6 has a 2-lane rural cross section, with a centre median (delineated by lane marking only) and partially paved shoulders. The posted speed limit is 60 km/h, north of Sideroad 19 and transitions to a posted speed limit of 80 km/h, north of Sideroad 18. Sidewalks are provided on both sides of the street. The sidewalk on the east side terminates at Gordon Street and the sidewalk on the west side terminates at Sideroad 19.

Gartshore Street

Gartshore Street is a north-south arterial road, under the jurisdiction of the County for the section south of Glengarry Crescent and under the jurisdiction of the Township north of Glengarry Crescent. The roadway terminates at Sideroad 10 to the north. Gartshore Street has a 2-lane urban cross section south of the Elora Cataract Trailway and has a rural cross section to the north. The roadway has a posted speed limit of 50 km/hr. Sidewalks are provided on both sides of the street between Elora Cataract Trailway and Garafraxa Street East.

Garafraxa Street East / Wellington Road 1

Garafraxa Street E / Wellington Road 19 is an east-west arterial road under the jurisdiction of the County. It has a 2-lane urban cross section and posted speed limit of 40 km/h. Sidewalk is provided on both sides of the road with the sidewalks ending about 120 metres east of Robinson Road.

Side Road 15

Sideroad 15 is an east-west collector road under the jurisdiction of the Township. The Township TMP recommends that this road have an arterial road classification in the future. The roadway terminates at Highway 6 to the east and James Street to the west. It has a 2-lane rural cross section and an assumed unposted speed limit of 80 km/hr.

Gordon Street

Gordon Street is an east-west collector road under the jurisdiction of the Township. It has a 2-lane urban cross section and a posted speed limit of 50 km/hr. Gordon Street has a raised, vegetated centre median to the east of Gzowski Street. Sidewalks are provided on both sides of the road west of Gzowski Street and on south side east of Gzowski Street.

Dickson Drive

Dickson Drive is an east-west collector road under the jurisdiction of the Township. The roadway extends approximately 630 m to the eastward from Gartshore Street and terminates as a cul-de-sac. The Township is currently in the process of extending Dickson Drive between its current termination point and First Line, as part of the development of a Municipal Business Park in this area.

Dickson Drive has a 2-lane rural cross section and an assumed unposted speed limit of 50 km/hr.

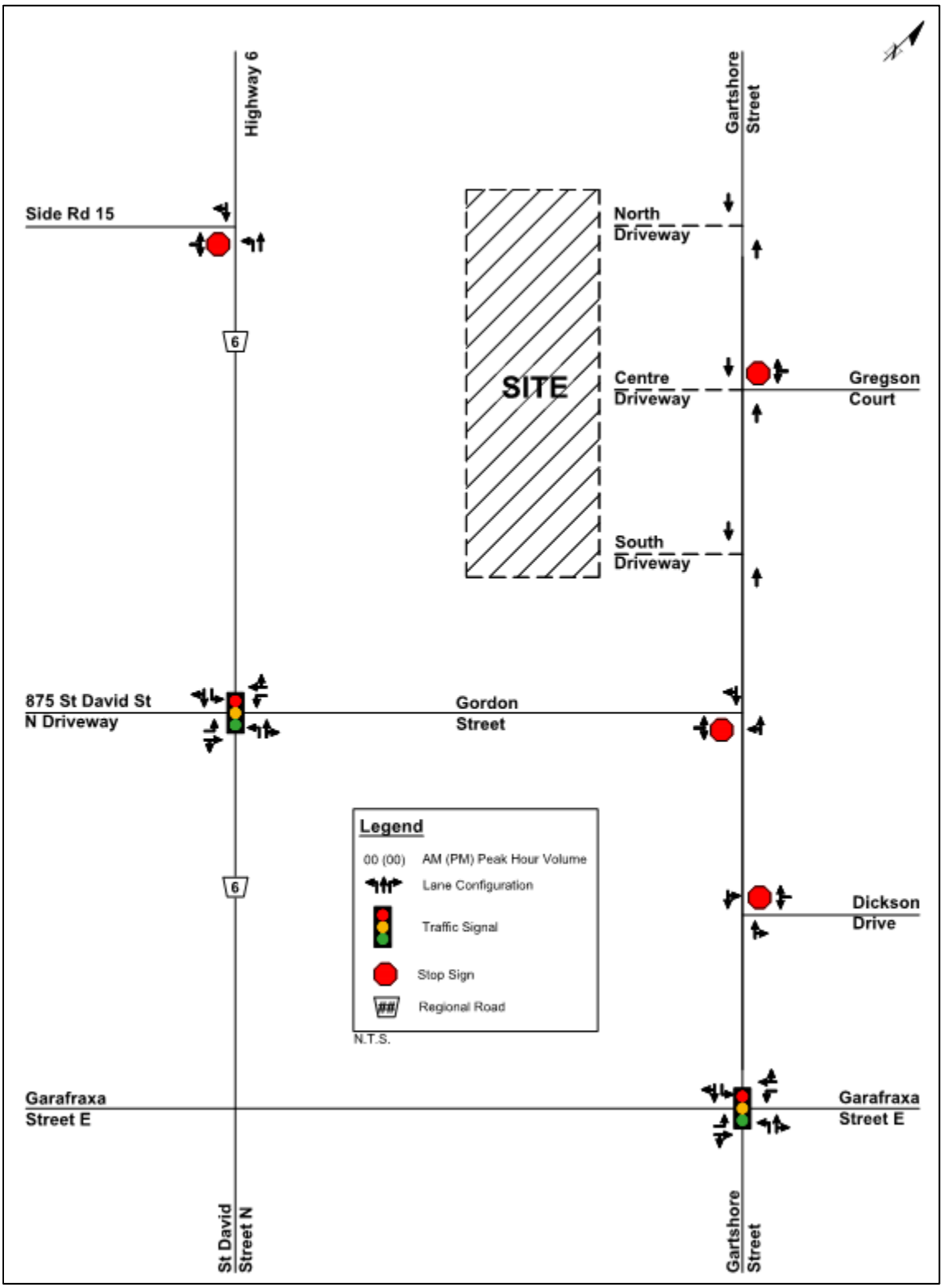
Gregson Court

Gregson Court is an east-west local road under the jurisdiction of the Township. The roadway extends approximately 250 m to the eastward from Gartshore Street and terminates as a cul-de-sac.

Gregson Court has a 2-lane rural cross section and an assumed unposted speed limit of 50 km/hr.

The existing lane configuration and traffic control is illustrated in Figure 4.

Figure 4: Existing Lane Configuration and Traffic Control



3.3 Existing Transit Services

Currently, the County has launched a pilot rideshare transit service that is county-wide, called RIDE WELL^{OM}. This pilot program is expected to be complete in 2025. RIDE WELL^{OM} provides year-round (excluding Statutory Holidays), Monday to Friday, 6:00 AM to 7:00 PM services within the County. This is a rideshare service where residents can book a ride via a mobile application, website and / or by calling a service number. There is no fixed route. Trip requests are real-time. The service will take riders within the County for a fixed fee and to designated transit hubs (Guelph Owen Sound Transportation and GO Transit) in Mount Forest, Arthur, Fergus, Elora, Guelph, Rockwood, and Aberfoyle.

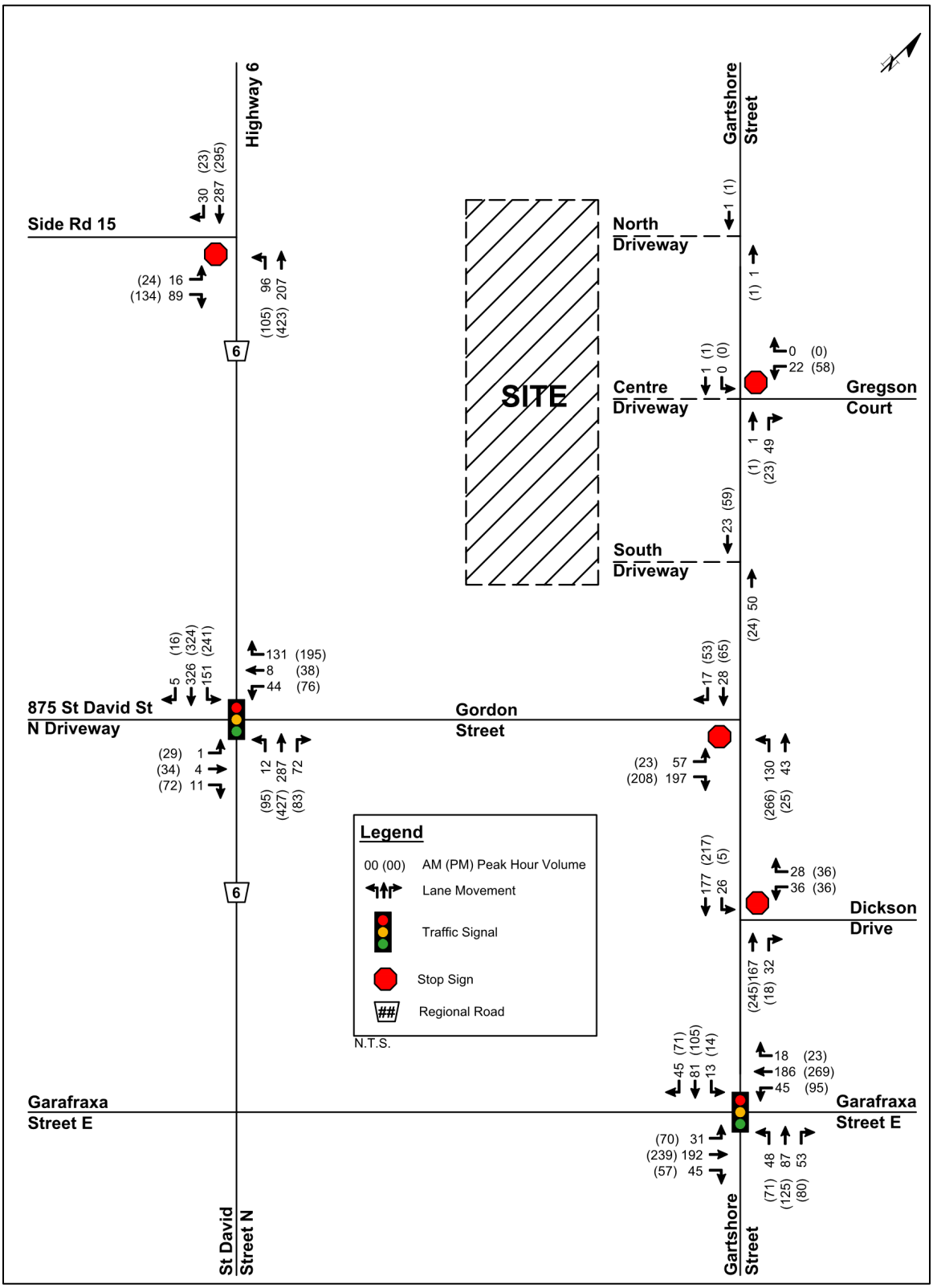
3.4 Existing Traffic Volumes

Existing traffic counts at the intersections identified in Section 2.0 were undertaken for the weekday morning AM peak period (7:00 AM to 9:00 AM) and afternoon PM peak period (4:00 PM to 6:00 PM). Traffic counts were conducted by Ontario Traffic Inc., on behalf of Burnside on Wednesday, July 6, 2022, except for the Dickson Drive / Gartshore Street intersection. The turning movement counts from this intersection were obtained from the Dickson TIS and dated Tuesday, September 2021. The weekday AM and PM peak hours were selected as these are typical peak traffic periods on the road network.

As the traffic counts at the Dickson Drive / Gartshore Street intersection are dated, growth rate was applied to bring the traffic volumes to existing conditions (year 2022). A review of historical counts obtained from the County and Township found that traffic volumes along Gartshore have decreased or remained approximately the same between 2003 to 2020. However, to be conservative, a 1% compound annual growth rate was applied to all movements at the Dickson Drive / Gartshore Street intersection.

The existing 2022 traffic volumes are illustrated in Figure 5. All turning movement counts are provided in Appendix A.

Figure 5: Existing 2022 Traffic Volumes



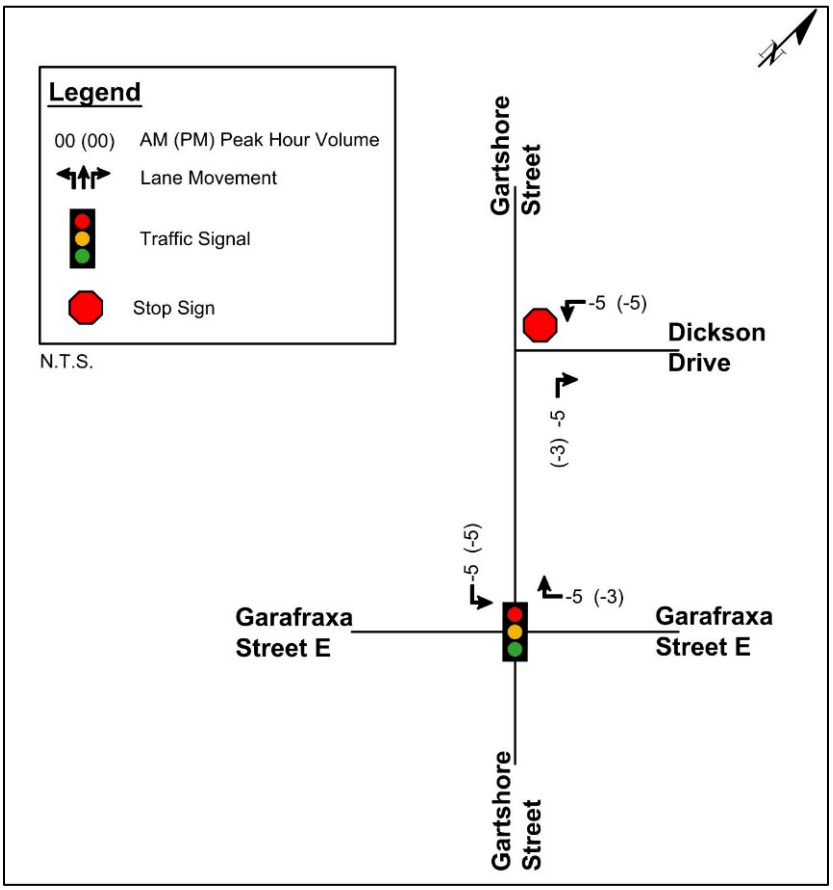
4.0 Future Background Conditions

Future background traffic consists of existing traffic, background traffic growth and traffic from other developments. Background traffic growth and traffic from other developments are discussed below. Future road network, transit and active transportation improvements within the study horizon year are also discussed. With the anticipated build-out year of 2027 for Phase 1, the horizon year of 2032 (i.e., 5 years after build-out) and 2037 (i.e., 10 years after build-out) were selected for future projections.

4.1 Future Road Network

A 2-lane extension of Dickson Drive is planned to be constructed by 2023, between the existing easterly limit to First Line. Estimates of the future traffic that will utilize the extended Dickson Drive were based on the Dickson TIS, which stated that 15% of the inbound and outbound industrial lands traffic on Dickson Drive would utilize First Line. The diversion of traffic to / from the west, originating from the existing industrial lands, will more than offset any increases in traffic from the new Business Park, resulting in a net reduction of traffic contributing to the intersection of Dickson Drive / Gartshore Street. The projected trips are illustrated in Figure 6.

Figure 6: Projected Trips due to Future Dickson Drive Extension



The Township has informed us that the bridge (Bridge 24-WG) on First Line between Sideroad 10 and Sideroad 15 has been closed since July 2018 and it is anticipated that the bridge will be replaced and reopened to traffic by 2024. The status of this bridge has been noted; however, it will not impact the analysis in this current TIS, as there will not be a significant impact to the travel pattern of the study intersections.

In addition, there are also several improvements identified in the Township TMP. However, these improvements are planned to be beyond 2041. This includes the extension of Gartshore Street to the north and intersection improvements along Highway 6 at Sideroad 15 and Gordon Street. The extended Gartshore street is planned to connect to Highway 6 opposite of Sideroad 15. The detail of the extension is still under review and will be subject to a larger area study. It is noted by the Township that, due to the presence of the wetland complex north and west of the site, the alignment will need to be carefully assessed. The Township had indicated that the extended Gartshore is potentially planned to be classed as a major collector rather than an arterial road.

4.2 Future Transit

There are no planned transit improvements within the study area and horizon years.

4.3 Future Active Transportation

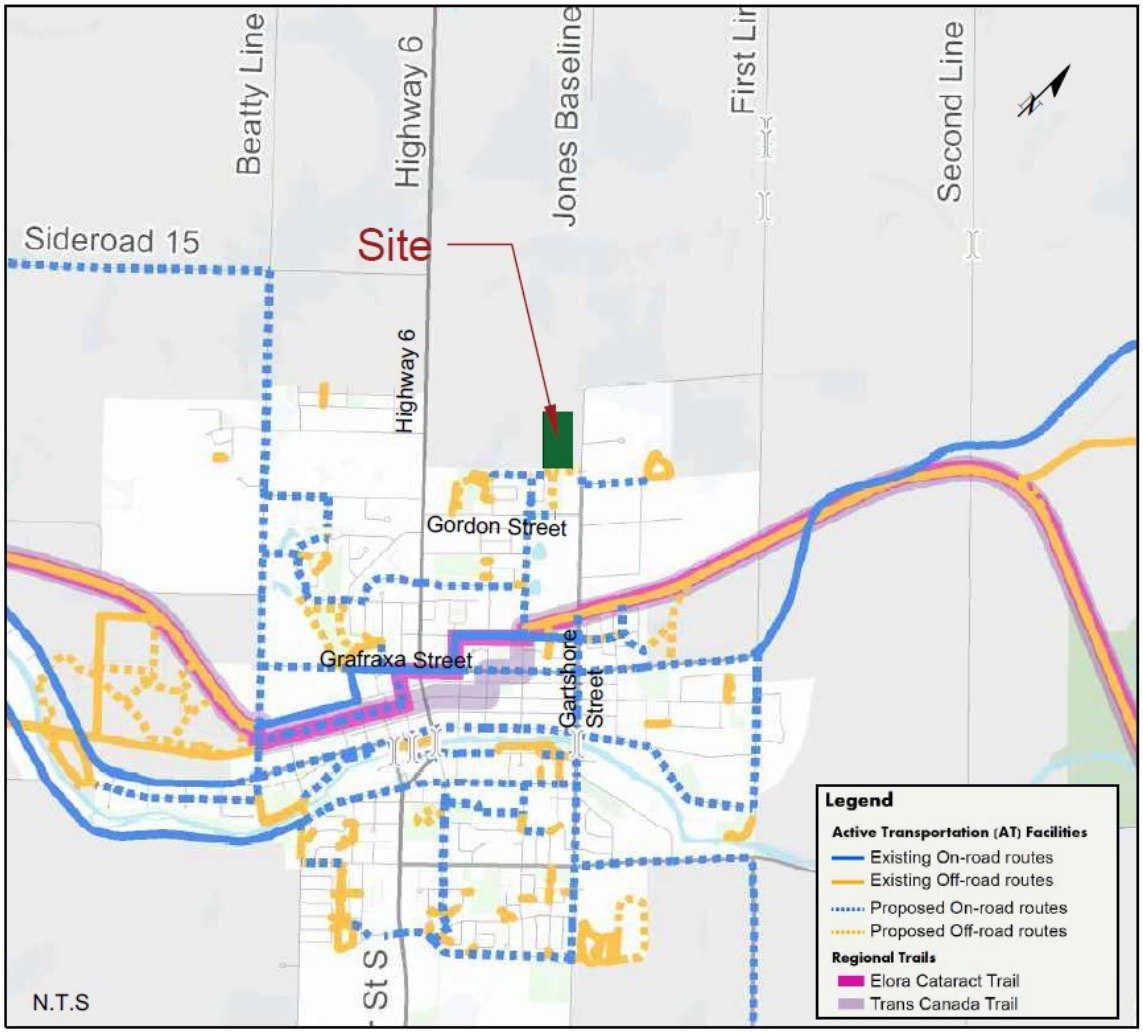
The Township TMP proposes active transportation (AT) routes within the study area. The following AT routes are proposed, which are also illustrated in Figure 7 (excerpt from Township TMP, Figure 37). The following AT routes are planned:

- Off-road route, west of Gartshore Street, south of the site, connecting through the Harper Crescent Park onto Gordon Street.
- Off-road route, west of Gibbons Drive Park, extending south to Gordon Street.
- On-road route, easterly along Glengarry Crescent and extending a short distance along Gartshore Street to the north of Glengarry Crescent.

As part of the future Dickson Drive business park expansion, a north-south off-road multi-use path will be constructed through the business park connecting to the Elora Cataract Trailway.

In addition, on-road routes are planned along Gibbons Drive, Gzowski Street, Garafraxa Street / Wellington Road 19, and Gartshore Street, south of the Elora Cataract Trailway. However, there is no indication of timeline on when these improvements will be implemented.

Figure 7: Existing and Planned Active Transportation Network



Source: Township TMP, Figure 37

4.4 Background Traffic Growth

Historical traffic counts were reviewed, based on data obtained from the MTO, County and Township, for the period from 2003 to 2020. Based on the growth patterns of the historical counts, a growth rate of 0.5% compounded annually is applied to Highway 6 / St. David Street and a growth rate of 1% compounded annually is applied to Gartshore Street, Garafraxa Street and Sideroad 15. No growth was applied to Dickson Drive, Gordon Street and other driveways since those areas are fully built or have had growth forecasted based on background developments, as noted in the next section. Detailed growth analysis is provided in Appendix B.

4.5 Background Developments

The Township provided information on background developments within the proximity of the site for inclusion in the analysis. The developments are summarized in Table 1. Trips generated from each development were included in the background traffic projections. Excerpts of the site traffic figures from each development are provided in Appendix C.

Table 1: Background Development Summary

Address	Development Statistics			Source
	Proposed Use	AM Trips	PM Trips	
Industrial Developments along Dickson Drive	360,000 ft^2 Business Park	457	451	Dickson TIS
950 & 960 St. David Street N	112 Townhouses, 13,500 ft^2 Retail	93	165	*950 & 960 St. David Street N Transportation Impact Study*, prepared by Paradigm Transportation Solutions Limited, dated May 2022
961 St. David Street N	23 Single Family Homes	21	25	*961 St. David Street North Transportation Study*, prepared by Paradigm Transportation Solutions Limited, dated April 2021

The Dickson TIS assumed that the Township's Business Park would be fully occupied by 2026 and that the extension of Dickson Drive would be in place to serve this development. The Dickson TIS identified the potential need to implement traffic signals at the intersection of Gartshore Street / Dickson Drive in this time period. The traffic volume forecasts from the TIS have been carried forward in this current TIS, however the Peak Hour Factors (PHFs) have been adjusted. The Dickson TIS applies the existing PHFs for each movement at this intersection, while the current TIS applies PHFs for the overall intersection, based on typical urban conditions (Synchro default PHF=0.92) and a review of the PHF for the overall intersection. This methodology is considered conservative and more representative of PHF under typical urban conditions, as assessing PHF by movement may result in underestimating the traffic flow.

Therefore, the previous recommendation for signalization at this intersection may not apply.

4.6 Background Traffic Volumes

Background traffic volumes consist of the traffic projections from Dickson Drive extension, application of growth per annum (up to the horizon years of 2032 and 2037) and traffic from background developments. The resulting background for 2032 and 2037 traffic volumes are illustrated in Figure 8 and Figure 9 respectively.

Figure 8: 2032 Background Traffic Volumes

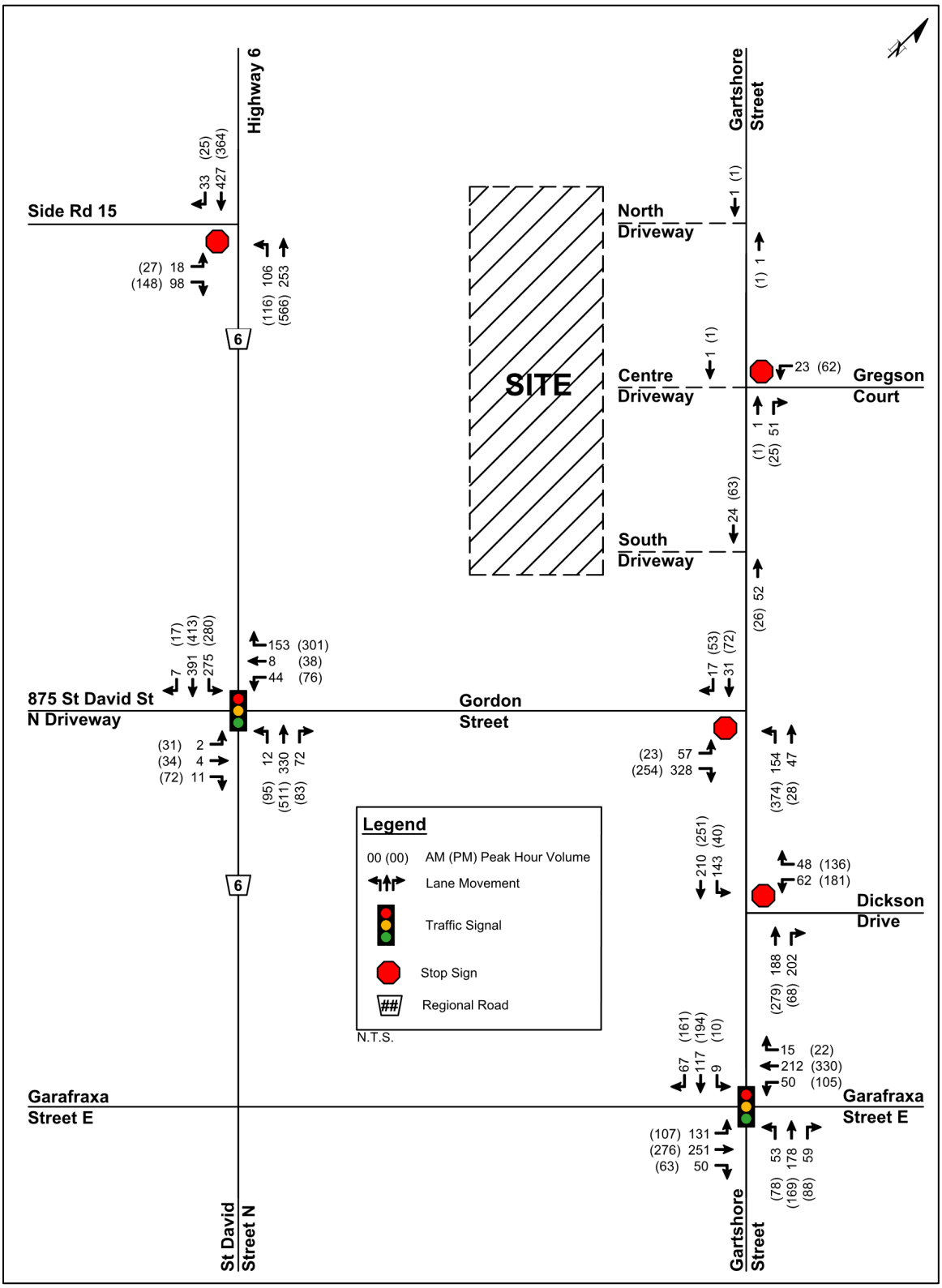
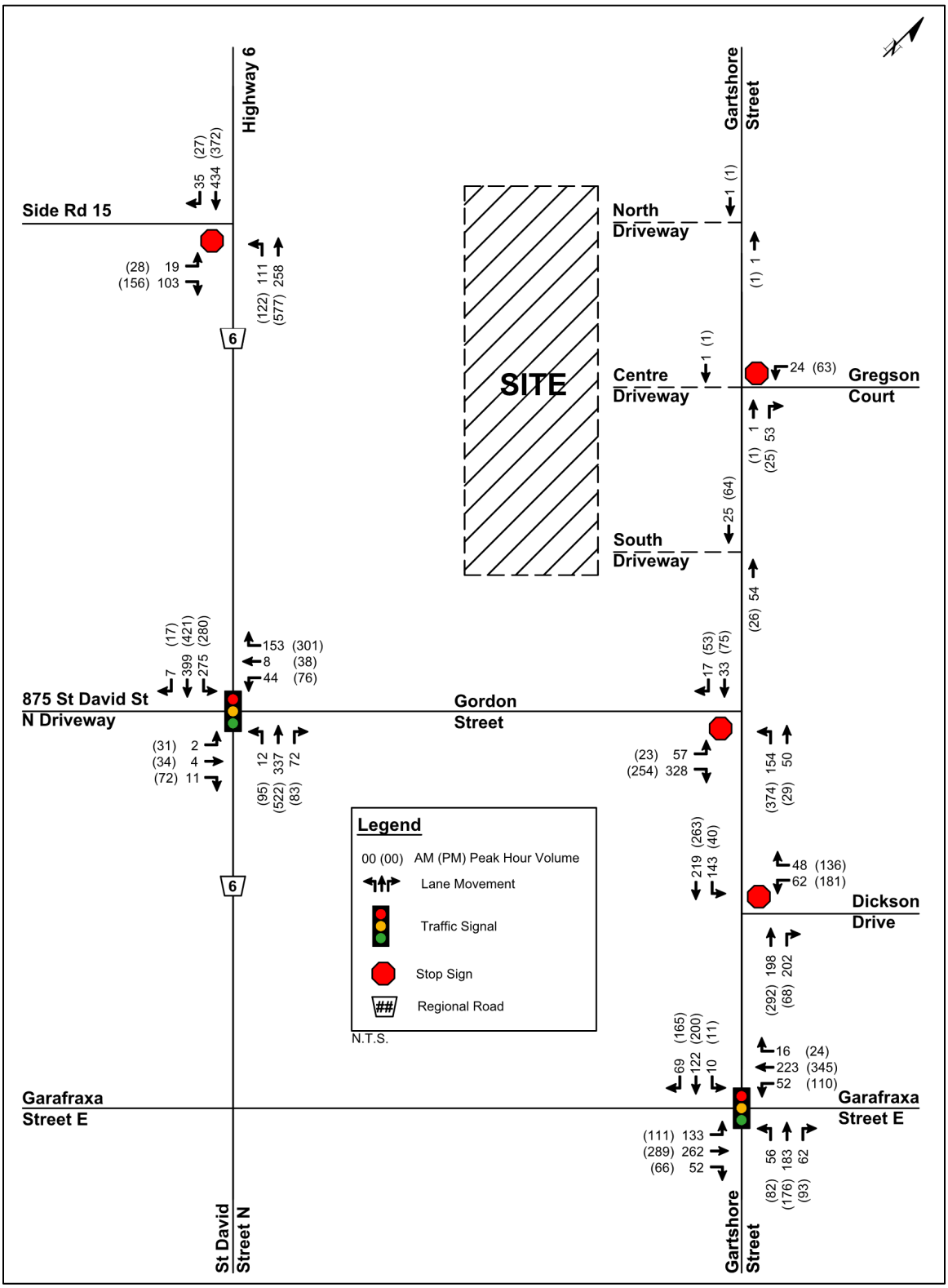


Figure 9: 2037 Background Traffic Volumes



5.0 Proposed Development

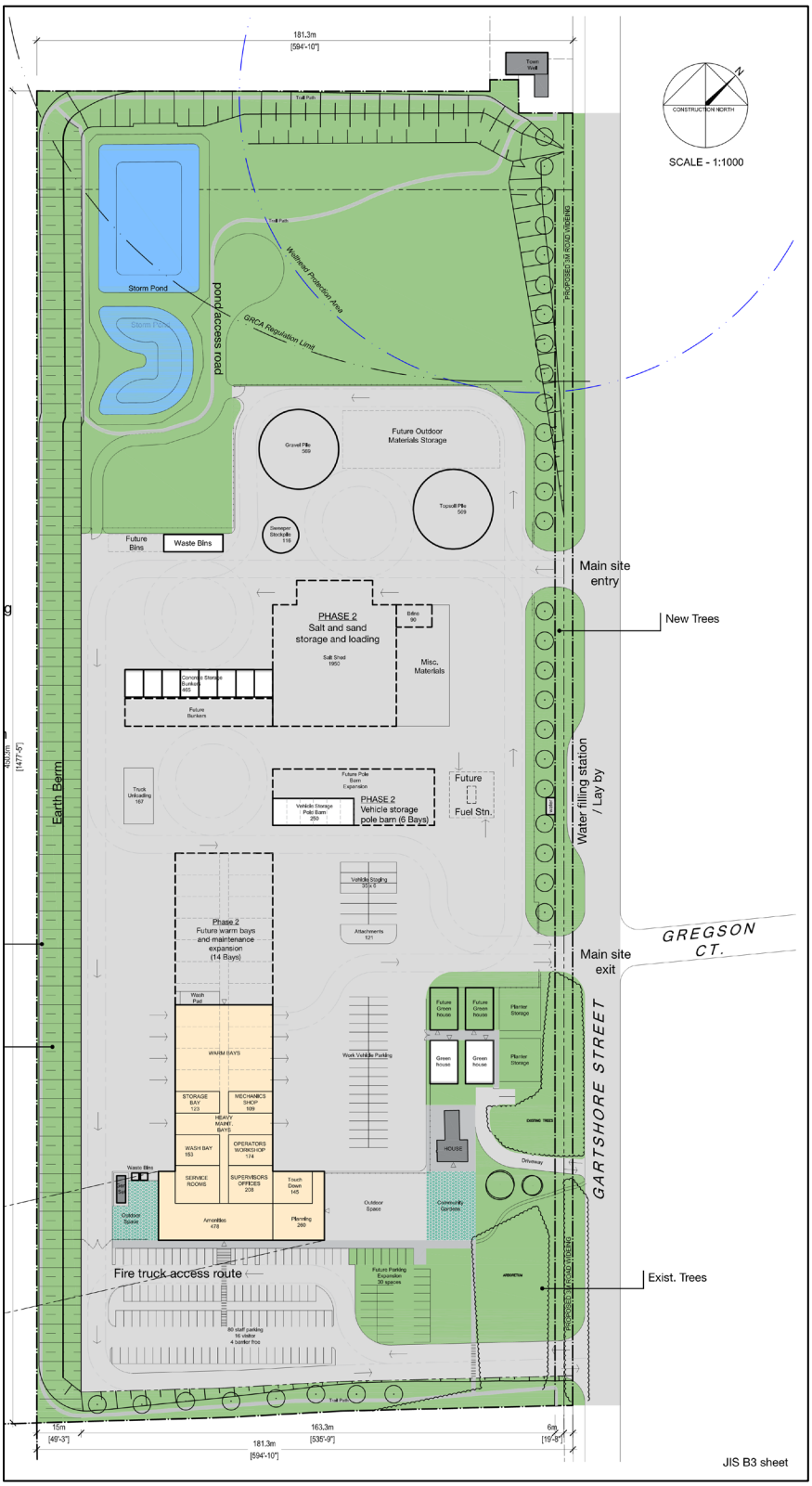
The proposed development will consist of two phases. Phase 1 has an approximate total gross floor area (GFA) of 3,560 m^2 (38,321 ft^2) and is expected to be built-out by 2027.

Phase 1 of the facility will include an exterior works yard, an outdoor operations area, garage buildings including heated and unheated storage bays, workshop space, maintenance bays and a greenhouse. The proposed parking supply consists of 100 staff / visitor parking spaces, 34 work vehicle parking spaces, 6 vehicle staging parking spaces and is expected to be built-out by 2027.

Phase 2 of the facility is expected to be built-out beyond 20 years and will include additional heated and unheated garage areas, salt storage facility and additional greenhouses for an approximate total build-out GFA of 5,515 m^2 (59,365 ft^2). This phase will not be considered in this current study.

Accesses to the proposed Operations Facility are provided along Gartshore Street via one full movement driveway, one inbound-only driveway and one outbound-only driveway. The site plan is shown in Figure 10.

Figure 10: Proposed Site Plan



5.1 Trip Generation

Trip generation was based on information contained in the *Trip Generation Manual, 11th Edition*, published by the Institute of Transportation Engineers. The following Land Use Code (LUC) 710 (General Office Building) was assumed for all office related components and LUC 170 (Utility) was used for the remaining components. In addition, general urban / suburban conditions were assumed. Table 2 summarizes the resulting trip generation for the proposed development.

Table 2: Site Trip Generation

Land Use (Size)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	In	Out	Total	In	Out	Total
General Office Building (12,623 ft^2)[1]	25	3	28	5	25	30
Utility (25,698 ft^2)	52	8	60	6	27	33
Total	***77***	***11***	***88***	***11***	***52***	***63***

5.2 Trip Distribution and Assignment

Trip distribution and assignment of site trips were based upon existing traffic patterns, the available road network, and a review of other TIS reports in the vicinity of the study area. The estimated distribution for the generated trips is summarized in Table 3.

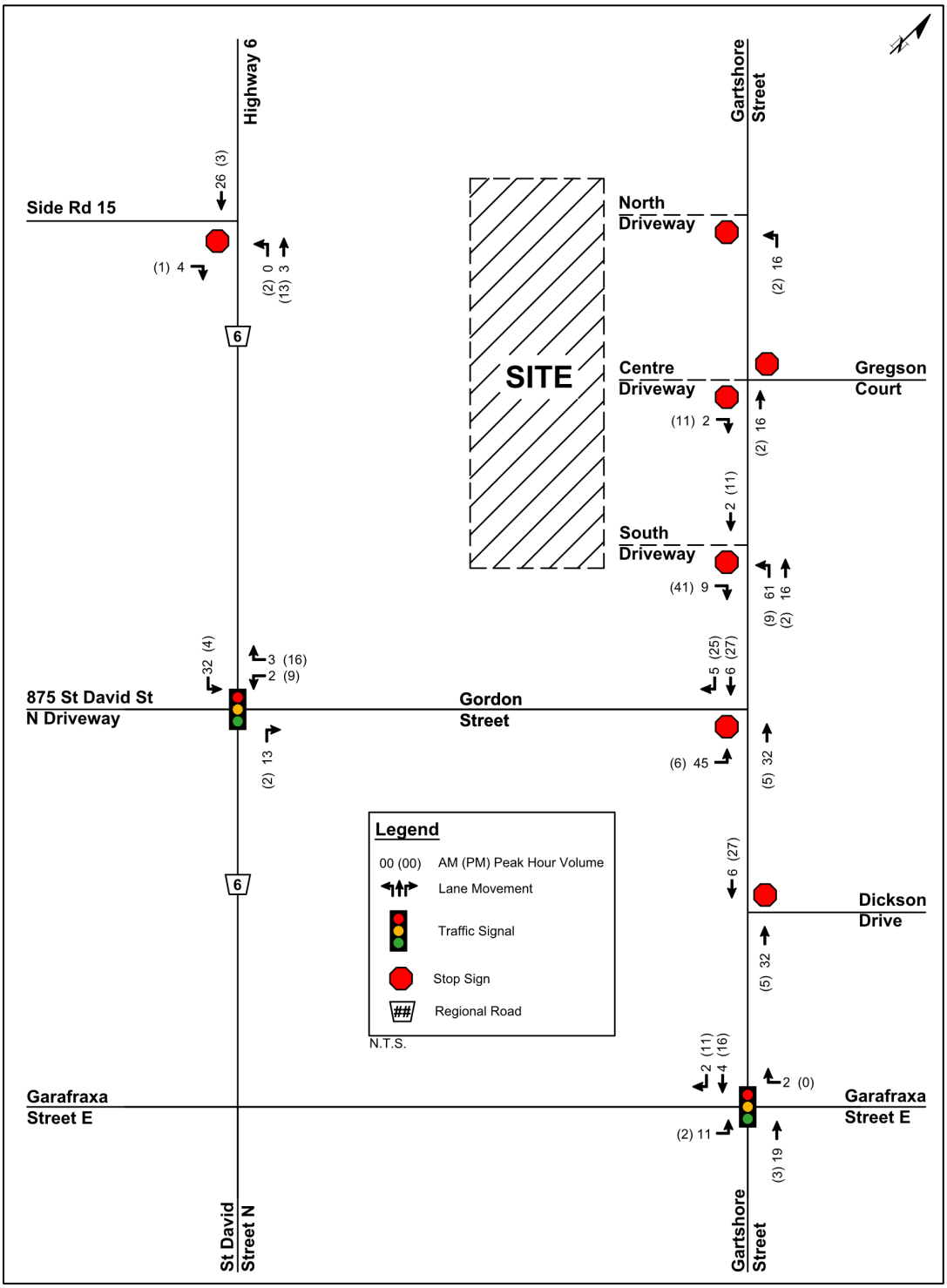
Table 3: Trip Distribution

To/From	Via	Inbound / Outbound Distribution				
		Passenger Vehicles				Trucks
	Peak Period	**AM**		**PM**		**AM/PM**
	Directional Split	**In**	**Out**	**In**	**Out**	
West	Garafraxa St (Wellington Rd 19)	19%	25%	14%	24%	0%
	Sideroad 15 and other sideroads	11%	0%	14%	8%	0%
East	Garafraxa St (Wellington Rd 19)	2%	0%	15%	3%	0%
North	Highway 6 (via Gordon Street)	32%	25%	14%	24%	40%
South	St David St (via Gordon Street)	11%	13%	14%	11%	33%
	Gartshore Street	25%	37%	29%	30%	27%
	Total	**100%**				**100%**

Truck traffic was assumed to be 20% of the total trips and assigned to the northerly driveways on Gartshore Street. The remaining 80% of the site traffic was assignment to the southerly driveway on Gartshore Street. The resulting site traffic is illustrated in

Figure 11. Note that as the northerly driveways are inbound and outbound driveways, it is combined for the analysis to be conservative.

Figure 11: Site Traffic Volumes



6.0 Total Traffic

Total traffic volumes consist of background traffic volumes plus the site traffic were illustrated in Figure 11. The resulting 2032 and 2037 total traffic volumes are shown in Figure 12 and Figure 13 respectively. Note that the northbound and southbound through traffic at the north and south driveways on Gartshore Street was assumed to be half of the screenline volume north of Gordon Street / Gartshore Street intersection as there are relatively little surrounding developments at those locations.

Figure 12: 2032 Total Traffic Volumes

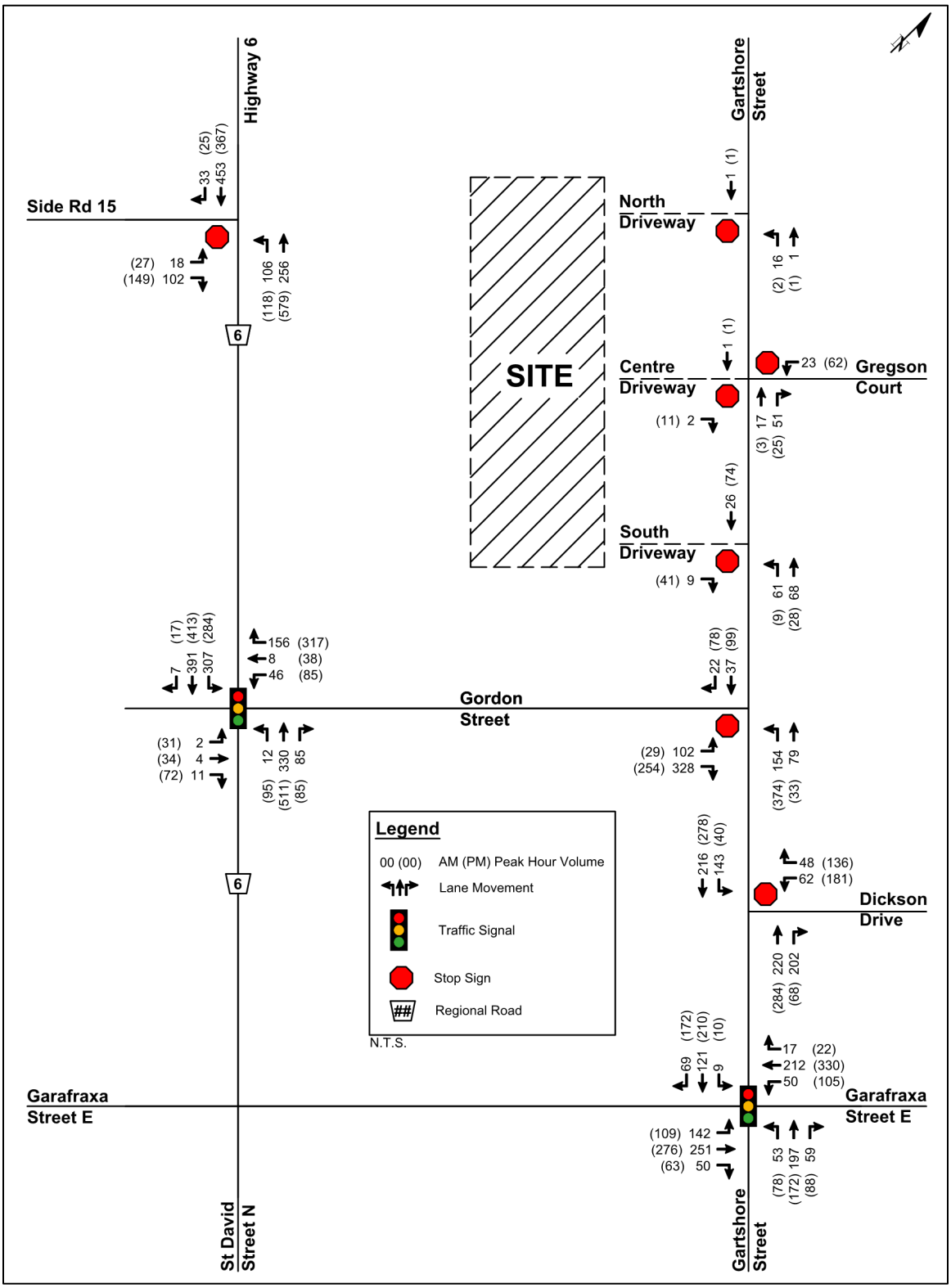
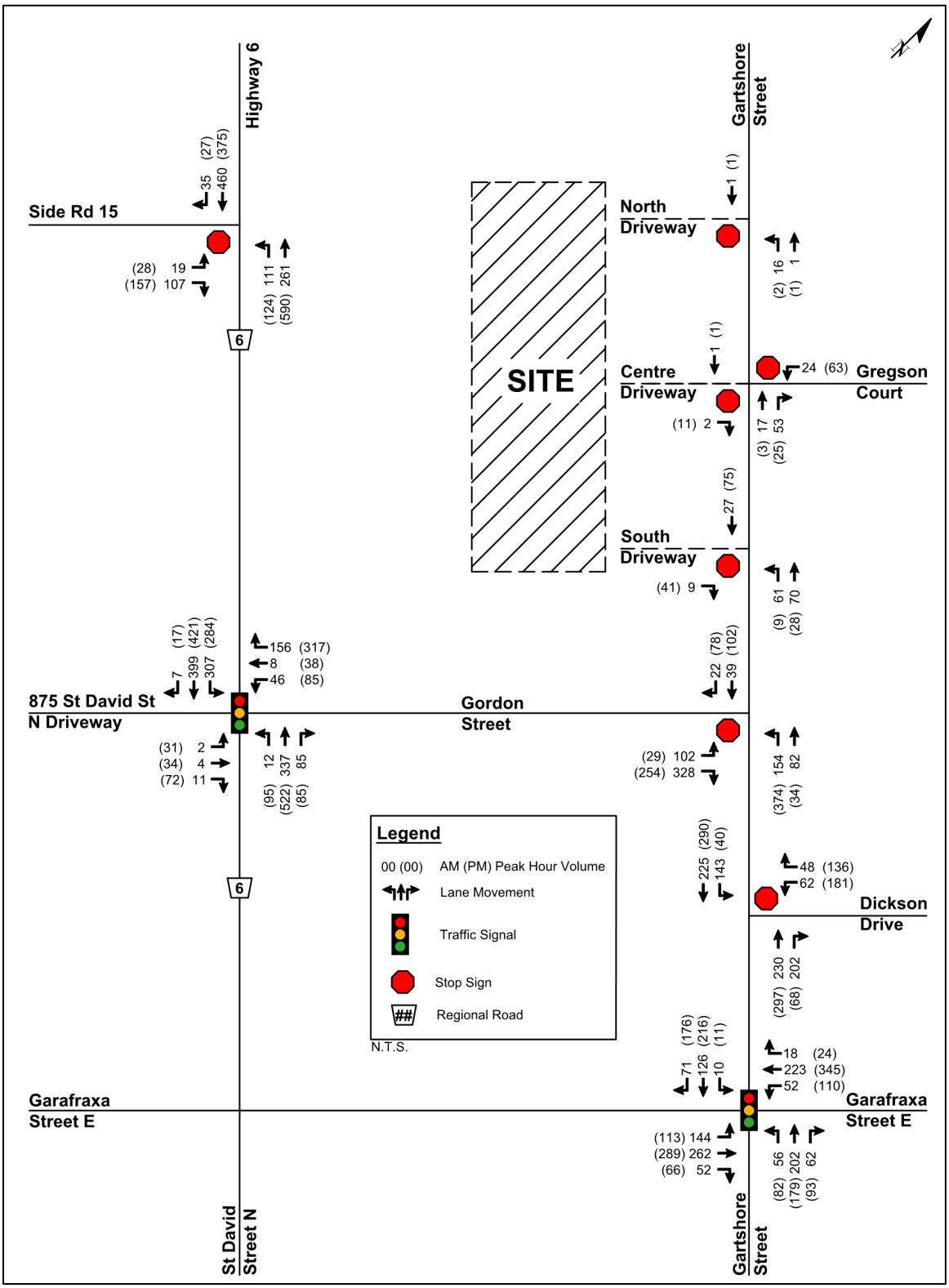


Figure 13: 2037 Total Traffic Volumes



7.0 Traffic Operations Analysis

Traffic operations analyses were conducted under existing and future traffic conditions for the weekday AM and PM peak hours at all study intersections. In addition, queueing was reviewed using Synchro's 95th percentile queue. A comparison of the existing storage / link distances and projected queues are summarized. Detailed Synchro and queue reports are provided in Appendices D through H.

7.1 Highway 6 / St. David Street / Gordon Street/ Commercial Driveway Intersection

The existing, background and total traffic operations at the Highway 6 / St. David Street / Gordon Street / Commercial Driveway intersection are summarized in Table 4.

Table 4: Highway 6 / St. David Street / Gordon Street Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
Overall	-	0.38	B	-	0.51	B	-
EBL	15	0.01	C	2	0.30	C	12
EBTR	50+	0.03	C	6	0.20	C	17
WBL	27	0.32	C	15	0.45	C	23
WBTR	500+	0.15	C	14	0.31	C	24
NBL	90	0.02	A	2	0.15	A	9
NBTR	200	0.41	A	47	0.53	B	80
SBL	26	0.28	A	11	0.49	A	21
SBTR	500+	0.33	A	43	0.34	A	49
Background 2032 Conditions							
Overall	-	0.54	B	-	0.64	B	-
EBL	15	0.02	C	2	0.32	C	12
EBTR	50+	0.03	C	6	0.19	C	17
WBL	27	0.32	C	15	0.42	C	22
WBTR	500+	0.17	C	15	0.37	C	28
NBL	90	0.02	A	2	0.17	A	11
NBTR	200	0.46	B	56	0.63	B	111
SBL	26	0.55	A	21	0.67	B	35
SBTR	500+	0.39	A	54	0.43	B	72

Table 4: Highway 6 / St. David Street / Gordon Street Intersection Operations continued

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Background 2037 Conditions							
Overall	-	0.55	B	-	0.65	B	-
EBL	15	0.02	C	2	0.32	C	12
EBTR	50+	0.03	C	6	0.19	C	17
WBL	27	0.32	C	15	0.42	C	22
WBTR	500+	0.17	C	15	0.37	C	28
NBL	90	0.02	A	2	0.17	A	11
NBTR	200	0.46	B	57	0.64	B	114
SBL	26	0.55	A	21	0.69	B	37
SBTR	500+	0.40	A	55	0.44	B	73
Total 2032 Conditions							
Overall	-	0.61	B	-	0.66	B	-
EBL	15	0.02	C	2	0.32	C	12
EBTR	50+	0.03	C	6	0.18	C	17
WBL	27	0.33	C	16	0.45	C	24
WBTR	500+	0.17	C	15	0.38	C	28
NBL	90	0.02	A	2	0.17	A	11
NBTR	200	0.47	B	58	0.63	B	113
SBL	26	0.62	A	24	0.69	B	38
SBTR	500+	0.39	A	54	0.43	B	72
Total 2037 Conditions							
Overall	-	0.55	B	-	0.67	B	-
EBL	15	0.02	C	2	0.32	C	12
EBTR	50+	0.03	C	6	0.18	C	17
WBL	27	0.32	C	15	0.45	C	24
WBTR	500+	0.17	C	15	0.38	C	28
NBL	90	0.02	A	2	0.17	A	11
NBTR	200	0.46	B	57	0.64	B	116
SBL	26	0.55	A	21	0.70	B	40
SBTR	500+	0.40	A	55	0.44	B	74

Under existing and future conditions, the critical movements for this intersection are operating and will operate with excess capacity and a level of service C or better. Queues are projected to be within the existing storage with one exception. Under background conditions during the afternoon peak hour, the southbound left turn queue is forecasted to extend into the taper area by about 1 vehicle during the PM peak hour under 2032 and 2037 Background traffic conditions. Under 2032 and 2037 PM Peak Hour Total traffic conditions the southbound left turn queue is forecasted to extend into the taper area by about 1 to 2 vehicles. To mitigate the identified future queuing deficiency, it is recommended that the signal timing be optimized at this intersection. A sensitivity analysis was completed to compare the operations with and without signal

optimization, for the worse-case scenario (i.e., Total 2037 PM Peak Hour), as summarized in Table 5.

Table 5: Highway 6 / St. David / Gordon Intersection Operations Total 2037 PM Peak Hour

Movement	Existing Storage / Link Distance (m)	Without Improvements			With Signal Timing Improvements		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Total 2037 Conditions							
Overall	-	0.67	B	-	0.62	B	-
EBL	15	0.32	C	12	0.38	D	14
EBTR	50+	0.18	C	17	0.18	D	19
WBL	27	0.45	C	24	0.46	D	28
WBTR	500+	0.38	C	28	0.38	D	33
NBL	90	0.17	A	11	0.17	A	11
NBTR	200	0.64	B	116	0.65	B	142
SBL	26	0.70	B	40	0.63	A	31
SBTR	500+	0.44	B	74	0.41	B	73

With the signal timing improvements, the southbound left turn queue is forecasted to have minimal encroachment into the taper area. It is also important to note that any encroachment will be an infrequent occurrence and therefore traffic operations are acceptable.

It is noted that any extension of the southbound left turn lane at the intersection of Highway 6 / Gordon Street will also need to consider the northbound left turn storage requirements at the intersection of Highway 6 / Sideroad 19, since these intersections are served by back-to-back left turn lanes. The future phase 2 study will review the left turn storage requirements for both intersections and analyze an optimized signal timing plan as required.

7.2 Gartshore Street / Garafraxa Street Intersection

The existing, background and total traffic operations, at the intersection of Gartshore Street / Garafraxa Street, are summarized in Table 6.

Table 6: Gartshore Street / Garafraxa Street Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
Overall	-	0.27	B	-	0.34	B	-
EBL	38	0.12	B	9	0.30	B	16
EBTR	300+	0.53	C	40	0.59	C	49
WBL	37	0.20	B	11	0.41	B	21
WBTR	100+	0.49	B	36	0.60	C	49
NBL	20	0.08	A	9	0.12	A	12
NBTR	100+	0.14	A	15	0.20	A	21
SBL	28	0.02	A	4	0.02	A	4
SBTR	500+	0.13	A	14	0.17	A	17
Background 2032 Conditions							
Overall	-	0.40	B	-	0.50	B	-
EBL	38	0.49	C	28	0.52	C	25
EBTR	300+	0.61	C	51	0.64	C	57
WBL	37	0.24	B	13	0.49	C	24
WBTR	100+	0.49	B	40	0.67	C	61
NBL	20	0.10	A	10	0.18	A	13
NBTR	100+	0.28	A	28	0.28	A	28
SBL	28	0.02	A	3	0.02	A	3
SBTR	500+	0.20	A	20	0.39	B	39
Background 2037 Conditions							
Overall	-	0.41	B	-	0.52	B	-
EBL	38	0.51	C	28	0.57	C	27
EBTR	300+	0.63	C	54	0.67	C	60
WBL	37	0.26	B	13	0.54	C	26
WBTR	100+	0.52	B	42	0.70	C	65
NBL	20	0.11	A	10	0.19	A	14
NBTR	100+	0.29	A	30	0.29	A	30
SBL	28	0.02	A	3	0.02	A	3
SBTR	500+	0.21	A	21	0.40	B	40
Total 2032 Conditions							
Overall	-	0.41	B	-	0.51	B	-
EBL	38	0.54	C	30	0.53	C	25
EBTR	300+	0.61	C	51	0.64	C	57
WBL	37	0.24	B	13	0.49	C	24
WBTR	100+	0.50	B	40	0.67	C	61
NBL	20	0.10	A	10	0.19	A	13
NBTR	100+	0.30	A	31	0.28	A	29
SBL	28	0.02	A	3	0.02	A	3
SBTR	500+	0.21	A	21	0.42	B	43

Table 6: Gartshore Street / Garafraxa Street Intersection Operations continued

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Total 2037 Conditions							
Overall	-	0.41	B	-	0.54	B	-
EBL	38	0.51	C	28	0.58	C	28
EBTR	300+	0.63	C	54	0.67	C	60
WBL	37	0.26	B	13	0.54	C	26
WBTR	100+	0.52	B	42	0.70	C	65
NBL	20	0.11	A	10	0.20	A	14
NBTR	100+	0.29	A	30	0.30	A	30
SBL	28	0.02	A	3	0.02	A	3
SBTR	500+	0.21	A	21	0.44	B	45

Under existing, background and total conditions, the intersection is operating and will operate with excess capacity and a level of service C or better. Queues are projected to be within the existing storage.

7.3 Highway 6 / Sideroad 15 Intersection

The existing, background and total traffic operations, at the Highway 6 /Sideroad 15 intersection, are summarized in Table 7.

Table 7: Highway 6 / Sideroad 15 Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
EBLR	500+	0.18	B	6	0.32	B	11
NBL	130	0.08	A	3	0.09	A	3
Background 2032 Conditions							
EBLR	500+	0.25	B	8	0.44	C	17
NBL	130	0.11	A	3	0.11	A	3
Background 2037 Conditions							
EBLR	500+	0.27	C	9	0.48	C	20
NBL	130	0.11	A	3	0.12	A	4
Total 2032 Conditions							
EBLR	500+	0.27	C	9	0.45	C	18
NBL	130	0.11	A	3	0.11	A	3
Total 2037 Conditions							
EBLR	500+	0.27	C	9	0.49	C	20
NBL	130	0.11	A	3	0.12	A	4

Under existing, background and total conditions, the intersection is operating and will operate with excess capacity and a level of service C or better. Queues are projected to be within the existing storage.

7.4 Gartshore Street / Gordon Street Intersection

The existing, background and total traffic operations, at the intersection of Gartshore Street / Gordon Street, are summarized in Table 8.

Table 8: Gartshore Street / Gordon Street Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
EBLR	100+	0.32	B	11	0.31	B	11
NBLT	50+	0.09	A	3	0.20	A	6
Background 2032 Conditions							
EBLR	100+	0.47	B	20	0.41	B	16
NBLT	50+	0.11	A	3	0.28	A	9
Background 2037 Conditions							
EBLR	100+	0.47	B	20	0.42	B	16
NBLT	50+	0.11	A	3	0.28	A	9
Total 2032 Conditions							
EBLR	100+	0.58	C	29	0.48	C	20
NBLT	50+	0.11	A	3	0.29	A	10
Total 2037 Conditions							
EBLR	100+	0.47	B	20	0.48	C	20
NBLT	50+	0.11	A	3	0.29	A	10

Under existing, background and total conditions, the intersection is operating and will operate with excess capacity and a level of service C or better. Queues are projected to be within the existing storage.

7.5 Gartshore Street / Dickson Drive Intersection

The existing, background and total traffic operations, at the Gartshore Street / Dickson Drive intersection, are summarized in Table 9.

Table 9: Gartshore Street / Dickson Drive Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
WBLR	100+	0.10	B	3	0.13	B	4
SBLT	50+	0.02	A	1	0.00	A	1
Background 2032 Conditions							
WBLR	100+	0.30	C	10	0.71	D	43
SBLT	50+	0.14	A	4	0.04	A	1
Background 2037 Conditions							
WBLR	100+	0.31	C	10	0.73	D	46
SBLT	50+	0.14	A	4	0.04	A	1
Total 2032 Conditions							
WBLR	100+	0.32	C	11	0.73	D	46
SBLT	50+	0.14	A	4	0.04	A	1
Total 2037 Conditions							
WBLR	100+	0.31	C	10	0.76	D	49
SBLT	50+	0.14	A	4	0.04	A	1

Under existing, background and total conditions, the intersection is operating and will operate with excess capacity and a level of service D or better. Queues are projected to be within the existing storage.

7.6 Gartshore Street / Gregson Court / Centre Driveway

The existing, background, and total conditions, at the Gartshore Street / Gregson Court / Centre Driveway, are summarized in Table 10.

Table 10: Gartshore Street / Gregson Court / Centre Driveway Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Existing Conditions							
WBLR	100+	0.02	A	1	0.06	A	2
SBLT	100+	0.00	A	0	0.00	A	0
Background 2032 Conditions							
WBLR	100+	0.03	A	1	0.07	A	2
SBLT	100+	0.00	A	0	0.00	A	0
Background 2037 Conditions							
WBLR	100+	0.03	A	1	0.07	A	2
SBLT	100+	0.00	A	0	0.00	A	0

Table 10: Gartshore Street / Gregson Court / Centre Driveway Intersection Operations Continued…

Total 2032 Conditions							
EBLR	50+	0.00	A	0	0.01	A	1
WBLR	100+	0.03	A	1	0.07	A	2
SBLT	100+	0.00	A	0	0.00	A	0
Total 2037 Conditions							
WBLR	100+	0.01	A	0	0.01	A	1
SBLT	100+	0.03	A	1	0.07	A	2

Under existing, background and total conditions, the intersection will operate with excess capacity and a level of service A. Queues are projected to be within the existing or proposed storage. No additional turning lanes will be required.

7.7 Gartshore Street / North Driveway

The total conditions, at the Gartshore Street / North Driveway, are summarized in Table 11.

Table 11: Gartshore Street / North Driveway Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Total 2032 Conditions							
EBLR	50+	0.00	A	0	0.00	A	0
NBLT	50+	0.01	A	1	0.00	A	0
Total 2037 Conditions							
EBLR	50+	0.00	A	0	0.00	A	0
NBLT	50+	0.00	A	0	0.00	A	0

The intersection will operate with excess capacity and a level of service A. No additional turning lanes will be required.

7.8 Gartshore Street / South Driveway

The total conditions, at the Gartshore Street / South Driveway intersection, are summarized in Table 12.

Table 12: Gartshore Street / South Driveway Intersection Operations

Movement	Existing Storage / Link Distance (m)	Weekday AM Peak Hour			Weekday PM Peak Hour		
		v/c	LOS	95th Queue (m)	v/c	LOS	95th Queue (m)
Total 2032 Conditions							
EBLR	50+	0.01	A	1	0.05	A	2
NBLT	50+	0.04	A	1	0.01	A	1
Total 2037 Conditions							
EBLR	50+	0.05	A	0	0.05	A	2
NBLT	50+	0.00	A	0	0.01	A	1

The intersection will operate with excess capacity and a level of service A. No additional turning lanes will be required.

8.0 Geometric Considerations

8.1 Left Turn Warrant Analysis

The warrants for a left turn lane, under existing and future traffic conditions along Gartshore Street were assessed based on the information contained in the *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads* (MTO, April 2020). A design speed of 60 km/h was considered along Gartshore Street. The results of the left-turn lane warrant analysis are summarized in Table 13. Detailed analysis can be found in Appendix I.

Table 13: Left Turn Warrant Analysis Along Gartshore Street

Intersections	Direction	Storage Length [m]	
		AM Peak Hour	PM Peak Hour
Existing Conditions			
Gordon Street	Northbound	Not Warranted	Not Warranted
Dickson Drive	Southbound	Not Warranted	Not Warranted
Background 2032 Conditions			
Gordon Street	Northbound	Not Warranted	**15 m**
Dickson Drive	Southbound	**15 m**	Not Warranted

Table 13: Left Turn Warrant Analysis Along Gartshore Street continued

Intersections	Direction	Storage Length [m]	
		AM Peak Hour	PM Peak Hour
Background 2037 Conditions			
Gordon Street	Northbound	Not Warranted	**15 m**
Dickson Drive	Southbound	**15 m**	Not Warranted
Total 2032 Conditions			
South Driveway	Northbound	Not Warranted	Not Warranted
Gordon Street	Northbound	Not Warranted	**15 m**
Dickson Drive	Southbound	**15 m**	Not Warranted
Total 2037 Conditions			
South Driveway	Northbound	Not Warranted	Not Warranted
Gordon Street	Northbound	Not Warranted	**15 m**
Dickson Drive	Southbound	**15 m**	Not Warranted

Based on the above MTO criteria, under background 2032 conditions, the northbound left at Gordon Street / Gartshore Street intersection and the southbound left at Dickson Drive / Gartshore Street intersection will warrant an exclusive left turn lane with a 15 m storage.

Based on the Synchro analysis, under 2037 total conditions during the PM peak hour (worse-case scenario), the projected 95th percentile queue will be 10 m for the northbound left turn at the Gordon Street / Gartshore Street intersection and 4 m for the southbound left turn at the Dickson Drive / Gartshore Street intersection. However, there will not be operation concerns. It is recommended that the Township monitor these movements for future improvement.

8.2 Right Turn Warrant Analysis

For unsignalized intersections, MTO guidelines (Geometric Design Standards for Ontario Highways) indicates that right turn lanes may be considered where right turn volumes exceed 60 vph and where the volume of the right turning vehicles creates a hazard or reduces capacity at the intersection. For signalized intersections, the Highway Capacity Manual (HCM) indicates that an exclusive right turn lane should be considered if right turn movements exceed 300 vph and the adjacent mainline volume exceeds 300 vph. Based on the above criteria, the northbound right turn volume at the Dickson Drive / Gartshore Street intersection will have a volume of 202 vph, which exceeds the criteria under background 2032 conditions during the AM Peak Hour. This is due to the traffic generated by the industrial developments along Dickson Drive. This is due to the traffic generated by the future Dickson Drive industrial developments. The timing for implementing a future northbound right turn lane would be dependent on when the future

Dickson Drive industrial developments are to be fully built-out. Phase 1 traffic will not contribute to this movement. However, the movement will not have any capacity and delay concerns. The Township should monitor this movement to implement a right turn lane or taper.

9.0 Site Plan Review

A high-level review was conducted of the proposed site plan for internal circulation and access. An access and circulation analysis was conducted for a passenger vehicle, a snow plow, and a typical gravel truck (HSU) design vehicles using AutoTURN, which is shown in Appendix J. The analysis confirms that the proposed geometrics will accommodate for all vehicles that will visit the site.

9.1 Active Transportation Considerations

The Township's TMP recommends some enhancements to the active transportation network in the general area of the proposed Operations Centre. Recognizing the additional employment to be generated at the Operations Centre, the following additions to the active transportation facilities may be considered by the Township to minimize the generation of vehicles using the roads and their inherent environmental impacts:

- Extend sidewalk connections north of Gordon Street on Garthshore Street to encourage pedestrians to consider walking.
- Extend off-road active transportation route north of Gordon Street on Garthshore Street to consider cycling.

10.0 Conclusions

10.1 Traffic Operations

Under existing and future conditions, all intersections are and will operate with excess capacity, a level of service D or better and queues that are projected to be within their existing storage and link distances with one exception as discussed below.

Under background traffic conditions, during the afternoon peak hour in 2032 and 2037 horizons, the southbound left turn queue at the intersection of Highway 6 / Gordon Street will extend by about 1 to 2 vehicles into the taper area for this lane. Under total traffic conditions, the impact on this queuing is forecasted to be minimal and therefore similar queuing operations are expected. To minimize the identified future queuing deficiency, it is recommended that the signal timing be optimized at this intersection. A sensitivity analysis was completed that confirms acceptable traffic operations with an optimized signal timing plan. It is recommended that the Township continue to monitor traffic operations at this intersection, to confirm the signal optimization requirements, as well as to confirm the interface of traffic operations at this location with traffic operations at the adjacent intersection at Highway 6 / Sideroad 19.

Overall, Phase 1 of the site will not result in any external intersection improvements.

10.2 Geometric Considerations

Left Turn Warrant Analysis

The warrants for a left turn lane, under existing and future traffic conditions along Gartshore Street were assessed based on the information contained in the *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads* (MTO, April 2020). A design speed of 60 km/h was considered along Gartshore Street. Based on the MTO criteria, under background 2032 conditions, the northbound left at Gordon Street / Gartshore Street intersection and the southbound left at Dickson Drive / Gartshore Street intersection will warrant an exclusive left turn lane with a 15 m storage. Also, there will be no operation concerns at these locations. It is recommended that the Township continue to monitor this intersection for future improvement.

Right Turn Warrant Analysis

The warrant for a right turn lane for unsignalized intersections follows the MTO guidelines (Geometric Design Standards for Ontario Highways). For signalized intersections, the Highway Capacity Manual (HCM) guidelines were reviewed. Based on the two documentation's criteria, the northbound right turn volume at the Dickson Drive / Gartshore Street intersection will have a volume of 202 vph, which meets the criteria

under background 2032 conditions during the AM Peak Hour. This is due to the traffic generated by the industrial developments along Dickson Drive. Phase 1 traffic will not contribute to this movement. However, the movement will not have any capacity and delay concerns. The Township should review this movement to implement a right turn lane or taper.

10.3 Site Plan Review

No additional lane requirements will be required because of site traffic. Access and circulation analyses utilizing AutoTURN confirms that the site can accommodate all expected design vehicles.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

Traffic Counts and Signal Timing Plan

Peak Hour Diagram

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Specified Period		One Hour Peak	
From:	07:00:00	From:	07:30:00
To:	09:00:00	To:	08:30:00

Intersection: Gartshore St & Garafraxa St E
Site Code: 2223400001
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Signalized Intersection **** **Major Road:** Garafraxa St E runs E/W

North Approach

	Out	In	Total
Cars	132	129	261
Trucks	7	7	14
Bicycles	1	0	1
	140	**136**	**276**

Gartshore St

Bicycles	0	0	1	0
Trucks	0	7	0	0
Cars	45	74	13	0
Totals	**45**	**81**	**14**	**0**

East Approach

	Out	In	Total
Cars	227	249	476
Trucks	22	9	31
Bicycles	0	1	1
	249	**259**	**508**

Garafraxa St E

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	2	29	**31**
0	5	187	**192**
0	1	44	**45**

Peds: 2

Peds: 2

Peds: 1

Garafraxa St E

Totals	Cars	Trucks	Bicycles
0	0	0	0
18	15	3	0
186	170	16	0
45	42	3	0

Peds: 0

West Approach

	Out	In	Total
Cars	260	262	522
Trucks	8	17	25
Bicycles	0	0	0
	268	**279**	**547**

Totals	**48**	**87**	**53**	**0**
Cars	47	85	49	0
Trucks	1	2	4	0
Bicycles	0	0	0	0

Gartshore St

South Approach

	Out	In	Total
Cars	181	160	341
Trucks	7	11	18
Bicycles	0	0	0
	188	**171**	**359**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Gartshore St & Garafraxa St E
Site Code: 2223400001
Count Date: Jul 06, 2022
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Gartshore St						South Approach Gartshore St						East Approach Garafraxa St E						West Approach Garafraxa St E						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:30	7	24	8	0	0	39	12	13	11	0	0	36	11	46	5	0	0	62	10	48	12	0	0	70	207
07:45	0	24	10	0	0	34	13	28	11	0	0	52	18	54	3	0	1	75	9	53	15	0	0	77	238
08:00	4	16	17	0	0	37	11	21	13	0	0	45	9	38	3	0	0	50	6	44	7	0	1	57	189
08:15	3	17	10	0	2	30	12	25	18	0	0	55	7	48	7	0	0	62	6	47	11	0	1	64	211
Grand Total	**14**	**81**	**45**	**0**	**2**	**140**	**48**	**87**	**53**	**0**	**0**	**188**	**45**	**186**	**18**	**0**	**1**	**249**	**31**	**192**	**45**	**0**	**2**	**268**	**845**
Approach %	10	57.9	32.1	0		-	25.5	46.3	28.2	0		-	18.1	74.7	7.2	0		-	11.6	71.6	16.8	0		-	
Totals %	1.7	9.6	5.3	0		16.6	5.7	10.3	6.3	0		22.2	5.3	22	2.1	0		29.5	3.7	22.7	5.3	0		31.7	
PHF	**0.5**	**0.84**	**0.66**	**0**		**0.9**	**0.92**	**0.78**	**0.74**	**0**		**0.85**	**0.63**	**0.86**	**0.64**	**0**		**0.83**	**0.78**	**0.91**	**0.75**	**0**		**0.87**	**0.89**
Cars	13	74	45	0		132	47	85	49	0		181	42	170	15	0		227	29	187	44	0		260	800
% Cars	92.9	91.4	100	0		94.3	97.9	97.7	92.5	0		96.3	93.3	91.4	83.3	0		91.2	93.5	97.4	97.8	0		97	94.7
Trucks	0	7	0	0		7	1	2	4	0		7	3	16	3	0		22	2	5	1	0		8	44
% Trucks	0	8.6	0	0		5	2.1	2.3	7.5	0		3.7	6.7	8.6	16.7	0		8.8	6.5	2.6	2.2	0		3	5.2
Bicycles	1	0	0	0		1	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	1
% Bicycles	7.1	0	0	0		0.7	0	0	0	0		0	0	0	0	0		0	0	0	0	0		0	0.1
Peds					2	-					0	-					1	-					2	-	5
% Peds					40	-					0	-					20	-					40	-	

Peak Hour Diagram

Specified Period

From: 16:00:00
To: 18:00:00

One Hour Peak

From: 16:15:00
To: 17:15:00

Intersection: Gartshore St & Garafraxa St E
Site Code: 2223400001
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Signalized Intersection ****

Major Road: Garafraxa St E runs E/W

North Approach

	Out	In	Total
Cars	186	214	400
Trucks	4	4	8
Bicycles	1	2	3
	191	**220**	**411**

Gartshore St

Bicycles	0	1	0	0
Trucks	1	3	0	0
Cars	70	102	14	0
Totals	**71**	**106**	**14**	**0**

East Approach

	Out	In	Total
Cars	374	324	698
Trucks	12	9	21
Bicycles	1	2	3
	387	**335**	**722**

Garafraxa St E

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	1	69	**70**
2	8	231	**241**
0	1	56	**57**

Peds: 1

Peds: 0

Peds: 1

Garafraxa St E

Totals	Cars	Trucks	Bicycles
0	0	0	0
23	21	2	0
269	260	8	1
95	93	2	0

Peds: 2

West Approach

	Out	In	Total
Cars	356	400	756
Trucks	10	10	20
Bicycles	2	1	3
	368	**411**	**779**

Totals	**71**	**127**	**80**	**0**
Cars	70	124	79	0
Trucks	1	1	1	0
Bicycles	0	2	0	0

Gartshore St

South Approach

	Out	In	Total
Cars	273	251	524
Trucks	3	6	9
Bicycles	2	1	3
	278	**258**	**536**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Gartshore St & Garafraxa St E
Site Code: 2223400001
Count Date: Jul 06, 2022
Period: 16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Gartshore St						South Approach Gartshore St						East Approach Garafraxa St E						West Approach Garafraxa St E						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:15	5	26	16	0	0	47	13	29	21	0	0	63	25	66	5	0	0	96	13	57	10	0	0	80	286
16:30	6	36	15	0	0	57	19	28	29	0	2	76	27	72	7	0	1	106	17	55	17	0	1	89	328
16:45	2	21	21	0	0	44	25	32	16	0	0	73	19	53	7	0	0	79	26	69	13	0	0	108	304
17:00	1	23	19	0	0	43	14	38	14	0	0	66	24	78	4	0	0	106	14	60	17	0	0	91	306
Grand Total	**14**	**106**	**71**	**0**	**0**	**191**	**71**	**127**	**80**	**0**	**2**	**278**	**95**	**269**	**23**	**0**	**1**	**387**	**70**	**241**	**57**	**0**	**1**	**368**	**1224**
Approach %	7.3	55.5	37.2	0		-	25.5	45.7	28.8	0		-	24.5	69.5	5.9	0		-	19	65.5	15.5	0		-	
Totals %	1.1	8.7	5.8	0		15.6	5.8	10.4	6.5	0		22.7	7.8	22	1.9	0		31.6	5.7	19.7	4.7	0		30.1	
PHF	**0.58**	**0.74**	**0.85**	**0**		**0.84**	**0.71**	**0.84**	**0.69**	**0**		**0.91**	**0.88**	**0.86**	**0.82**	**0**		**0.91**	**0.67**	**0.87**	**0.84**	**0**		**0.85**	**0.93**
Cars	14	102	70	0		186	70	124	79	0		273	93	260	21	0		374	69	231	56	0		356	1189
% Cars	100	96.2	98.6	0		97.4	98.6	97.6	98.8	0		98.2	97.9	96.7	91.3	0		96.6	98.6	95.9	98.2	0		96.7	97.1
Trucks	0	3	1	0		4	1	1	1	0		3	2	8	2	0		12	1	8	1	0		10	29
% Trucks	0	2.8	1.4	0		2.1	1.4	0.8	1.3	0		1.1	2.1	3	8.7	0		3.1	1.4	3.3	1.8	0		2.7	2.4
Bicycles	0	1	0	0		1	0	2	0	0		2	0	1	0	0		1	0	2	0	0		2	6
% Bicycles	0	0.9	0	0		0.5	0	1.6	0	0		0.7	0	0.4	0	0		0.3	0	0.8	0	0		0.5	0.5
Peds					0	-					2	-					1	-					1	-	4
% Peds					0	-					50	-					25	-					25	-	

Peak Hour Diagram

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Specified Period		One Hour Peak	
From:	07:00:00	From:	07:15:00
To:	09:00:00	To:	08:15:00

Intersection: Gartshore St & Gordon St
Site Code: 2223400002
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Unsignalized Intersection **** **Major Road:** Gartshore St runs N/S

North Approach

	Out	In	Total
Cars	41	99	140
Trucks	4	1	5
Bicycles	0	1	1
	45	**101**	**146**

Gartshore St

Bicycles	0	0	0
Trucks	1	3	0
Cars	16	25	0
Totals	**17**	**28**	**0**

Peds: 0

Gordon St

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
1	1	56	**58**
0	13	184	**197**

Peds: 0

Peds: 0

Peds: 0

Totals	**130**	**43**	**0**
Cars	120	43	0
Trucks	9	0	0
Bicycles	1	0	0

Gartshore St

West Approach

	Out	In	Total
Cars	240	136	376
Trucks	14	10	24
Bicycles	1	1	2
	255	**147**	**402**

South Approach

	Out	In	Total
Cars	163	209	372
Trucks	9	16	25
Bicycles	1	0	1
	173	**225**	**398**

Cars - Trucks - Bicycles

Comments

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Peak Hour Summary

Intersection:	Gartshore St & Gordon St
Site Code:	2223400002
Count Date:	Jul 06, 2022
Period:	07:00 - 09:00

Peak Hour Data (07:15 - 08:15)

Start Time	North Approach Gartshore St						South Approach Gartshore St						East Approach						West Approach Gordon St						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:15		6	2	0	0	8	23	14		0	0	37					0		23		50	0	0	73	118
07:30		11	3	0	0	14	38	6		0	0	44					0		13		58	0	0	71	129
07:45		7	3	0	0	10	31	15		0	0	46					0		10		62	0	0	72	128
08:00		4	9	0	0	13	38	8		0	0	46					0		12		27	0	0	39	98
Grand Total		**28**	**17**	**0**	**0**	**45**	**130**	**43**		**0**	**0**	**173**					**0**	**0**	**58**		**197**	**0**	**0**	**255**	**473**
Approach %		62.2	37.8	0		-	75.1	24.9		0		-						-	22.7		77.3	0		-	
Totals %		5.9	3.6	0		9.5	27.5	9.1		0		36.6						0	12.3		41.6	0		53.9	
PHF		**0.64**	**0.47**	**0**		**0.8**	**0.86**	**0.72**		**0**		**0.94**						**0**	**0.63**		**0.79**	**0**		**0.87**	**0.92**
Cars		25	16	0		41	120	43		0		163						0	56		184	0		240	444
% Cars		89.3	94.1	0		91.1	92.3	100		0		94.2						0	96.6		93.4	0		94.1	93.9
Trucks		3	1	0		4	9	0		0		9						0	1		13	0		14	27
% Trucks		10.7	5.9	0		8.9	6.9	0		0		5.2						0	1.7		6.6	0		5.5	5.7
Bicycles		0	0	0		0	1	0		0		1						0	1		0	0		1	2
% Bicycles		0	0	0		0	0.8	0		0		0.6						0	1.7		0	0		0.4	0.4
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:15:00
To:	18:00:00	To:	17:15:00

Intersection: Gartshore St & Gordon St
Site Code: 2223400002
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Unsignalized Intersection **** **Major Road:** Gartshore St runs N/S

North Approach

	Out	In	Total
Cars	116	47	163
Trucks	2	1	3
Bicycles	1	0	1
	119	**48**	**167**

Gartshore St

Bicycles	0	1	0
Trucks	2	0	0
Cars	51	65	0
Totals	**53**	**66**	**0**

Peds: 0

Gordon St

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	0	23	**23**
2	9	199	**210**

Peds: 0

Peds: 0

Peds: 0

Totals	**266**	**25**	**0**
Cars	261	24	0
Trucks	5	1	0
Bicycles	0	0	0

Gartshore St

West Approach

	Out	In	Total
Cars	222	312	534
Trucks	9	7	16
Bicycles	2	0	2
	233	**319**	**552**

South Approach

	Out	In	Total
Cars	285	264	549
Trucks	6	9	15
Bicycles	0	3	3
	291	**276**	**567**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Gartshore St & Gordon St
Site Code:	2223400002
Count Date:	Jul 06, 2022
Period:	16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Gartshore St						South Approach Gartshore St						East Approach						West Approach Gordon St						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:15		15	5	0	0	20	58	6		0	0	64					0		8		54	0	0	62	146
16:30		14	18	0	0	32	69	8		0	0	77					0		5		61	0	0	66	175
16:45		11	12	0	0	23	71	5		0	0	76					0		8		45	0	0	53	152
17:00		26	18	0	0	44	68	6		0	0	74					0		2		50	0	0	52	170
Grand Total		**66**	**53**	**0**	**0**	**119**	**266**	**25**		**0**	**0**	**291**					**0**	**0**	**23**		**210**	**0**	**0**	**233**	**643**
Approach %		55.5	44.5	0		-	91.4	8.6		0		-						-	9.9		90.1	0		-	
Totals %		10.3	8.2	0		18.5	41.4	3.9		0		45.3						0	3.6		32.7	0		36.2	
PHF		**0.63**	**0.74**	**0**		**0.68**	**0.94**	**0.78**		**0**		**0.94**						**0**	**0.72**		**0.86**	**0**		**0.88**	**0.92**
Cars		65	51	0		116	261	24		0		285						0	23		199	0		222	623
% Cars		98.5	96.2	0		97.5	98.1	96		0		97.9						0	100		94.8	0		95.3	96.9
Trucks		0	2	0		2	5	1		0		6						0	0		9	0		9	17
% Trucks		0	3.8	0		1.7	1.9	4		0		2.1						0	0		4.3	0		3.9	2.6
Bicycles		1	0	0		1	0	0		0		0						0	0		2	0		2	3
% Bicycles		1.5	0	0		0.8	0	0		0		0						0	0		1	0		0.9	0.5
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	07:45:00
To:	09:00:00	To:	08:45:00

Intersection: Gordon St & Hwy 6
Site Code: 2223400003
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Signalized Intersection **** **Major Road:** Hwy 6 runs N/S

North Approach

	Out	In	Total
Cars	461	394	855
Trucks	21	25	46
Bicycles	0	1	1
	482	**420**	**902**

Hwy 6

Bicycles	0	0	0	0
Trucks	0	10	11	0
Cars	5	316	140	0
Totals	**5**	**326**	**151**	**0**

East Approach

	Out	In	Total
Cars	175	215	390
Trucks	8	12	20
Bicycles	1	0	1
	184	**227**	**411**

Commerical Entrance

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	0	1	**1**
0	0	4	**4**
0	0	11	**11**

Peds: 2

Peds: 1

Peds: 0

Gordon St

Totals	Cars	Trucks	Bicycles
0	0	0	0
132	124	7	1
8	8	0	0
44	43	1	0

Peds: 3

West Approach

	Out	In	Total
Cars	16	25	41
Trucks	0	0	0
Bicycles	0	0	0
	16	**25**	**41**

Totals	**12**	**287**	**72**	**0**
Cars	12	269	71	0
Trucks	0	18	1	0
Bicycles	0	0	0	0

Hwy 6

South Approach

	Out	In	Total
Cars	352	370	722
Trucks	19	11	30
Bicycles	0	0	0
	371	**381**	**752**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Gordon St & Hwy 6
Site Code:	2223400003
Count Date:	Jul 06, 2022
Period:	07:00 - 09:00

Peak Hour Data (07:45 - 08:45)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach Gordon St						West Approach Commerical Entrance						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:45	54	84	2	0	0	140	4	61	17	0	0	82	7	1	31	0	0	39	1	0	0	0	0	1	262
08:00	27	53	0	0	2	80	1	60	10	0	1	71	18	1	45	0	0	64	0	2	7	0	1	9	224
08:15	45	99	1	0	0	145	3	60	13	0	0	76	10	1	25	0	0	36	0	0	1	0	0	1	258
08:30	25	90	2	0	0	117	4	106	32	0	2	142	9	5	31	0	0	45	0	2	3	0	0	5	309
Grand Total	**151**	**326**	**5**	**0**	**2**	**482**	**12**	**287**	**72**	**0**	**3**	**371**	**44**	**8**	**132**	**0**	**0**	**184**	**1**	**4**	**11**	**0**	**1**	**16**	**1053**
Approach %	31.3	67.6	1	0		-	3.2	77.4	19.4	0		-	23.9	4.3	71.7	0		-	6.3	25	68.8	0		-	
Totals %	14.3	31	0.5	0		45.8	1.1	27.3	6.8	0		35.2	4.2	0.8	12.5	0		17.5	0.1	0.4	1	0		1.5	
PHF	**0.7**	**0.82**	**0.63**	**0**		**0.83**	**0.75**	**0.68**	**0.56**	**0**		**0.65**	**0.61**	**0.4**	**0.73**	**0**		**0.72**	**0.25**	**0.5**	**0.39**	**0**		**0.44**	**0.85**
Cars	140	316	5	0		461	12	269	71	0		352	43	8	124	0		175	1	4	11	0		16	1004
% Cars	92.7	96.9	100	0		95.6	100	93.7	98.6	0		94.9	97.7	100	93.9	0		95.1	100	100	100	0		100	95.3
Trucks	11	10	0	0		21	0	18	1	0		19	1	0	7	0		8	0	0	0	0		0	48
% Trucks	7.3	3.1	0	0		4.4	0	6.3	1.4	0		5.1	2.3	0	5.3	0		4.3	0	0	0	0		0	4.6
Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	1	0		1	0	0	0	0		0	1
% Bicycles	0	0	0	0		0	0	0	0	0		0	0	0	0.8	0		0.5	0	0	0	0		0	0.1
Peds					2	-					3	-					0	-					1	-	6
% Peds					33.3	-					50	-					0	-					16.7	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:15:00
To:	18:00:00	To:	17:15:00

Intersection: Gordon St & Hwy 6
Site Code: 2223400003
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Signalized Intersection **** **Major Road:** Hwy 6 runs N/S

North Approach

	Out	In	Total
Cars	565	642	1207
Trucks	16	9	25
Bicycles	0	0	0
	581	**651**	**1232**

Hwy 6

Bicycles	0	0	0	0
Trucks	0	5	11	0
Cars	16	319	230	0
Totals	**16**	**324**	**241**	**0**

Peds: 7

Peds: 2

Peds: 1

Peds: 2

East Approach

	Out	In	Total
Cars	303	344	647
Trucks	6	15	21
Bicycles	1	1	2
	310	**360**	**670**

Commerical Entrance

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	0	29	**29**
1	0	35	**36**
1	0	72	**73**

Gordon St

Totals	Cars	Trucks	Bicycles
0	0	0	0
195	191	4	0
38	38	0	0
77	74	2	1

West Approach

	Out	In	Total
Cars	136	149	285
Trucks	0	0	0
Bicycles	2	0	2
	138	**149**	**287**

Hwy 6

Totals	**95**	**427**	**83**	**0**
Cars	95	422	79	0
Trucks	0	5	4	0
Bicycles	0	0	0	0

South Approach

	Out	In	Total
Cars	596	465	1061
Trucks	9	7	16
Bicycles	0	2	2
	605	**474**	**1079**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Gordon St & Hwy 6
Site Code:	2223400003
Count Date:	Jul 06, 2022
Period:	16:00 - 18:00

Peak Hour Data (16:15 - 17:15)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach Gordon St						West Approach Commerical Entrance						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:15	53	71	3	0	4	127	30	104	27	0	1	161	15	10	35	0	1	60	11	8	23	0	1	42	390
16:30	53	91	9	0	1	153	24	110	20	0	0	154	29	12	48	0	0	89	5	11	14	0	0	30	426
16:45	95	87	2	0	1	184	18	96	18	0	1	132	18	11	52	0	0	81	8	10	18	0	0	36	433
17:00	40	75	2	0	1	117	23	117	18	0	0	158	15	5	60	0	0	80	5	7	18	0	1	30	385
Grand Total	**241**	**324**	**16**	**0**	**7**	**581**	**95**	**427**	**83**	**0**	**2**	**605**	**77**	**38**	**195**	**0**	**1**	**310**	**29**	**36**	**73**	**0**	**2**	**138**	**1634**
Approach %	41.5	55.8	2.8	0		-	15.7	70.6	13.7	0		-	24.8	12.3	62.9	0		-	21	26.1	52.9	0		-	
Totals %	14.7	19.8	1	0		35.6	5.8	26.1	5.1	0		37	4.7	2.3	11.9	0		19	1.8	2.2	4.5	0		8.4	
PHF	**0.63**	**0.89**	**0.44**	**0**		**0.79**	**0.79**	**0.91**	**0.77**	**0**		**0.94**	**0.66**	**0.79**	**0.81**	**0**		**0.87**	**0.66**	**0.82**	**0.79**	**0**		**0.82**	**0.94**
Cars	230	319	16	0		565	95	422	79	0		596	74	38	191	0		303	29	35	72	0		136	1600
% Cars	95.4	98.5	100	0		97.2	100	98.8	95.2	0		98.5	96.1	100	97.9	0		97.7	100	97.2	98.6	0		98.6	97.9
Trucks	11	5	0	0		16	0	5	4	0		9	2	0	4	0		6	0	0	0	0		0	31
% Trucks	4.6	1.5	0	0		2.8	0	1.2	4.8	0		1.5	2.6	0	2.1	0		1.9	0	0	0	0		0	1.9
Bicycles	0	0	0	0		0	0	0	0	0		0	1	0	0	0		1	0	1	1	0		2	3
% Bicycles	0	0	0	0		0	0	0	0	0		0	1.3	0	0	0		0.3	0	2.8	1.4	0		1.4	0.2
Peds					7	-					2	-					1	-					2	-	12
% Peds					58.3	-					16.7	-					8.3	-					16.7	-	

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Diagram

Specified Period		One Hour Peak	
From:	07:00:00	From:	07:30:00
To:	09:00:00	To:	08:30:00

Intersection: Sideroad 15 & Hwy 6
Site Code: 2223400004
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Unsignalized Intersection **** **Major Road:** Hwy 6 runs N/S

North Approach

	Out	In	Total
Cars	297	192	489
Trucks	20	31	51
Bicycles	0	0	0
	317	**223**	**540**

Hwy 6

Bicycles	0	0	0
Trucks	5	15	0
Cars	25	272	0
Totals	**30**	**287**	**0**

Peds: 0

Sideroad 15

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	1	15	**16**
2	6	83	**91**

Peds: 0

Peds: 0

Peds: 0

Totals	**96**	**207**	**0**
Cars	92	177	0
Trucks	4	30	0
Bicycles	0	0	0

Hwy 6

West Approach

	Out	In	Total
Cars	98	117	215
Trucks	7	9	16
Bicycles	2	0	2
	107	**126**	**233**

South Approach

	Out	In	Total
Cars	269	355	624
Trucks	34	21	55
Bicycles	0	2	2
	303	**378**	**681**

Cars - Trucks - Bicycles

Comments

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection: Sideroad 15 & Hwy 6
Site Code: 2223400004
Count Date: Jul 06, 2022
Period: 07:00 - 09:00

Peak Hour Data (07:30 - 08:30)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach						West Approach Sideroad 15						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
07:30		87	7	0	0	94	25	52		0	0	77					0		4		19	0	0	23	194
07:45		76	10	0	0	86	21	51		0	0	72					0		5		25	0	0	30	188
08:00		43	6	0	0	49	33	49		0	0	82					0		4		24	0	0	28	159
08:15		81	7	0	0	88	17	55		0	0	72					0		3		23	0	0	26	186
Grand Total		**287**	**30**	**0**	**0**	**317**	**96**	**207**		**0**	**0**	**303**					**0**	**0**	**16**		**91**	**0**	**0**	**107**	**727**
Approach %		90.5	9.5	0		-	31.7	68.3		0		-						-	15		85	0		-	
Totals %		39.5	4.1	0		43.6	13.2	28.5		0		41.7						0	2.2		12.5	0		14.7	
PHF		**0.82**	**0.75**	**0**		**0.84**	**0.73**	**0.94**		**0**		**0.92**						**0**	**0.8**		**0.91**	**0**		**0.89**	**0.94**
Cars		272	25	0		297	92	177		0		269						0	15		83	0		98	664
% Cars		94.8	83.3	0		93.7	95.8	85.5		0		88.8						0	93.8		91.2	0		91.6	91.3
Trucks		15	5	0		20	4	30		0		34						0	1		6	0		7	61
% Trucks		5.2	16.7	0		6.3	4.2	14.5		0		11.2						0	6.3		6.6	0		6.5	8.4
Bicycles		0	0	0		0	0	0		0		0						0	0		2	0		2	2
% Bicycles		0	0	0		0	0	0		0		0						0	0		2.2	0		1.9	0.3
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	

Peak Hour Diagram

Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Specified Period		One Hour Peak	
From:	16:00:00	From:	16:30:00
To:	18:00:00	To:	17:30:00

Intersection: Sideroad 15 & Hwy 6
Site Code: 2223400004
Count Date: Jul 06, 2022

Weather conditions: Clear

**** Unsignalized Intersection **** **Major Road:** Hwy 6 runs N/S

North Approach

	Out	In	Total
Cars	305	437	742
Trucks	13	10	23
Bicycles	0	0	0
	318	**447**	**765**

Hwy 6

Bicycles	0	0	0
Trucks	3	10	0
Cars	20	285	0
Totals	**23**	**295**	**0**

Peds: 0

Sideroad 15

Bicycles	Trucks	Cars	Totals
0	0	0	**0**
0	1	23	**24**
0	4	130	**134**

Peds: 0

Peds: 0

Peds: 0

West Approach

	Out	In	Total
Cars	153	124	277
Trucks	5	4	9
Bicycles	0	0	0
	158	**128**	**286**

Totals	**105**	**423**	**0**
Cars	104	414	0
Trucks	1	9	0
Bicycles	0	0	0

Hwy 6

South Approach

	Out	In	Total
Cars	518	415	933
Trucks	10	14	24
Bicycles	0	0	0
	528	**429**	**957**

Cars - Trucks - Bicycles

Comments

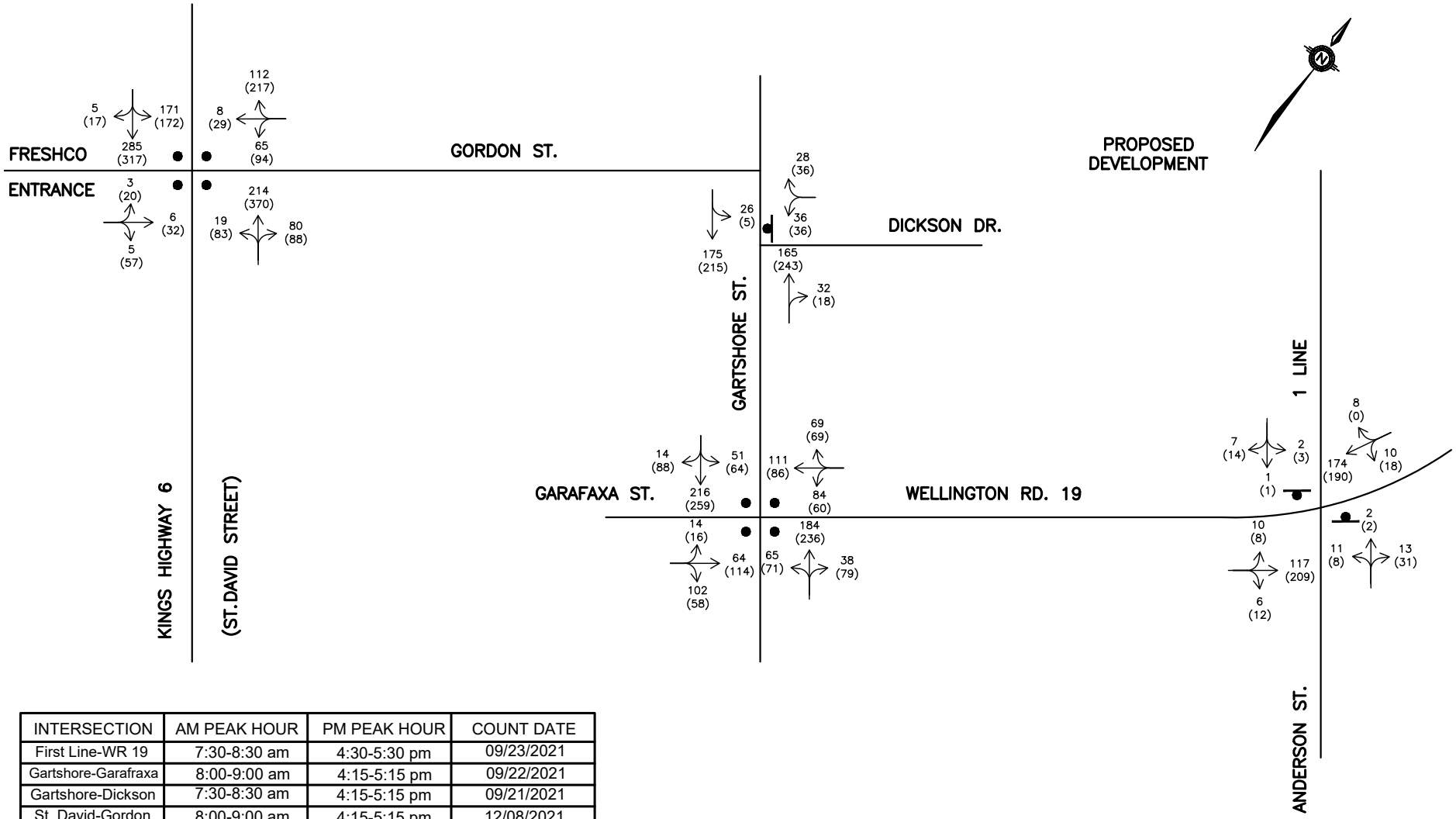
Ontario Traffic Inc.
Traffic Monitoring • Services & Products

Peak Hour Summary

Intersection:	Sideroad 15 & Hwy 6
Site Code:	2223400004
Count Date:	Jul 06, 2022
Period:	16:00 - 18:00

Peak Hour Data (16:30 - 17:30)

Start Time	North Approach Hwy 6						South Approach Hwy 6						East Approach						West Approach Sideroad 15						Total Vehicles
					Peds	Total					Peds	Total					Peds	Total					Peds	Total	
16:30		81	5	0	0	86	27	107		0	0	134					0		4		30	0	0	34	254
16:45		64	4	0	0	68	29	84		0	0	113					0		5		28	0	0	33	214
17:00		72	6	0	0	78	26	115		0	0	141					0		6		34	0	0	40	259
17:15		78	8	0	0	86	23	117		0	0	140					0		9		42	0	0	51	277
Grand Total		**295**	**23**	**0**	**0**	**318**	**105**	**423**		**0**	**0**	**528**					**0**	**0**	**24**		**134**	**0**	**0**	**158**	**1004**
Approach %		92.8	7.2	0		-	19.9	80.1		0		-						-	15.2		84.8	0		-	
Totals %		29.4	2.3	0		31.7	10.5	42.1		0		52.6						0	2.4		13.3	0		15.7	
PHF		**0.91**	**0.72**	**0**		**0.92**	**0.91**	**0.9**		**0**		**0.94**						**0**	**0.67**		**0.8**	**0**		**0.77**	**0.91**
Cars		285	20	0		305	104	414		0		518						0	23		130	0		153	976
% Cars		96.6	87	0		95.9	99	97.9		0		98.1						0	95.8		97	0		96.8	97.2
Trucks		10	3	0		13	1	9		0		10						0	1		4	0		5	28
% Trucks		3.4	13	0		4.1	1	2.1		0		1.9						0	4.2		3	0		3.2	2.8
Bicycles		0	0	0		0	0	0		0		0						0	0		0	0		0	0
% Bicycles		0	0	0		0	0	0		0		0						0	0		0	0		0	0
Peds					0	-					0	-					0	-					0	-	0
% Peds					0	-					0	-					0	-					0	-	



INTERSECTION	AM PEAK HOUR	PM PEAK HOUR	COUNT DATE
First Line-WR 19	7:30-8:30 am	4:30-5:30 pm	09/23/2021
Gartshore-Garafraxa	8:00-9:00 am	4:15-5:15 pm	09/22/2021
Gartshore-Dickson	7:30-8:30 am	4:15-5:15 pm	09/21/2021
St. David-Gordon	8:00-9:00 am	4:15-5:15 pm	12/08/2021

(NOT TO SCALE)

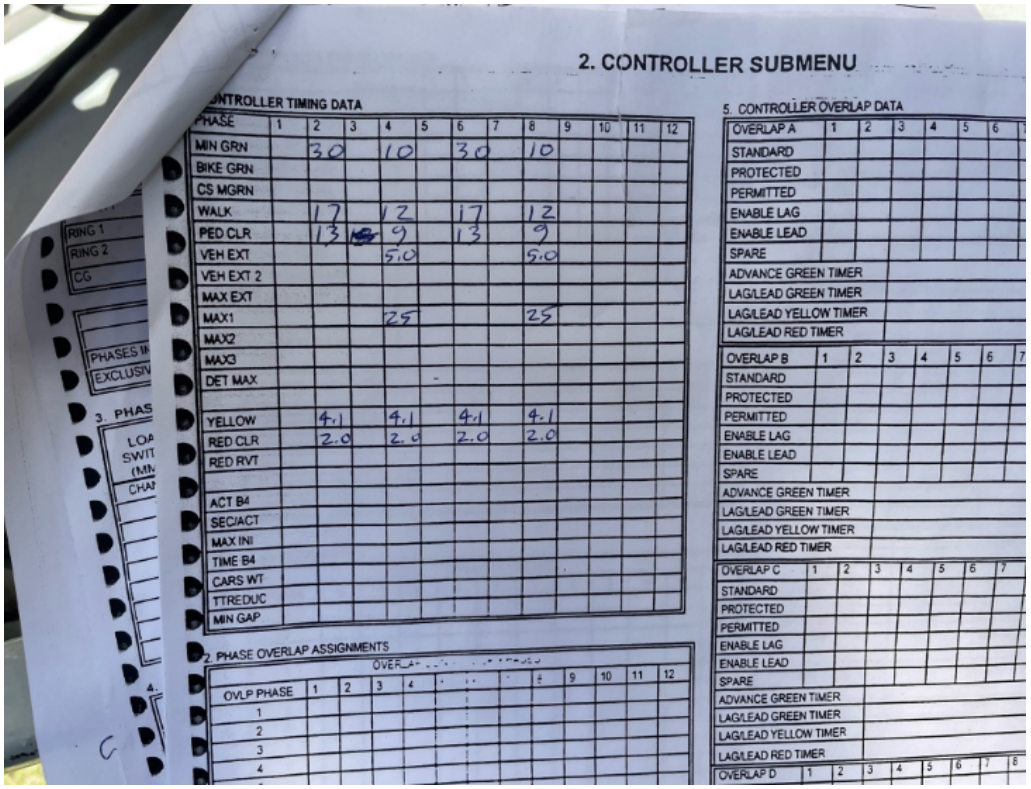
LEGEND:

- STOP CONTROL
- 25 (25) AM PEAK HOUR / PM PEAK HOUR TRAFFIC VOLUMES
- EXISTING ROAD
- TRAFFIC FLOW
- TRAFFIC SIGNALS
- PROPOSED ENTRANCE

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

FIGURE 1:
2021 EXISTING PEAK HOUR TRAFFIC

Gartshore / Garafraxa Signal Timing



2. CONTROLLER SUBMENU

CONTROLLER TIMING DATA

PHASE	1	2	3	4	5	6	7	8	9	10	11	12
MIN GRN		30		10		30		10				
BIKE GRN												
CS MGRN												
WALK		17		12		17		12				
PED CLR		13		9		13		9				
VEH EXT				5.0				5.0				
VEH EXT 2												
MAX EXT												
MAX1				25				25				
MAX2												
MAX3												
DET MAX												
YELLOW		4.1		4.1		4.1		4.1				
RED CLR		2.0		2.0		2.0		2.0				
RED RVT												
ACT B4												
SEC/ACT												
MAX INI												
TIME B4												
CARS WT												
TTREDUC												
MIN GAP												

2. PHASE OVERLAP ASSIGNMENTS

OVLP PHASE	1	2	3	4	5	6	7	8	9	10	11	12
1												
2												
3												
4												

5. CONTROLLER OVERLAP DATA

OVERLAP A	1	2	3	4	5	6	7
STANDARD							
PROTECTED							
PERMITTED							
ENABLE LAG							
ENABLE LEAD							
SPARE							
ADVANCE GREEN TIMER							
LAG/LEAD GREEN TIMER							
LAG/LEAD YELLOW TIMER							
LAG/LEAD RED TIMER							

OVERLAP B	1	2	3	4	5	6	7
STANDARD							
PROTECTED							
PERMITTED							
ENABLE LAG							
ENABLE LEAD							
SPARE							
ADVANCE GREEN TIMER							
LAG/LEAD GREEN TIMER							
LAG/LEAD YELLOW TIMER							
LAG/LEAD RED TIMER							

OVERLAP C	1	2	3	4	5	6	7
STANDARD							
PROTECTED							
PERMITTED							
ENABLE LAG							
ENABLE LEAD							
SPARE							
ADVANCE GREEN TIMER							
LAG/LEAD GREEN TIMER							
LAG/LEAD YELLOW TIMER							
LAG/LEAD RED TIMER							

OVERLAP D	1	2	3	4	5	6	7	8

1-3 PHASE TO LOAD SWITCH (MMU) ASSIGNMENT

LOAD SWITCH	PHASE / OVERLAP 1-16	TYPE VPO	DIMMING				AUTOMATIC FLASH		
			RED	YELLOW	GREEN	DIMMING PHASE + -	RED	YELLOW	FLASH TOGETHER
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

1-4-2 MMU PROGRAM

#

CH2CH	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															
13															
14															
15															

1-4-1 SDLC OPTIONS

	BIU NUMBER							
TERM & FACIL	1	2	3	4	5	6	7	8
ENABLE								
DETECTOR RACK	1	2	3	4	5	6	7	8
ENABLE								

ENABLE TS2 / MMU TYPE CABINET TYPE	
ENABLE SDLC MMU STOP TIME	
ENABLE 3 CRITICAL RFEs LOCKUP	
ENABLE DIAGNOSTIC ENABLE (TEST FIXTURE)	
ENABLE SECONDARY TO SECONDARY	
SECONDARY TO SECONDARY ADDRESSING	

T&F	01	02	03	04	05	06	07	08	MMU
D/R	09	10	11	12	13	14	15	16	

1-4-3 COLOUR CHECK ENABLE

ENABLE ALL COLOUR CHECKS

MMU CHANNEL	1	2	3	4	5	6	7	8
GREEN / WALK								
YELLOW / PC								
RED / DW								

MMU CHANNEL	9	10	11	12	13	14	15	16
GREEN / WALK								
YELLOW / PC								
RED / DW								

1-5-1 ETHERNET PORT CONFIGURATION

MAC ADDRESS						
CONTROLLER IP						
SUBNET MASK						
DEFAULT GATEWAY IP						
SERVER IP						
LINK SPEED / DUPLEX						

1-5-2 ASC/3 PORT 2 − 2070 C50S

ENABLE		PROTOCOL	
BIT RATE		ADDRESS	
DATA/PARITY/STOP DATA/P/S		GROUP ADD / TDR	
DUPLEX HALF/FULL		SIGNAL FLAG	
FLOW CONTROL		DROP-OUT TIME	
INTERSECTION MONITOR			
MODEM SETUP STRING			
USER STRING			

1-5-3 ASC/3 PORT 3A − 2070 C21S

ENABLE		PROTOCOL	
BIT RATE		ADDRESS	
DATA/PARITY/STOP DATA/P/S		GROUP ADD / TDR	
DUPLEX HALF/FULL		SIGNAL FLAG	
FLOW CONTROL		DROP-OUT TIME	

1-5-4 ASC/3 PORT 3B − 2070 C22S

ENABLE		PROTOCOL	
BIT RATE		ADDRESS	
DATA/PARITY/STOP DATA/P/S		GROUP ADD / TDR	
DUPLEX HALF/FULL		SIGNAL FLAG	
FLOW CONTROL		DROP-OUT TIME	
RTS-CTS DELAY			
RTS TURN OFF			
EARLY RTS			

1-5-5 GLOBAL PORT PARAMETERS

NTCIP BACKUP TIME (SECONDS)	
UDP PORT	
ETHERNET PRIORITY	
PORT 2/C50S PRIORITY	
PORT 3A/C21S PRIORITY	
PORT 3B/C22S PRIORITY	

1-5-6 ECPIP

SYSTEM DETECTOR ASSIGNMENT:								
SYSTEM DET	A1	A2	B1	B2	C1	C2	D1	D2
LOCAL DET								
SECOND SYS DETECTORS A1-D2 ADDRESS								
SYSTEM DET	A1	A2	B1	B2	C1	C2	D1	D2
LOCAL DET								

1-6-1 ENABLE EVENT LOGS

CRITICAL RFEs (MMU/T&F)		3 CRITICAL FRE ERRORS IN 24	
MMU FLASH FAULTS		LOCAL FLASH FAULTS	
NON-CRITICAL RFEs (DET/TEST)		DETECTOR ERRORS	
COORDINATION ERRORS		CONTROLLER DOWNLOAD	
PREEMPT		TSP/SCP	
POWER ON/OFF		LOW BATTERY	
ACCESS		DATA CHANGE	
ALARM 1		ALARM 2	
ALARM 3		ALARM 4	
ALARM 5		ALARM 6	
ALARM 7		ALARM 8	
ALARM 9		ALARM 10	
ALARM 11		ALARM 12	
ALARM 13		ALARM 14	
ALARM 15		ALARM 16	

1-7-1 ADMINISTRATION

ENABLE CU/CABINET INTERLOCK CRC	
CU/CABINET INTERLOCK CRC VALUE	
CU/CABINET INTERLOCK HW VALUE	
CONTROLLER DATA SUMCHECK (CRC) #	
REQUEST DOWNLOAD OF PROGRAMMED DATA	

1-7-2 DISPLAY OPTIONS

KEY CLICK ENABLE	
BACKLIGHT ENABLE	

1-8-1 LOGIC STATEMENT CONTROL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LP 01-15															
LP 16-30															
LP 31-45															
LP 46-60															
LP 61-75															
LP 76-90															
LP 91-100															

1-8-2 LOGIC PROCESSOR STATEMENTS 1-4

LOGIC GATE NUMBER				1
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				2
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				3
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				4
IF				
THEN				
ELSE				

1-8-2 LOGIC PROCESSOR STATEMENTS, continued

LOGIC GATE NUMBER				
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				
IF				
THEN				
ELSE				

LOGIC GATE NUMBER				
IF				
THEN				
ELSE				

CONTROLLER SUBMENU

2-1 CONTROLLER TIMING DATA

TIMING PLAN 1																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MINIMUM GREEN	5	35		7	5	35		7								
BICYCLE MINIMUM GREEN																
CONDITIONAL SERVICE MINIMUM GREEN																
DELAYED GREEN																
WALK		25		10		25		10								
WALK 2																
WALK MAX																
PEDESTRIAN CLEARANCE		14		8		14		8								
PEDESTRIAN CLEARANCE 2																
PEDESTRIAN CLEARANCE MAX																
PEDESTRIAN CARRY OVER																
VEHICLE EXTENSION	2	5		3	2	5		3								
VEHICLE EXTENSION 2																
MAX1	10	35		25	10	35		25								
MAX2																
MAX3																
DYNAMIC MAX																
DYNAMIC MAX STEP																
YELLOW CHANGE	3	3.8		3.7	3	3.8		3.7								
RED CLRANCE	1	3.2		2.3	1	3.2		2.3								
RED MAX																
RED REVERT																
ACTUATIONS BEFORE GAP REDUCTION																
SECONDS PER ACTIONS ADDED TO INITIAL																
MAXIMUM ADDED INITIAL GREEN																
TIME BEFORE GAP REDUCTION																
CARS WAITING BEFORE GAP REDUCTION																
STEP TO REDUCE																
TIME TO REDUCE TO MINIMUM																
MINIMUM GAP																

2-1 CONTROLLER TIMING DATA, continued

TIMING PLAN																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
MINIMUM GREEN																
BICYCLE MINIMUM GREEN																
CONDITIONAL SERVICE MINIMUM GREEN																
DELAYED GREEN																
WALK																
WALK 2																
WALK MAX																
PEDESTRIAN CLEARANCE																
PEDESTRIAN CLEARANCE 2																
PEDESTRIAN CLEARANCE MAX																
PEDESTRIAN CARRY OVER																
VEHICLE EXTENSION																
VEHICLE EXTENSION 2																
MAX1																
MAX2																
MAX3																
DYNAMIC MAX																
DYNAMIC MAX STEP																
YELLOW CHANGE																
RED CLRANCE																
RED MAX																
RED REVERT																
ACTUATIONS BEFORE GAP REDUCTION																
SECONDS PER ACTIONS ADDED TO INITIAL																
MAXIMUM ADDED INITIAL GREEN																
TIME BEFORE GAP REDUCTION																
CARS WAITING BEFORE GAP REDUCTION																
STEP TO REDUCE																
TIME TO REDUCE TO MINIMUM																
MINIMUM GAP																

2-2 VEHICLE OVERLAP

TIMING VEHICLE OVERLAP (A)	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN				LAG YEL				LAG RED				ADV GRN			

TIMING VEHICLE OVERLAP (B)	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN				LAG YEL				LAG RED				ADV GRN			

TIMING VEHICLE OVERLAP (C)	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN				LAG YEL				LAG RED				ADV GRN			

2-2 VEHICLE OVERLAP, continued

TIMING VEHICLE OVERLAP ____	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN			LAG YEL			LAG RED			ADV GRN						

TIMING VEHICLE OVERLAP ____	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN			LAG YEL			LAG RED			ADV GRN						

TIMING VEHICLE OVERLAP ____	TYPE -															
PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
INCLUDED																
PROTECT																
MODIFIER																
PED PRTC																
NO SERVE																
FLSH GRN																
LAG X PH																
LAG 2 PH																
	LAG GRN			LAG YEL			LAG RED			ADV GRN						

2-3 VEH-PED OVERLAP

VEH OL \ PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VEH OL A																
VEH OL B																
VEH OL C																
VEH OL D																
VEH OL E																
VEH OL F																
VEH OL G																
VEH OL H																
VEH OL I																
VEH OL J																
VEH OL K																
VEH OL L																
VEH OL M																
VEH OL N																
VEH OL O																
VEH OL P																
PED OL \ PHASES	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED OL 1																
PED OL 2																
PED OL 3																
PED OL 4																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																
PED OL #																

2-4 GUARANTEED MINIMUM TIMES

OL / PHASE	A01	B02	C03	D04	E05	F06	G07	H08
MIN GREEN								
WALK								
PED CLR								
YELLOW								
RED CLR								
OVL GRN								
OL / PHASE	I09	J10	K11	L12	M13	N14	O15	P16
MIN GRN								
WALK								
PED CLR								
YELLOW								
RED CLR								
OVL GRN								

2-5 START / FLASH DATA

START UP																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PHASE																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
OVERLAP																
FLASH > MON.					FLASH TIME					ALL RED TIME						
PWR START SEQ.																

AUTOMATIC FLASH																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ENTRY																
EXIT																
OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
EXIT																
FLASH > MON.					MIN FLASH				EXIT FLASH							
MINIMUM RECALL									CYCLE THROUGH PHASES							

2-6-1 CONTROLLER OPTIONS

PEDESTRIAN CLEARANCE PROTECT																
UNIT RED REVERT																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
GUAR PASSAGE																
NON-ACT I																
NON-ACT II																
DUAL ENTRY		X		X		X		X								
COND SERVICE																
COND RESERVICE																
PED RESERVICE																
REST IN WALK		X				X										
FLASHING WALK																
PED CLEAR > YELL0W																
PED CLEAR > ALL RED																
IGRN + VEH EXT																

2-7 ACTUATED PRE-TIMED MODE

ENABLE PRE-TIMED OPERATION																
FREE INPUT DISABLED PRE-TIMED																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PRETIMED																

2-8 PHASE RECALL OPTIONS

TIMING PLAN NUMBER (1)																
PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
LOCK DET																
VE RCALL																
PD RCALL																
MX RCALL																
SF RCALL																
NO REST																
AI CALC																

TIMING PLAN NUMBER (2)																
PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
LOCK DET																
VE RCALL																
PD RCALL																
MX RCALL																
SF RCALL																
NO REST																
AI CALC																

TIMING PLAN NUMBER (3)																
PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
LOCK DET																
VE RCALL																
PD RCALL																
MX RCALL																
SF RCALL																
NO REST																
AI CALC																

TIMING PLAN NUMBER (4)																
PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
LOCK DET																
VE RCALL																
PD RCALL																
MX RCALL																
SF RCALL																
NO REST																
AI CALC																

COORDINATOR SUBMENU

3-1 COORDINATOR OPTIONS

COORD OPTIONS			
MANUAL PATTERN		ECPI COORD	
SYSTEM SOURCE		SYSTEM FORMAT	
SPLITS IN		OFFSET IN	
TRANSITION		MAX SELECT	
DWELL / ADD TIME		ENABLE MAN SYNC	
DLY COORD WK-LZ		NO FORCE OFF	
OFFSET REF		LEAD CAL USE PED TM	
PED RECALL		PED RESERVE	
LOCAL ZERO OVRD		FO ADD INI GRN	
RE-SYNC COUNT		MULTISYNC	

3-2 COORDINATOR PATTERN

COORINATOR PATTERN			
USE SPLIT PATTERN 1			
TS2 PATTERN / OFFSET			
CYCLE		STD (COS)	
OFFSET VAL			
ACTUATED COORD		TIMING PLAN	
ACT WALK REST 0		SEQUENCE	
PHASE RESRVCE 0		ACTION PLAN	

SPLIT PREFERENCE PHASES

PHASES		01	02	03	04	05	06	07	08
SPT									
PREF 1									
PREF 2									
SPLT EXT									
VEH PERM					DISP				
RING DISP						(RING 2-4)			

SPLIT PREFERENCE PHASES

PHASE		09	10	11	12	13	14	15	16
SPT									
PREF 1									
PREF 2									
				1	2				
SPLIT DEMAND PTRN						XART PTRN			

PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																
SF OUT									(1-8)							

3-2 COORDINATOR PATTERN, continued

COORINATOR PATTERN			
USE SPLIT PATTERN 1			
TS2 PATTERN / OFFSET			
CYCLE		STD (COS)	
OFFSET VAL			
ACTUATED COORD		TIMING PLAN	
ACT WALK REST 0		SEQUENCE	
PHASE RESRVCE 0		ACTION PLAN	

SPLIT PREFERENCE PHASES

PHASES		01	02	03	04	05	06	07	08
SPT									
PREF 1									
PREF 2									
SPLT EXT									
VEH PERM					DISP				
RING DISP						(RING 2-4)			

SPLIT PREFERENCE PHASES

PHASE		09	10	11	12	13	14	15	16
SPT									
PREF 1									
PREF 2									
				1	2				
SPLIT DEMAND PTRN						XART PTRN			

PHASE	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																
SF OUT									(1-8)							

3-3 SPLIT PATTERN

SPLIT PATTERN NUMBER																
PHASE	1		2		3		4		5		6		7		8	
SPLIT																
PHASE	9		10		11		12		13		14		15		16	
SPLIT VALUE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																

SPLIT PATTERN NUMBER																
PHASE	1		2		3		4		5		6		7		8	
SPLIT																
PHASE	9		10		11		12		13		14		15		16	
SPLIT VALUE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																

SPLIT PATTERN NUMBER																
PHASE	1		2		3		4		5		6		7		8	
SPLIT																
PHASE	9		10		11		12		13		14		15		16	
SPLIT VALUE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																

SPLIT PATTERN NUMBER																
PHASE	1		2		3		4		5		6		7		8	
SPLIT																
PHASE	9		10		11		12		13		14		15		16	
SPLIT VALUE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COORD																
VE RCALL																
PD RCALL																
MX RCALL																
OMIT																

3-4 AUTO PERMISSIVE MINIMUM GREEN TIME

PHASE	1	2	3	4	5	6	7	8
MIN GRN								
PHASE	9	10	11	12	13	45	15	16
MIN GRN								

3-5 SPLIT DEMAND

PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DEMAND 1																
DEMAND 2																

DEMAND	1	2
DETECTOR		
CALL TIME (SEC)		
CYCLE COUNT		

PREEMPTOR SUBMENU

4-1 PREEMPTOR

PREEMPTOR NUMBER	1															
VEH / PED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
TRACK CLR V																
TRACK CLR O																
ENA TRL																
DWEL VEH																
DWEL PED																
DWEL OLP																
CYC VEH																
CYC PED																
CYC OLP																
EXIT PH																
EXIT CAL																
SP FUNC																

ENABLE		PREEMPTION OVERRIDE		INTERLOCK ENABLE	
NON-LOCK INPUT		DELAY TIME (SECONDS)		INHIBIT TIME (SECONDS)	
AUTOMATIC FLASH HAS PRIORITY		DURATION TIME (SECONDS)		RED CLEAR GOES GREEN	
TERMINATE OVERLAPS ASAP		PED CLEAR THROUGH YELLOW		TERM PH	
PED DARD		TRACK CLEARANCE RESERVICE		DWELL FL	
LINKED PREEMPTOR		FLASH EXIT COLOUR		PREEMPTION TO COORDINATION	
EXIT TIMING PLAN		RESERVICE TIME			

FREE DURING PREEMPTION	RING 1		RING 2		RING 3		RING 4	

TIMING	WALK	PED CLEAR	GREEN	YELLOW	RED
ENTRANCE					
	MIN GREEN	EXT GREEN	MAX GREEN	YELLOW	RED
TRACK CLEAR					
	MIN DWELL	PMT EXT	MAX TIME	YELLOW	RED
DWELL / CYCLE - EXIT					

PREEMPTOR ACTIVE OUT		PREEMPTOR ACTIVE OUT IN DWELL	
OTHER PRIORITY PREEMPTOR OUT		NON-PRIORITY PREEMPTOR OUT	

4-1 PREEMPTOR, continued

PREEMPTOR NUMBER	_____

VEH / PED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
OVERLAP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
TRACK CLR V																
TRACK CLR O																
ENA TRL																
DWEL VEH																
DWEL PED																
DWEL OLP																
CYC VEH																
CYC PED																
CYC OLP																
EXIT PH																
EXIT CAL																
SP FUNC																

ENABLE		PREEMPTION OVERRIDE		INTERLOCK ENABLE	
NON-LOCK INPUT		DELAY TIME (SECONDS)		INHIBIT TIME (SECONDS)	
AUTOMATIC FLASH HAS PRIORITY		DURATION TIME (SECONDS)		RED CLEAR GOES GREEN	
TERMINATE OVERLAPS ASAP		PED CLEAR THROUGH YELLOW		TERM PH	
PED DARD		TRACK CLEARANCE RESERVICE		DWELL FL	
LINKED PREEMPTOR		FLASH EXIT COLOUR		PREEMPTION TO COORDINATION	
EXIT TIMING PLAN		RESERVICE TIME			

FREE DURING PREEMPTION	RING 1		RING 2		RING 3		RING 4	

TIMING	WALK	PED CLEAR	GREEN	YELLOW	RED
ENTRANCE					
	MIN GREEN	EXT GREEN	MAX GREEN	YELLOW	RED
TRACK CLEAR					
	MIN DWELL	PMT EXT	MAX TIME	YELLOW	RED
DWELL / CYCLE - EXIT					

PREEMPTOR ACTIVE OUT		PREEMPTOR ACTIVE OUT IN DWELL	
OTHER PRIORITY PREEMPTOR OUT		NON-PRIORITY PREEMPTOR OUT	

4-2 LOW PRIORITY PREEMPTOR SELECTION

FILTERED INPUT	SOLID	PULSING
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

TIME BASE SUBMENU

5-1 CLOCK / CALENDAR DATA

DATE SET:		TIME SET:	
MANUAL ACTION PLAN			
SYNC REFERENCE TIME		SYNC REFERENCE	
STANDARD TIME FROM GMT		DAYLIGHT SAVINGS	
TIME RESET INPUT TIME SET			

5-2 ACTION PLAN

ACTION PLAN EVENT																
PATTERN								SYSTEM OVERRIDE								
TIMING PLAN								SEQUENCE								
VEHICLE DETECTOR PLAN								DETECTOR LOG								
FLASH								RED REST								
VEHICLE DET DIAGNOSTI C PLAN								PED DET DIAGNOSTIC PLAN								
DIMMING ENABLE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED RECALL																
WALK 2																
VEH ECT 2																
VEH RECALL																
MAX RECALL																
MAX 2																
MAX 3																
CS INHIBIT																
PHASE OMIT																
SPEC FUNCTION									(1-8)							
AUX FUNCTION				(1-3)												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
LP 01-15																
LP 16-30																
LP 31-45																
LP 46-60																
LP 61-75																
LP 76-90																
LP 91-100																

ACTION PLAN EVENT																
PATTERN								SYSTEM OVERRIDE								
TIMING PLAN								SEQUENCE								
VEHICLE DETECTOR PLAN								DETECTOR LOG								
FLASH								RED REST								
VEHICLE DET DIAGNOSTI C PLAN								PED DET DIAGNOSTIC PLAN								
DIMMING ENABLE																
PHASE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PED RECALL																
WALK 2																
VEH ECT 2																
VEH RECALL																
MAX RECALL																
MAX 2																
MAX 3																
CS INHIBIT																
PHASE OMIT																
SPEC FUNCTION									(1-8)							
AUX FUNCTION				(1-3)												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
LP 01-15																
LP 16-30																
LP 31-45																
LP 46-60																
LP 61-75																
LP 76-90																
LP 91-100																

5-3 DAY PLAN

DAY PLAN #	EVENT #	ACTION PLAN #	START TIME
	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		
	12		
	13		
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DAY PLAN #	EVENT #	ACTION PLAN #	START TIME
	1		
	2		
	3		
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5-4 SCHEDULE

SCHEDULE NUMBER	
DAY PLAN NUMBER	

MONTH						
JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	
JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	

DAY OF WEEK (DOW)	SUN	MON	TUE	WED	THU	FRI	SAT

DAY OF MONTH (DOM)									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

SCHEDULE NUMBER	
DAY PLAN NUMBER	

MONTH						
JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	
JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	

DAY OF WEEK (DOW)	SUN	MON	TUE	WED	THU	FRI	SAT

DAY OF MONTH (DOM)									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

SCHEDULE NUMBER	
DAY PLAN NUMBER	

MONTH						
JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	
JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	

DAY OF WEEK (DOW)	SUN	MON	TUE	WED	THU	FRI	SAT

DAY OF MONTH (DOM)									
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31									

5-5 EXCEPTION DAY PROGRAM

EXCEPTION DAY	FLOAT / FIXED	MON / MON	DOW / DOM	WOM / YEAR	DAY PLAN
1					
2					
3					
4					
5					
6					
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DETECTOR SUBMENU

6-1 VEH DET ASSIGNMENT

VEHICLE DETECTOR PLAN NUMBER (1)																	
DET	PH	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
01		X															
02			X														
03				X													
04					X												
05						X											
06							X										
07								X									
08									X								
09																	
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6-2 VEHICLE DETECTOR SETUP

DETECTOR NUMBER	1		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	2		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	3		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	4		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	5		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	6		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	7		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER	8		
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #	1	ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

6-2 VEHICLE DETECTOR SETUP, continued

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

DETECTOR NUMBER			
ECPI TYPE		TS2 DETECTOR	
VEH DET PLAN #		ECPI LOG	

DET	PH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1																	

EXTEND TIME		DELAY TIME	
CALL OPTION		PASSAGE OPTION	
ADDED OPTION		X SWITCH PHASE	
QUEUE OPTION		QUEUE LIMIT	
NTCIP OCCUPANCY		NTCIP VOLUME	
YELLOW LOCK		RED LOCK	

6-4 PED DETECTOR INPUT ASSIGNMENT

DETECTOR INPUT TO PED PHASE ASSIGNMENT								
PHASE #	01	02	03	04	05	06	07	08
INPUT #								
PHASE #	09	10	11	12	13	14	15	16
INPUT #								

6-5 LOG − SPEED DETECTOR SET UP

NTCIP LOG		ECPI LOG			LENGTH UNIT			
SPEED DET	1	2	3	4	5	6	7	8
LOCAL DET								
ONE / TWO DET								
VEH LENGTH								
TRAP LENGTH								
ENABLE LOG								
SPEED DET	9	10	11	12	13	14	15	16
LOCAL DET								
ONE / TWO DET								
VEH LENGTH								
TRAP LENGTH								
ENABLE LOG								

6-6 VEH DET DIAG

VEHICLE DIAGNOSTIC PLAN NUMBER				1	FAILED	
DET	COUNTS	ACT	PRES	X's	TIME	CL DELAY
01						
02						
03						
04						
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VEHICLE DIAGNOSTIC PLAN NUMBER				2	FAILED	
DET	COUNTS	ACT	PRES	X's	TIME	CL DELAY
01						
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6-6 VEH DET DIAG, continued

VEHICLE DIAGNOSTIC PLAN NUMBER				3	FAILED	
DET	COUNTS	ACT	PRES	X's	TIME	CL DELAY
01						
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VEHICLE DIAGNOSTIC PLAN NUMBER				4	FAILED	
DET	COUNTS	ACT	PRES	X's	TIME	CL DELAY
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6-7 PED DETECTOR DIAG

PED DETECTOR DIAG PLAN				1	PED DETECTOR DIAG PLAN				2
DET	COUNTS	ACTUATIONS	PRESENCE	MULTIPLIER	DET	COUNTS	ACTUATIONS	PRESENCE	MULTIPLIER
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				

PED DETECTOR DIAG PLAN				3	PED DETECTOR DIAG PLAN				4
DET	COUNTS	ACTUATIONS	PRESENCE	MULTIPLIER	DET	COUNTS	ACTUATIONS	PRESENCE	MULTIPLIER
1					1				
2					2				
3					3				
4					4				
5					5				
6					6				
7					7				
8					8				
9					9				
10					10				
11					11				
12					12				
13					13				
14					14				
15					15				
16					16				

BURNSIDE

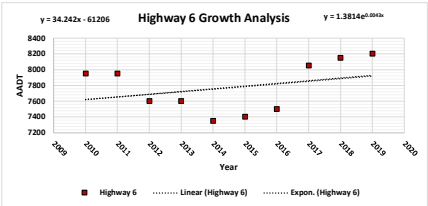
[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

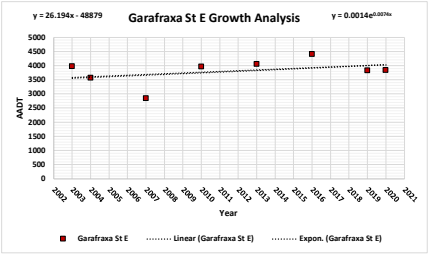
Growth Analysis

PHV to AADT 0.1

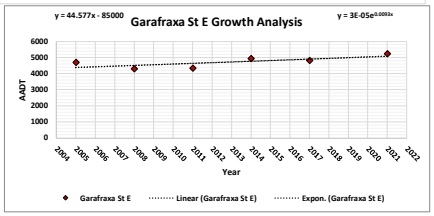
ID	Road	Point	Intersection	Source	Year	AADT		
1001	Highway 6	1	Highway 6 in Centre Wellington	MTO	2010	7950		
		2	Highway 6 in Centre Wellington	MTO	2011	7950		
		3	Highway 6 in Centre Wellington	MTO	2012	7600		
		4	Highway 6 in Centre Wellington	MTO	2013	7600		
		5	Highway 6 in Centre Wellington	MTO	2014	7350		
		6	Highway 6 in Centre Wellington	MTO	2015	7400		
		7	Highway 6 in Centre Wellington	MTO	2016	7500		
		8	Highway 6 in Centre Wellington	MTO	2017	8050		
		9	Highway 6 in Centre Wellington	MTO	2018	8150	Calculated Linear	Calculated Exponential
		10	Highway 6 in Centre Wellington	MTO	2019	8200	7929	8142
		Projection						
			LINEAR GROWTH		2022	8031	0.427%	0.430%
			EXPONENTIAL GROWTH		2022	8248	0.432%	
			LINEAR GROWTH		2032	8374	0.419%	0.425%
			EXPONENTIAL GROWTH		2032	8610	0.430%	
			LINEAR GROWTH		2037	8545	0.414%	0.422%
			EXPONENTIAL GROWTH		2037	8797	0.431%	
							Assume:	0.50%



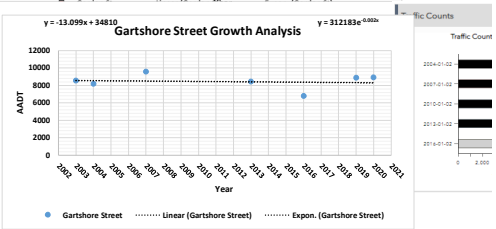
ID	Road	Point	Intersection	Source	Year	AADT		
1904	Garafraxa St E	1	Centre of Wellington	Township of Centre Wellington	2003	3975		
		2	Centre of Wellington	Township of Centre Wellington	2004	3572		
		3	Centre of Wellington	Township of Centre Wellington	2007	2845		
		4	Centre of Wellington	Township of Centre Wellington	2010	3964		
		5	Centre of Wellington	Township of Centre Wellington	2013	4049		
		6	Centre of Wellington	Township of Centre Wellington	2016	4401		
		7	Centre of Wellington	Township of Centre Wellington	2019	3828	Calculated Linear	Calculated Exponential
		8	Centre of Wellington	Township of Centre Wellington	2020	3841	4033	4345
		Projection						
			LINEAR GROWTH		2022	4085	0.643%	0.694%
			EXPONENTIAL GROWTH		2022	4410	0.745%	
			LINEAR GROWTH		2032	4347	0.624%	0.682%
			EXPONENTIAL GROWTH		2032	4748	0.741%	
			LINEAR GROWTH		2037	4478	0.614%	0.678%
			EXPONENTIAL GROWTH		2037	4927	0.742%	
							Assume:	1.00%



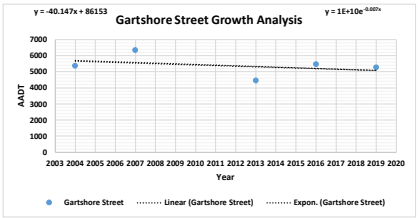
ID	Road	Point	Intersection	Source	Year	AADT	Growth Rate Linear	Growth Rate Exp.
1905	Garafraxa StE	1	Centre of Wellington	Township of Centre Wellington	2005	4703		
		2	Centre of Wellington	Township of Centre Wellington	2008	4294		
		3	Centre of Wellington	Township of Centre Wellington	2011	4339		
		4	Centre of Wellington	Township of Centre Wellington	2014	4929		
		5	Centre of Wellington	Township of Centre Wellington	2017	4813	Calculated Linear	Calculated Exponential
		6	Centre of Wellington	Township of Centre Wellington	2021	5235	5090	4363
		Projection						
			LINEAR GROWTH		2022	5135	0.884%	0.912%
			EXPONENTIAL GROWTH		2022	4404	0.940%	
			LINEAR GROWTH		2032	5580	0.835%	0.884%
			EXPONENTIAL GROWTH		2032	4833	0.934%	
			LINEAR GROWTH		2032	5580	0.835%	0.884%
			EXPONENTIAL GROWTH		2032	4833	0.934%	
							Assume:	1.00%



ID	Road	Point	Intersection	Source	Year	AADT	Growth Rate Linear	Growth Rate Exp.
4301	Gartshore Street	1	North of St George Street E	Township of Centre Wellington	2003	8519		
		2	North of St George Street E	Township of Centre Wellington	2004	8153		
		3	North of St George Street E	Township of Centre Wellington	2007	9556		
		4	North of St George Street E	Township of Centre Wellington				
		5	North of St George Street E	Township of Centre Wellington	2013	8440		
		6	North of St George Street E	Township of Centre Wellington	2016	6785		
		7	North of St George Street E	Township of Centre Wellington	2019	8850	Calculated Linear	
		8	North of St George Street E	Township of Centre Wellington	2020	8913	8532	
		Projection						
			LINEAR GROWTH		2022	8506	-0.152%	-0.152%
			EXPONENTIAL GROWTH		2022			
			LINEAR GROWTH		2032	8376	-0.154%	-0.154%
			EXPONENTIAL GROWTH		2032			
			LINEAR GROWTH		2037	8311	-0.175%	-0.175%
			EXPONENTIAL GROWTH		2037			
							Assume:	0.00%



ID	Road	Point	Intersection	Source	Year	AADT	Growth Rate Linear	Growth Rate Exp.
4302	Gartshore Street	1	North of Glengarry Crescent	Township of Centre Wellington	2004	5385		
		2	North of Glengarry Crescent	Township of Centre Wellington	2007	6344		
		3	North of Glengarry Crescent	Township of Centre Wellington				
		4	North of Glengarry Crescent	Township of Centre Wellington	2013	4457		
		5	North of Glengarry Crescent	Township of Centre Wellington	2016	5467	Calculated Linear	Calculated Exponential
		6	North of Glengarry Crescent	Township of Centre Wellington	2019	5268	5096	
		Projection						
			LINEAR GROWTH		2022	4976	-0.791%	-0.791%
			EXPONENTIAL GROWTH		2022			
					2032	4574	-1.075%	-1.075%
					2032			
			LINEAR GROWTH		2037	4374	-3.009%	-3.009%
			EXPONENTIAL GROWTH		2037			
							Assume:	0.00%

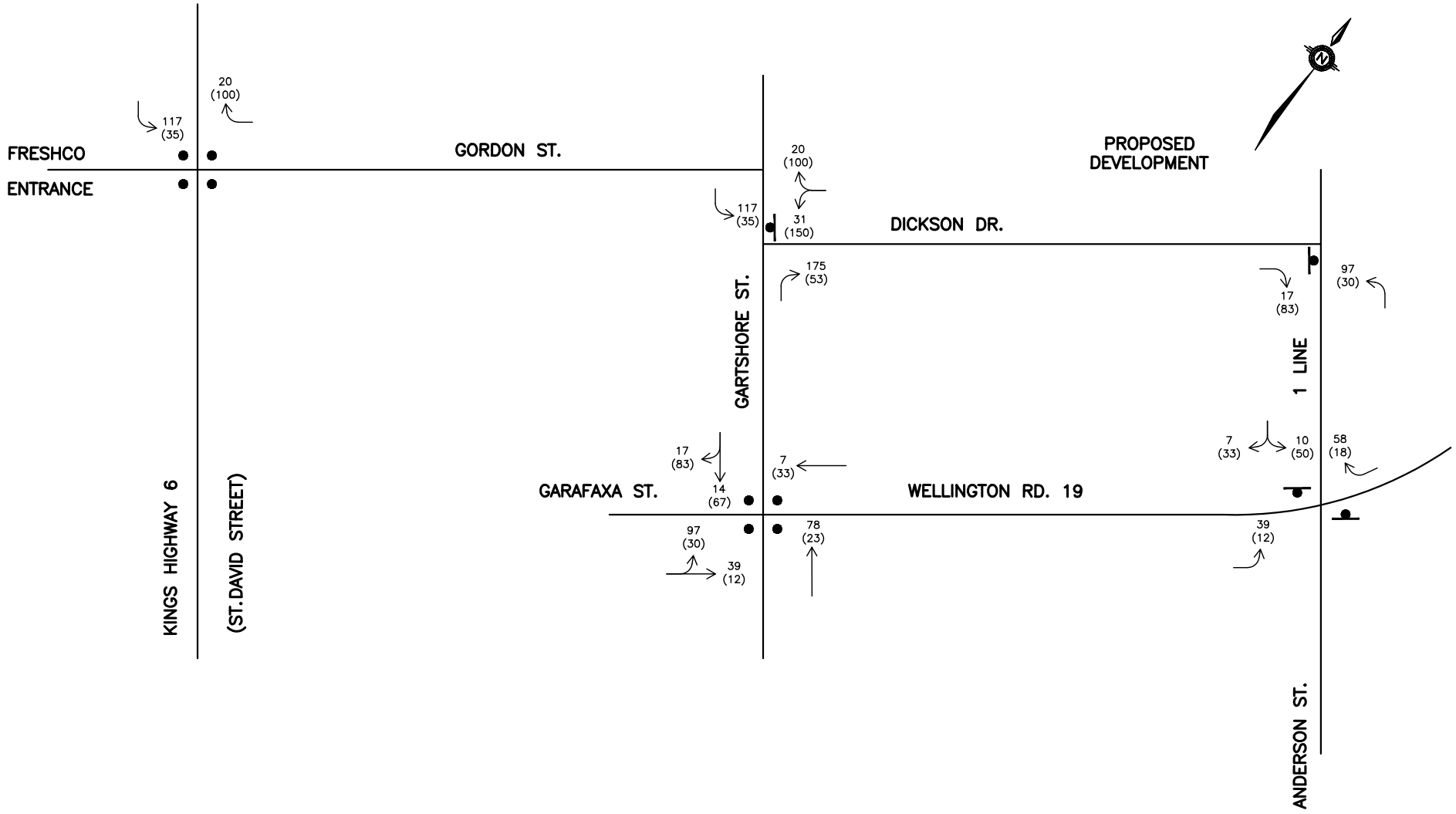


BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Background Development Traffic



(NOT TO SCALE)

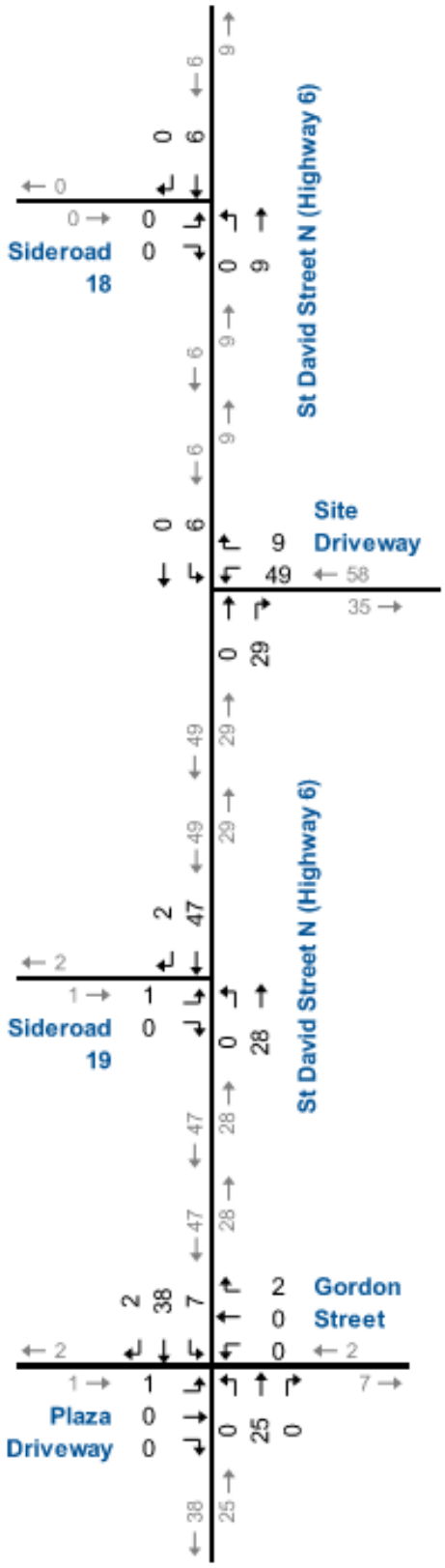
LEGEND:

	STOP CONTROL	25 (25)	AM PEAK HOUR PM PEAK HOUR	TRAFFIC VOLUMES		EXISTING ROAD
	TRAFFIC FLOW			TRAFFIC SIGNALS		PROPOSED ENTRANCE

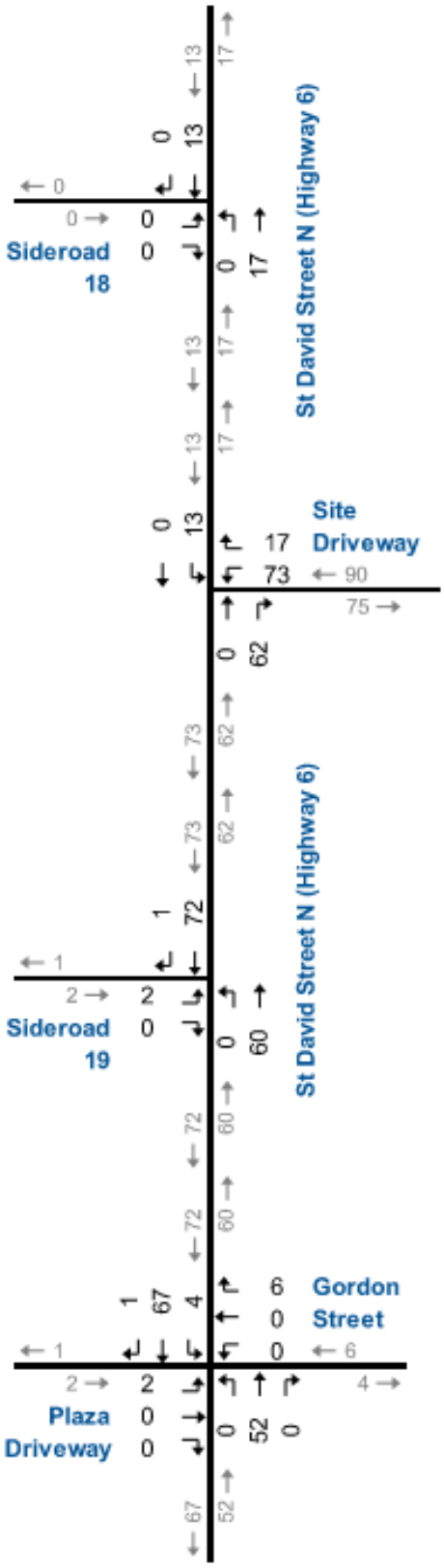
TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

FIGURE 6:
SITE GENERATED TRAFFIC

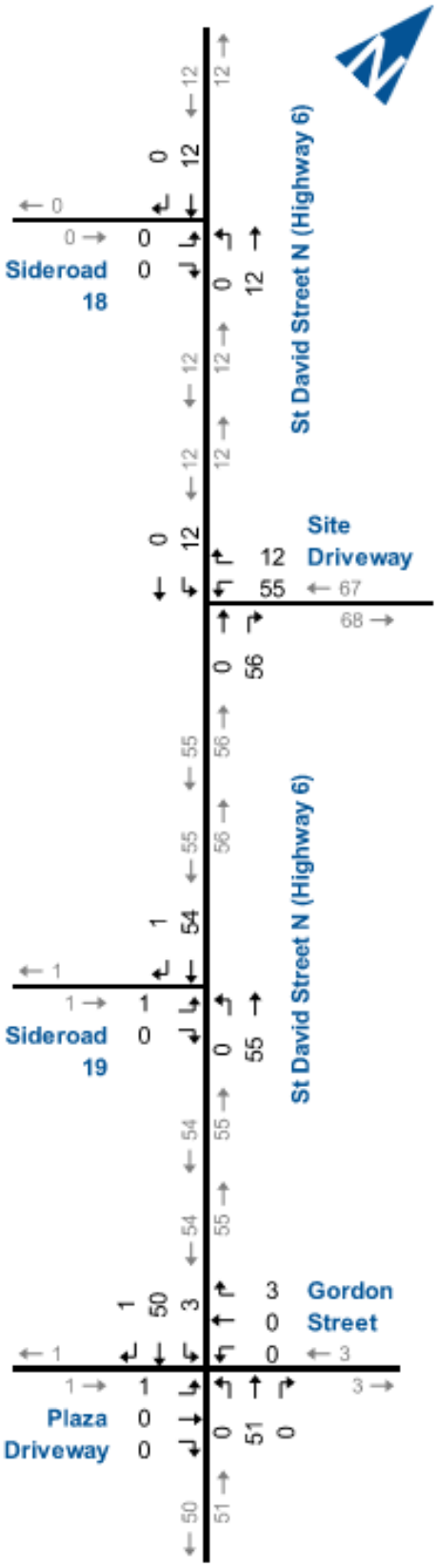
AM PEAK HOUR



PM PEAK HOUR

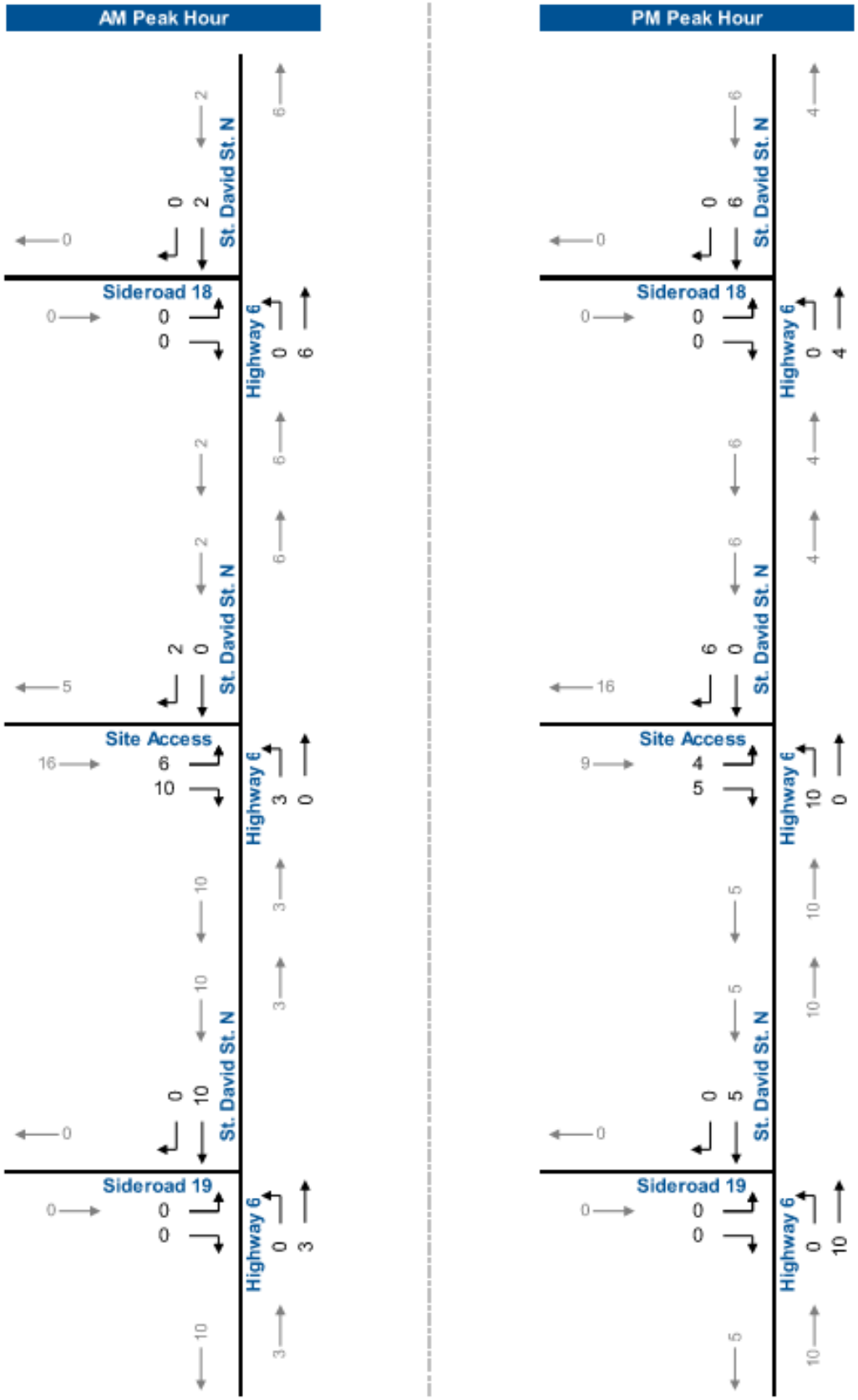


SAT PEAK HOUR



Site Traffic Volumes
Full Build-out
Weekday AM, PM and SAT Peak Hours

Figure 3.2



paradigm TRANSPORTATION SOLUTIONS LIMITED

Site Generated Traffic Volumes

961 St David Street North, Fergus TIS
210066

Figure 3.2

BURNSIDE

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Appendix D

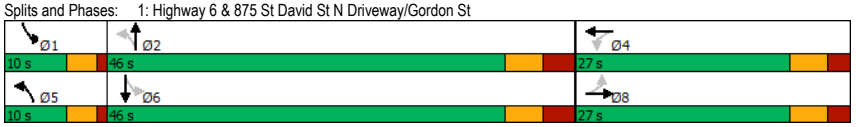
Existing Traffic Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	1	4	44	8	12	287	151	326
Future Volume (vph)	1	4	44	8	12	287	151	326
Lane Group Flow (vph)	1	18	52	163	14	423	178	390
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.01	0.08	0.31	0.51	0.02	0.43	0.27	0.31
Control Delay	27.0	17.7	33.3	12.4	3.1	10.6	4.1	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.7	33.3	12.4	3.1	10.6	4.1	6.6
Queue Length 50th (m)	0.1	0.6	6.4	1.1	0.4	27.4	5.0	15.5
Queue Length 95th (m)	1.3	5.3	14.8	14.0	1.6	47.0	11.0	42.2
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	352	511	417	567	765	994	656	1247
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.04	0.12	0.29	0.02	0.43	0.27	0.31

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 70.3
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	4	11	44	8	131	12	287	72	151	326	5
Future Volume (vph)	1	4	11	44	8	131	12	287	72	151	326	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1819	1681		1779	1539		1825	1775		1706	1861	
Flt Permitted	0.62	1.00		0.75	1.00		0.53	1.00		0.44	1.00	
Satd. Flow (perm)	1181	1681		1396	1539		1020	1775		793	1861	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	1	5	13	52	9	154	14	338	85	178	384	6
RTOR Reduction (vph)	0	11	0	0	136	0	0	9	0	0	0	0
Lane Group Flow (vph)	1	7	0	52	27	0	14	414	0	178	390	0
Confl. Peds. (#/hr)	2		3	3		2	1					1
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	6%	1%	7%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	8.5	8.5		8.5	8.5		43.3	42.3		52.1	47.1	
Effective Green, g (s)	8.5	8.5		8.5	8.5		43.3	42.3		52.1	47.1	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.59	0.57		0.71	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	136	194		161	177		611	1020		633	1190	
v/s Ratio Prot		0.00			0.02		0.00	c0.23		c0.02	0.21	
v/s Ratio Perm	0.00			c0.04			0.01			0.18		
v/c Ratio	0.01	0.03		0.32	0.15		0.02	0.41		0.28	0.33	
Uniform Delay, d1	28.8	28.9		29.9	29.3		6.3	8.7		3.9	6.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		1.2	0.4		0.0	1.2		0.1	0.7	
Delay (s)	28.8	29.0		31.1	29.7		6.3	9.9		4.0	6.8	
Level of Service	C	C		C	C		A	A		A	A	
Approach Delay (s)		29.0			30.0			9.8			5.9	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	73.6	Sum of lost time (s)	17.0
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		

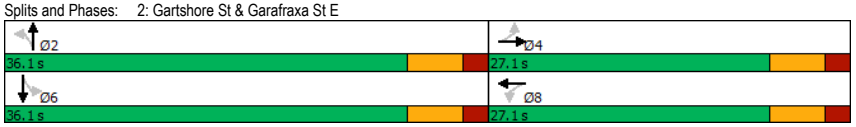
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	192	45	186	48	87	13	81
Future Volume (vph)	31	192	45	186	48	87	13	81
Lane Group Flow (vph)	35	267	51	229	54	158	15	142
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.12	0.54	0.20	0.50	0.08	0.17	0.02	0.15
Control Delay	16.5	21.0	17.9	21.1	8.5	6.0	8.3	6.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.5	21.0	17.9	21.1	8.5	6.0	8.3	6.1
Queue Length 50th (m)	2.8	21.8	4.1	19.3	2.5	4.6	0.7	4.2
Queue Length 95th (m)	8.1	39.2	11.0	35.1	8.3	14.4	3.4	13.5
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	408	686	363	645	658	938	663	926
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.09	0.39	0.14	0.36	0.08	0.17	0.02	0.15

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 57.3
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	192	45	45	186	18	48	87	53	13	81	45
Future Volume (vph)	31	192	45	45	186	18	48	87	53	13	81	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.94		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1718	1829		1722	1741		1786	1730		1824	1715	
Flt Permitted	0.61	1.00		0.54	1.00		0.67	1.00		0.66	1.00	
Satd. Flow (perm)	1109	1829		986	1741		1253	1730		1261	1715	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	35	216	51	51	209	20	54	98	60	15	91	51
RTOR Reduction (vph)	0	15	0	0	6	0	0	28	0	0	24	0
Lane Group Flow (vph)	35	252	0	51	223	0	54	130	0	15	118	0
Confl. Peds. (#/hr)	2					2	2		1	1		2
Heavy Vehicles (%)	6%	2%	2%	6%	8%	16%	2%	2%	7%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.9	14.9		14.9	14.9		30.1	30.1		30.1	30.1	
Effective Green, g (s)	14.9	14.9		14.9	14.9		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.26	0.26		0.26	0.26		0.53	0.53		0.53	0.53	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	288	476		256	453		659	910		663	902	
v/s Ratio Prot		c0.14			0.13			c0.07			0.07	
v/s Ratio Perm	0.03			0.05			0.04			0.01		
v/c Ratio	0.12	0.53		0.20	0.49		0.08	0.14		0.02	0.13	
Uniform Delay, d1	16.2	18.1		16.5	17.9		6.7	6.9		6.5	6.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	2.0		0.8	1.8		0.2	0.3		0.1	0.3	
Delay (s)	16.5	20.2		17.3	19.7		7.0	7.3		6.6	7.2	
Level of Service	B	C		B	B		A	A		A	A	
Approach Delay (s)		19.8			19.3			7.2			7.1	
Approach LOS		B			B			A			A	

Intersection Summary

HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	57.2	Sum of lost time (s)	12.2
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	89	96	207	287	30
Future Volume (Veh/h)	16	89	96	207	287	30
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	17	95	102	220	305	32
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	745	321	337			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	745	321	337			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	95	87	92			
cM capacity (veh/h)	344	711	1211			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	112	102	220	337
Volume Left	17	102	0	0
Volume Right	95	0	0	32
cSH	612	1211	1700	1700
Volume to Capacity	0.18	0.08	0.13	0.20
Queue Length 95th (m)	5.1	2.1	0.0	0.0
Control Delay (s)	12.2	8.2	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	12.2	2.6		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	197	130	43	28	17
Future Volume (Veh/h)	57	197	130	43	28	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	214	141	47	30	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	368	39	48			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	368	39	48			
tC, single (s)	6.4	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	89	79	91			
cM capacity (veh/h)	576	1021	1534			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	276	188	48
Volume Left	62	141	0
Volume Right	214	0	18
cSH	870	1534	1700
Volume to Capacity	0.32	0.09	0.03
Queue Length 95th (m)	10.4	2.3	0.0
Control Delay (s)	11.0	5.9	0.0
Lane LOS	B	A	
Approach Delay (s)	11.0	5.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	8.1		
Intersection Capacity Utilization	38.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	28	167	32	26	177
Future Volume (Veh/h)	36	28	167	32	26	177
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	30	182	35	28	192
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	448	200			217	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	448	200			217	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	96			98	
cM capacity (veh/h)	561	847			1365	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	217	220
Volume Left	39	0	28
Volume Right	30	35	0
cSH	657	1700	1365
Volume to Capacity	0.10	0.13	0.02
Queue Length 95th (m)	2.7	0.0	0.5
Control Delay (s)	11.1	0.0	1.1
Lane LOS	B		A
Approach Delay (s)	11.1	0.0	1.1
Approach LOS	B		

Intersection Summary			
Average Delay	2.0		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	22	0	1	49	0	1
Future Volume (Veh/h)	22	0	1	49	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	24	0	1	53	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	28	28			54	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	28	28			54	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	98	100			100	
cM capacity (veh/h)	986	1048			1551	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	24	54	0
Volume Left	24	0	0
Volume Right	0	53	0
cSH	986	1700	1700
Volume to Capacity	0.02	0.03	0.00
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	8.7	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.7	0.0	Err
Approach LOS	A		

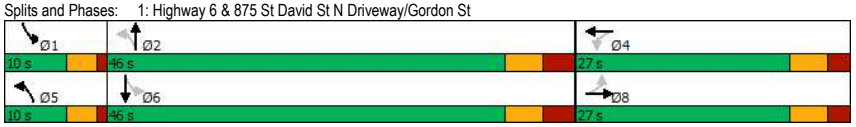
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	29	34	76	38	95	427	241	324
Future Volume (vph)	29	34	76	38	95	427	241	324
Lane Group Flow (vph)	31	113	81	247	101	542	256	362
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.30	0.37	0.45	0.61	0.14	0.54	0.47	0.33
Control Delay	34.9	15.0	36.1	13.9	4.2	13.6	7.2	10.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.9	15.0	36.1	13.9	4.2	13.6	7.2	10.6
Queue Length 50th (m)	3.8	4.4	10.2	4.9	3.1	41.9	8.7	24.7
Queue Length 95th (m)	11.2	16.9	22.2	23.6	8.9	80.0	21.0	48.7
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	214	547	373	612	759	1001	547	1081
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.14	0.21	0.22	0.40	0.13	0.54	0.47	0.33

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 72.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	34	72	76	38	195	95	427	83	241	324	16
Future Volume (vph)	29	34	72	76	38	195	95	427	83	241	324	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1809	1697		1783	1605		1824	1841		1755	1888	
Flt Permitted	0.39	1.00		0.68	1.00		0.55	1.00		0.36	1.00	
Satd. Flow (perm)	739	1697		1284	1605		1047	1841		674	1888	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	31	36	77	81	40	207	101	454	88	256	345	17
RTOR Reduction (vph)	0	66	0	0	178	0	0	7	0	0	2	0
Lane Group Flow (vph)	31	47	0	81	69	0	101	535	0	256	360	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	10.3	10.3		10.3	10.3		44.5	40.0		47.3	41.4	
Effective Green, g (s)	10.3	10.3		10.3	10.3		44.5	40.0		47.3	41.4	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.61	0.55		0.65	0.57	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	103	238		180	225		684	1006		522	1067	
v/s Ratio Prot		0.03			0.04		0.01	c0.29		c0.04	0.19	
v/s Ratio Perm	0.04			c0.06			0.08			0.28		
v/c Ratio	0.30	0.20		0.45	0.31		0.15	0.53		0.49	0.34	
Uniform Delay, d1	28.2	27.8		28.9	28.2		6.0	10.6		6.1	8.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.6	0.4		1.8	0.8		0.0	2.0		0.3	0.9	
Delay (s)	29.9	28.2		30.6	29.0		6.0	12.6		6.4	9.4	
Level of Service	C	C		C	C		A	B		A	A	
Approach Delay (s)		28.6			29.4			11.6			8.1	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	15.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	73.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	84.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	70	239	95	269	71	125	14	105
Future Volume (vph)	70	239	95	269	71	125	14	105
Lane Group Flow (vph)	75	318	102	314	76	220	15	189
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.30	0.60	0.41	0.60	0.12	0.23	0.02	0.20
Control Delay	19.5	22.2	22.4	22.8	9.5	7.0	8.9	6.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.5	22.2	22.4	22.8	9.5	7.0	8.9	6.4
Queue Length 50th (m)	6.3	27.3	8.8	28.3	4.1	8.2	0.8	6.2
Queue Length 95th (m)	15.5	48.2	20.3	49.0	11.1	20.2	3.4	16.8
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	321	658	312	659	618	944	607	933
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.48	0.33	0.48	0.12	0.23	0.02	0.20

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 59.1
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	239	57	95	269	23	71	125	80	14	105	71
Future Volume (vph)	70	239	57	95	269	23	71	125	80	14	105	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.94		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	1810		1786	1836		1806	1787		1824	1762	
Flt Permitted	0.47	1.00		0.47	1.00		0.64	1.00		0.62	1.00	
Satd. Flow (perm)	899	1810		877	1836		1214	1787		1192	1762	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	75	257	61	102	289	25	76	134	86	15	113	76
RTOR Reduction (vph)	0	14	0	0	5	0	0	34	0	0	36	0
Lane Group Flow (vph)	75	304	0	102	309	0	76	186	0	15	153	0
Confl. Peds. (#/hr)			2	2			1		1	1		1
Heavy Vehicles (%)	1%	3%	1%	2%	3%	8%	1%	0%	1%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.7	16.7		16.7	16.7		30.1	30.1		30.1	30.1	
Effective Green, g (s)	16.7	16.7		16.7	16.7		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.51	0.51		0.51	0.51	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	254	512		248	519		619	911		608	898	
v/s Ratio Prot		0.17			c0.17			c0.10			0.09	
v/s Ratio Perm	0.08			0.12			0.06			0.01		
v/c Ratio	0.30	0.59		0.41	0.60		0.12	0.20		0.02	0.17	
Uniform Delay, d1	16.5	18.2		17.2	18.2		7.6	7.9		7.2	7.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.4	2.8		2.3	2.8		0.4	0.5		0.1	0.4	
Delay (s)	17.9	21.0		19.5	21.0		8.0	8.4		7.2	8.2	
Level of Service	B	C		B	C		A	A		A	A	
Approach Delay (s)		20.4			20.6			8.3			8.1	
Approach LOS		C			C			A			A	

Intersection Summary

HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	59.0	Sum of lost time (s)	12.2
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	24	134	105	423	295	23
Future Volume (Veh/h)	24	134	105	423	295	23
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	26	147	115	465	324	25
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1032	336	349			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1032	336	349			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	79	91			
cM capacity (veh/h)	232	703	1215			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	173	115	465	349
Volume Left	26	115	0	0
Volume Right	147	0	0	25
cSH	539	1215	1700	1700
Volume to Capacity	0.32	0.09	0.27	0.21
Queue Length 95th (m)	10.5	2.4	0.0	0.0
Control Delay (s)	14.8	8.3	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	14.8	1.6		0.0
Approach LOS	B			

Intersection Summary				
Average Delay		3.2		
Intersection Capacity Utilization		42.3%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	208	266	25	65	53
Future Volume (Veh/h)	23	208	266	25	65	53
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	226	289	27	71	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	705	100	129			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	705	100	129			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	76	80			
cM capacity (veh/h)	326	950	1463			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	251	316	129
Volume Left	25	289	0
Volume Right	226	0	58
cSH	798	1463	1700
Volume to Capacity	0.31	0.20	0.08
Queue Length 95th (m)	10.3	5.6	0.0
Control Delay (s)	11.6	7.5	0.0
Lane LOS	B	A	
Approach Delay (s)	11.6	7.5	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		7.6		
Intersection Capacity Utilization		43.5%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	36	36	245	18	5	217
Future Volume (Veh/h)	36	36	245	18	5	217
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	39	266	20	5	236
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	522	276			286	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	522	276			286	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	92	95			100	
cM capacity (veh/h)	517	768			1288	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	78	286	241
Volume Left	39	0	5
Volume Right	39	20	0
cSH	617	1700	1288
Volume to Capacity	0.13	0.17	0.00
Queue Length 95th (m)	3.3	0.0	0.1
Control Delay (s)	11.7	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	11.7	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	26.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	58	0	1	23	0	1
Future Volume (Veh/h)	58	0	1	23	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	63	0	1	25	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	14	14			26	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	14	14			26	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	100			100	
cM capacity (veh/h)	1004	1067			1588	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	63	26	0
Volume Left	63	0	0
Volume Right	0	25	0
cSH	1004	1700	1700
Volume to Capacity	0.06	0.02	0.00
Queue Length 95th (m)	1.5	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	Err
Approach LOS	A		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

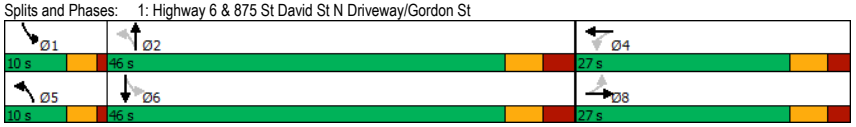
Background 2032 Traffic Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	2	4	44	8	12	330	275	391
Future Volume (vph)	2	4	44	8	12	330	275	391
Lane Group Flow (vph)	2	18	52	189	14	473	324	468
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.02	0.08	0.31	0.55	0.02	0.48	0.53	0.38
Control Delay	27.0	17.7	33.1	12.3	3.2	11.5	7.1	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.7	33.1	12.3	3.2	11.5	7.1	7.3
Queue Length 50th (m)	0.2	0.6	6.4	1.1	0.4	32.2	10.0	19.7
Queue Length 95th (m)	1.8	5.3	14.8	14.7	1.7	55.6	20.8	53.5
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	293	509	415	583	720	991	611	1246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.13	0.32	0.02	0.48	0.53	0.38

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 70.6
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	11	44	8	153	12	330	72	275	391	7
Future Volume (vph)	2	4	11	44	8	153	12	330	72	275	391	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1820	1681		1779	1536		1825	1779		1706	1861	
Flt Permitted	0.52	1.00		0.75	1.00		0.49	1.00		0.40	1.00	
Satd. Flow (perm)	987	1681		1396	1536		950	1779		726	1861	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	2	5	13	52	9	180	14	388	85	324	460	8
RTOR Reduction (vph)	0	11	0	0	159	0	0	8	0	0	0	0
Lane Group Flow (vph)	2	7	0	52	30	0	14	465	0	324	468	0
Confl. Peds. (#/hr)	2		3	3		2	1					1
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	6%	1%	7%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Effective Green, g (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.59	0.57		0.71	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	114	195		162	178		568	1018		593	1191	
v/s Ratio Prot		0.00			0.02		0.00	0.26		c0.04	0.25	
v/s Ratio Perm	0.00			c0.04			0.01			c0.34		
v/c Ratio	0.02	0.03		0.32	0.17		0.02	0.46		0.55	0.39	
Uniform Delay, d1	28.9	29.0		30.0	29.4		6.4	9.2		4.6	6.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		1.2	0.4		0.0	1.5		0.6	1.0	
Delay (s)	29.0	29.0		31.1	29.9		6.4	10.6		5.2	7.4	
Level of Service	C	C		C	C		A	B		A	A	
Approach Delay (s)		29.0			30.1			10.5			6.5	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	11.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

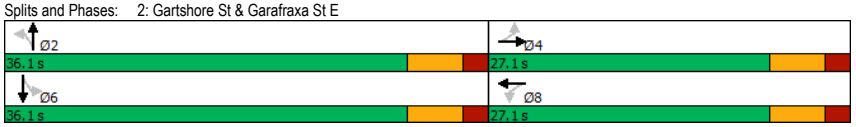
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	131	251	50	212	53	178	9	117
Future Volume (vph)	131	251	50	212	53	178	9	117
Lane Group Flow (vph)	147	338	56	255	60	266	10	206
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.49	0.62	0.24	0.50	0.10	0.29	0.02	0.23
Control Delay	23.4	22.6	18.7	20.5	9.5	9.2	8.9	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.4	22.6	18.7	20.5	9.5	9.2	8.9	7.3
Queue Length 50th (m)	13.1	29.8	4.6	22.2	3.4	14.1	0.6	8.4
Queue Length 95th (m)	27.3	51.0	12.2	39.3	9.1	28.0	2.6	19.2
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	364	659	280	621	596	916	575	894
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.51	0.20	0.41	0.10	0.29	0.02	0.23

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 59.8
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	131	251	50	50	212	15	53	178	59	9	117	67
Future Volume (vph)	131	251	50	50	212	15	53	178	59	9	117	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1718	1837		1722	1750		1787	1782		1824	1714	
Flt Permitted	0.57	1.00		0.44	1.00		0.63	1.00		0.60	1.00	
Satd. Flow (perm)	1032	1837		796	1750		1182	1782		1143	1714	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	147	282	56	56	238	17	60	200	66	10	131	75
RTOR Reduction (vph)	0	12	0	0	4	0	0	18	0	0	31	0
Lane Group Flow (vph)	147	326	0	56	251	0	60	248	0	10	175	0
Confl. Peds. (#/hr)	2					2	2		1	1		2
Heavy Vehicles (%)	6%	2%	2%	6%	8%	16%	2%	2%	7%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.4	17.4		17.4	17.4		30.1	30.1		30.1	30.1	
Effective Green, g (s)	17.4	17.4		17.4	17.4		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	300	535		232	510		595	898		576	864	
v/s Ratio Prot		c0.18			0.14			c0.14			0.10	
v/s Ratio Perm	0.14			0.07			0.05			0.01		
v/c Ratio	0.49	0.61		0.24	0.49		0.10	0.28		0.02	0.20	
Uniform Delay, d1	17.5	18.2		16.1	17.5		7.7	8.5		7.4	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.6	2.9		1.1	1.6		0.3	0.8		0.1	0.5	
Delay (s)	20.1	21.1		17.3	19.1		8.1	9.3		7.5	8.7	
Level of Service	C	C		B	B		A	A		A	A	
Approach Delay (s)		20.8			18.7			9.1			8.6	
Approach LOS		C			B			A			A	

Intersection Summary

HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.40		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	12.2
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	98	106	253	427	33
Future Volume (Veh/h)	18	98	106	253	427	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	19	104	113	269	454	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	966	472	489			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	966	472	489			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	92	82	89			
cM capacity (veh/h)	248	584	1064			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	123	113	269	489
Volume Left	19	113	0	0
Volume Right	104	0	0	35
cSH	483	1064	1700	1700
Volume to Capacity	0.25	0.11	0.16	0.29
Queue Length 95th (m)	7.6	2.7	0.0	0.0
Control Delay (s)	15.0	8.8	0.0	0.0
Lane LOS	B	A		
Approach Delay (s)	15.0	2.6		0.0
Approach LOS	B			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	328	154	47	31	17
Future Volume (Veh/h)	57	328	154	47	31	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	357	167	51	34	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	428	43	52			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	43	52			
tC, single (s)	6.4	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	88	65	89			
cM capacity (veh/h)	522	1016	1529			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	419	218	52
Volume Left	62	167	0
Volume Right	357	0	18
cSH	891	1529	1700
Volume to Capacity	0.47	0.11	0.03
Queue Length 95th (m)	19.4	2.8	0.0
Control Delay (s)	12.6	6.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	6.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	9.6		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	48	188	202	143	210
Future Volume (Veh/h)	62	48	188	202	143	210
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	52	204	220	155	228
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	852	314			424	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	852	314			424	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	77	93			86	
cM capacity (veh/h)	288	731			1146	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	119	424	383
Volume Left	67	0	155
Volume Right	52	220	0
cSH	391	1700	1146
Volume to Capacity	0.30	0.25	0.14
Queue Length 95th (m)	9.6	0.0	3.6
Control Delay (s)	18.2	0.0	4.3
Lane LOS	C		A
Approach Delay (s)	18.2	0.0	4.3
Approach LOS	C		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	57.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	23	0	1	51	0	1
Future Volume (Veh/h)	23	0	1	51	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	0	1	55	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	30	28			56	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	30	28			56	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	985	1046			1549	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	25	56	0
Volume Left	25	0	0
Volume Right	0	55	0
cSH	985	1700	1700
Volume to Capacity	0.03	0.03	0.00
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	Err
Approach LOS	A		

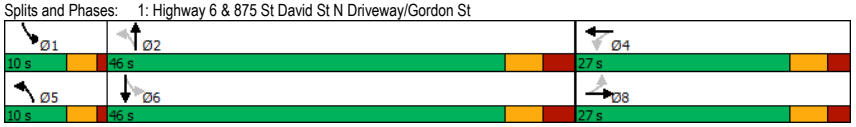
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	34	76	38	95	511	280	413
Future Volume (vph)	31	34	76	38	95	511	280	413
Lane Group Flow (vph)	33	113	81	360	101	632	298	457
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.32	0.35	0.42	0.70	0.15	0.64	0.65	0.43
Control Delay	35.4	14.2	34.1	13.3	4.8	16.5	13.9	12.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	14.2	34.1	13.3	4.8	16.5	13.9	12.4
Queue Length 50th (m)	4.1	4.4	10.2	4.9	3.1	53.0	10.5	33.3
Queue Length 95th (m)	11.6	16.5	21.8	27.2	10.6	110.9	#34.9	71.2
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	195	541	368	682	664	991	461	1070
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.21	0.22	0.53	0.15	0.64	0.65	0.43

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 73.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	34	72	76	38	301	95	511	83	280	413	17
Future Volume (vph)	31	34	72	76	38	301	95	511	83	280	413	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1813	1696		1783	1586		1824	1849		1755	1890	
Flt Permitted	0.36	1.00		0.68	1.00		0.47	1.00		0.29	1.00	
Satd. Flow (perm)	682	1696		1284	1586		896	1849		539	1890	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	36	77	81	40	320	101	544	88	298	439	18
RTOR Reduction (vph)	0	65	0	0	272	0	0	6	0	0	1	0
Lane Group Flow (vph)	33	48	0	81	88	0	101	626	0	298	456	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.2	11.2		11.2	11.2		44.5	40.0		47.5	41.5	
Effective Green, g (s)	11.2	11.2		11.2	11.2		44.5	40.0		47.5	41.5	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.60	0.54		0.64	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	102	256		193	239		593	996		443	1057	
v/s Ratio Prot		0.03			0.06		0.01	0.34		c0.05	0.24	
v/s Ratio Perm	0.05			c0.06			0.09			c0.38		
v/c Ratio	0.32	0.19		0.42	0.37		0.17	0.63		0.67	0.43	
Uniform Delay, d1	28.1	27.5		28.6	28.3		6.3	11.9		7.6	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.4		1.5	1.0		0.0	3.0		3.2	1.3	
Delay (s)	30.0	27.9		30.0	29.3		6.4	14.9		10.8	10.8	
Level of Service	C	C		C	C		A	B		B	B	
Approach Delay (s)		28.3			29.4			13.7			10.8	
Approach LOS		C			C			B			B	

Intersection Summary

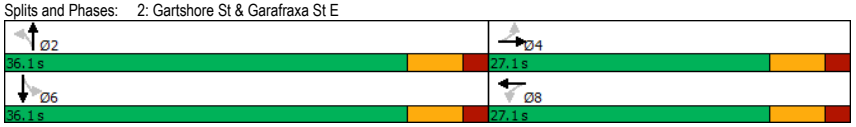
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	107	276	105	330	78	169	10	194
Future Volume (vph)	107	276	105	330	78	169	10	194
Lane Group Flow (vph)	115	365	113	379	84	277	11	382
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.52	0.65	0.49	0.68	0.18	0.30	0.02	0.42
Control Delay	26.9	23.3	25.4	24.9	10.7	8.7	9.0	9.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.9	23.3	25.4	24.9	10.7	8.7	9.0	9.5
Queue Length 50th (m)	10.4	32.7	10.2	35.8	5.3	14.3	0.6	20.0
Queue Length 95th (m)	24.5	56.6	23.8	60.6	12.6	27.7	2.8	38.5
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	254	642	264	644	469	923	561	911
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.57	0.43	0.59	0.18	0.30	0.02	0.42

Intersection Summary
Cycle Length: 63.2
Actuated Cycle Length: 60.7
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	107	276	63	105	330	22	78	169	88	10	194	161
Future Volume (vph)	107	276	63	105	330	22	78	169	88	10	194	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	1812		1787	1842		1806	1803		1824	1747	
Flt Permitted	0.38	1.00		0.41	1.00		0.50	1.00		0.59	1.00	
Satd. Flow (perm)	732	1812		762	1842		946	1803		1131	1747	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	115	297	68	113	355	24	84	182	95	11	209	173
RTOR Reduction (vph)	0	14	0	0	4	0	0	29	0	0	45	0
Lane Group Flow (vph)	115	351	0	113	375	0	84	248	0	11	337	0
Confl. Peds. (#/hr)			2	2			1		1	1		1
Heavy Vehicles (%)	1%	3%	1%	2%	3%	8%	1%	0%	1%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.3	18.3		18.3	18.3		30.1	30.1		30.1	30.1	
Effective Green, g (s)	18.3	18.3		18.3	18.3		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	547		230	556		469	895		561	867	
v/s Ratio Prot		0.19			c0.20			0.14			c0.19	
v/s Ratio Perm	0.16			0.15			0.09			0.01		
v/c Ratio	0.52	0.64		0.49	0.67		0.18	0.28		0.02	0.39	
Uniform Delay, d1	17.5	18.3		17.3	18.5		8.4	8.9		7.8	9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	3.5		3.4	4.2		0.8	0.8		0.1	1.3	
Delay (s)	21.7	21.8		20.8	22.7		9.3	9.7		7.8	10.8	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		21.8			22.3			9.6			10.7	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	12.2
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	148	116	566	364	25
Future Volume (Veh/h)	27	148	116	566	364	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	30	163	127	622	400	27
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1290	414	427			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1290	414	427			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	81	74	89			
cM capacity (veh/h)	159	637	1138			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	193	127	622	427
Volume Left	30	127	0	0
Volume Right	163	0	0	27
cSH	434	1138	1700	1700
Volume to Capacity	0.44	0.11	0.37	0.25
Queue Length 95th (m)	17.0	2.9	0.0	0.0
Control Delay (s)	19.8	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	19.8	1.5		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	254	374	28	72	53
Future Volume (Veh/h)	23	254	374	28	72	53
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	276	407	30	78	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	951	107	136			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	951	107	136			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	71	72			
cM capacity (veh/h)	209	942	1454			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	301	437	136
Volume Left	25	407	0
Volume Right	276	0	58
cSH	730	1454	1700
Volume to Capacity	0.41	0.28	0.08
Queue Length 95th (m)	15.4	8.8	0.0
Control Delay (s)	13.4	8.0	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	8.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	56.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	181	136	279	68	40	251
Future Volume (Veh/h)	181	136	279	68	40	251
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	148	303	74	43	273
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	699	340			377	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	699	340			377	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	50	79			96	
cM capacity (veh/h)	394	707			1193	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	345	377	316
Volume Left	197	0	43
Volume Right	148	74	0
cSH	487	1700	1193
Volume to Capacity	0.71	0.22	0.04
Queue Length 95th (m)	42.3	0.0	0.9
Control Delay (s)	28.4	0.0	1.4
Lane LOS	D		A
Approach Delay (s)	28.4	0.0	1.4
Approach LOS	D		

Intersection Summary			
Average Delay	9.9		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	0	1	25	0	1
Future Volume (Veh/h)	62	0	1	25	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	0	1	27	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	16	14			28	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16	14			28	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	100			100	
cM capacity (veh/h)	1003	1065			1585	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	67	28	0
Volume Left	67	0	0
Volume Right	0	27	0
cSH	1003	1700	1700
Volume to Capacity	0.07	0.02	0.00
Queue Length 95th (m)	1.6	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	Err
Approach LOS	A		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix F

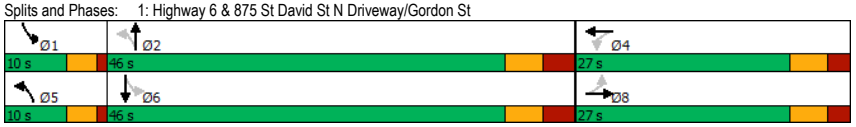
Background 2037 Traffic Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	2	4	44	8	12	337	275	399
Future Volume (vph)	2	4	44	8	12	337	275	399
Lane Group Flow (vph)	2	18	52	189	14	481	324	477
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.02	0.08	0.31	0.55	0.02	0.49	0.54	0.38
Control Delay	27.0	17.7	33.1	12.3	3.2	11.7	7.2	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.7	33.1	12.3	3.2	11.7	7.2	7.3
Queue Length 50th (m)	0.2	0.6	6.4	1.1	0.4	33.1	10.0	20.1
Queue Length 95th (m)	1.8	5.3	14.8	14.7	1.7	56.7	20.8	54.8
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	293	509	415	583	715	990	605	1246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.13	0.32	0.02	0.49	0.54	0.38

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 70.6
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	11	44	8	153	12	337	72	275	399	7
Future Volume (vph)	2	4	11	44	8	153	12	337	72	275	399	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1820	1681		1779	1536		1825	1779		1706	1861	
Flt Permitted	0.52	1.00		0.75	1.00		0.49	1.00		0.40	1.00	
Satd. Flow (perm)	987	1681		1396	1536		942	1779		716	1861	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	2	5	13	52	9	180	14	396	85	324	469	8
RTOR Reduction (vph)	0	11	0	0	159	0	0	8	0	0	0	0
Lane Group Flow (vph)	2	7	0	52	30	0	14	473	0	324	477	0
Confl. Peds. (#/hr)	2		3	3		2	1					1
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	6%	1%	7%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Effective Green, g (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.59	0.57		0.71	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	114	195		162	178		563	1018		587	1191	
v/s Ratio Prot		0.00			0.02		0.00	0.27		c0.04	0.26	
v/s Ratio Perm	0.00			c0.04			0.01			c0.35		
v/c Ratio	0.02	0.03		0.32	0.17		0.02	0.46		0.55	0.40	
Uniform Delay, d1	28.9	29.0		30.0	29.4		6.4	9.2		4.7	6.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		1.2	0.4		0.0	1.5		0.6	1.0	
Delay (s)	29.0	29.0		31.1	29.9		6.4	10.7		5.3	7.4	
Level of Service	C	C		C	C		A	B		A	A	
Approach Delay (s)		29.0			30.1			10.6			6.6	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

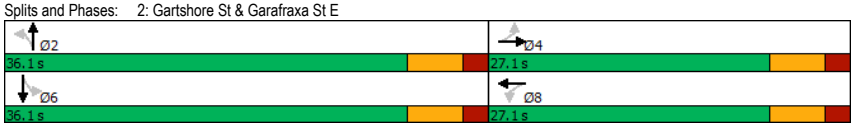
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	133	262	52	223	56	183	10	122
Future Volume (vph)	133	262	52	223	56	183	10	122
Lane Group Flow (vph)	149	352	58	269	63	276	11	215
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.51	0.64	0.26	0.52	0.11	0.30	0.02	0.24
Control Delay	24.3	23.1	19.2	20.9	9.6	9.4	9.0	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	23.1	19.2	20.9	9.6	9.4	9.0	7.5
Queue Length 50th (m)	13.4	31.5	4.8	23.6	3.6	15.0	0.6	9.1
Queue Length 95th (m)	28.0	53.6	12.7	41.6	9.4	29.1	2.8	20.1
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	348	656	266	618	588	911	568	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.54	0.22	0.44	0.11	0.30	0.02	0.24

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 60
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	262	52	52	223	16	56	183	62	10	122	69
Future Volume (vph)	133	262	52	52	223	16	56	183	62	10	122	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1718	1837		1722	1750		1787	1780		1824	1715	
Flt Permitted	0.55	1.00		0.42	1.00		0.62	1.00		0.59	1.00	
Satd. Flow (perm)	993	1837		760	1750		1173	1780		1132	1715	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	149	294	58	58	251	18	63	206	70	11	137	78
RTOR Reduction (vph)	0	12	0	0	4	0	0	18	0	0	31	0
Lane Group Flow (vph)	149	340	0	58	265	0	63	258	0	11	184	0
Confl. Peds. (#/hr)	2					2	2		1	1		2
Heavy Vehicles (%)	6%	2%	2%	6%	8%	16%	2%	2%	7%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.6	17.6		17.6	17.6		30.1	30.1		30.1	30.1	
Effective Green, g (s)	17.6	17.6		17.6	17.6		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	291	539		223	514		589	894		568	861	
v/s Ratio Prot		c0.19			0.15			c0.14			0.11	
v/s Ratio Perm	0.15			0.08			0.05			0.01		
v/c Ratio	0.51	0.63		0.26	0.52		0.11	0.29		0.02	0.21	
Uniform Delay, d1	17.6	18.3		16.2	17.6		7.8	8.7		7.5	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	3.3		1.3	1.7		0.4	0.8		0.1	0.6	
Delay (s)	20.6	21.7		17.5	19.3		8.2	9.5		7.5	8.9	
Level of Service	C	C		B	B		A	A		A	A	
Approach Delay (s)		21.3			19.0			9.2			8.8	
Approach LOS		C			B			A			A	

Intersection Summary

HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	103	111	258	434	35
Future Volume (Veh/h)	19	103	111	258	434	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	20	110	118	274	462	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	990	480	499			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	990	480	499			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	92	81	89			
cM capacity (veh/h)	238	577	1055			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	130	118	274	499
Volume Left	20	118	0	0
Volume Right	110	0	0	37
cSH	474	1055	1700	1700
Volume to Capacity	0.27	0.11	0.16	0.29
Queue Length 95th (m)	8.4	2.9	0.0	0.0
Control Delay (s)	15.4	8.8	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.4	2.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization		48.5%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	328	154	50	33	17
Future Volume (Veh/h)	57	328	154	50	33	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	357	167	54	36	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	433	45	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	433	45	54			
tC, single (s)	6.4	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	88	65	89			
cM capacity (veh/h)	518	1014	1526			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	419	221	54
Volume Left	62	167	0
Volume Right	357	0	18
cSH	888	1526	1700
Volume to Capacity	0.47	0.11	0.03
Queue Length 95th (m)	19.5	2.8	0.0
Control Delay (s)	12.6	6.0	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	6.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		9.5		
Intersection Capacity Utilization		47.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	48	198	202	143	219
Future Volume (Veh/h)	62	48	198	202	143	219
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	52	215	220	155	238
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	873	325			435	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	873	325			435	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	93			86	
cM capacity (veh/h)	279	721			1135	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	119	435	393
Volume Left	67	0	155
Volume Right	52	220	0
cSH	381	1700	1135
Volume to Capacity	0.31	0.26	0.14
Queue Length 95th (m)	10.0	0.0	3.6
Control Delay (s)	18.7	0.0	4.3
Lane LOS	C		A
Approach Delay (s)	18.7	0.0	4.3
Approach LOS	C		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	24	0	1	53	0	1
Future Volume (Veh/h)	24	0	1	53	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	0	1	58	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	31	30			59	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	31	30			59	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	97	100			100	
cM capacity (veh/h)	983	1044			1545	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	26	59	0
Volume Left	26	0	0
Volume Right	0	58	0
cSH	983	1700	1700
Volume to Capacity	0.03	0.03	0.00
Queue Length 95th (m)	0.6	0.0	0.0
Control Delay (s)	8.8	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.8	0.0	Err
Approach LOS	A		

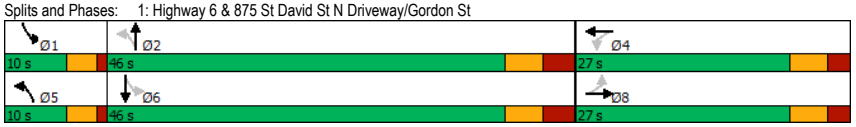
Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	34	76	38	95	522	280	421
Future Volume (vph)	31	34	76	38	95	522	280	421
Lane Group Flow (vph)	33	113	81	360	101	643	298	466
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.32	0.35	0.42	0.70	0.16	0.65	0.66	0.44
Control Delay	35.4	14.2	34.1	13.3	4.9	16.8	14.6	12.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	14.2	34.1	13.3	4.9	16.8	14.6	12.5
Queue Length 50th (m)	4.1	4.4	10.2	4.9	3.1	54.4	10.5	34.2
Queue Length 95th (m)	11.6	16.5	21.8	27.2	10.6	113.9	#36.4	72.9
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	195	541	368	682	655	991	452	1070
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.17	0.21	0.22	0.53	0.15	0.65	0.66	0.44

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 73.4
Natural Cycle: 85
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	34	72	76	38	301	95	522	83	280	421	17
Future Volume (vph)	31	34	72	76	38	301	95	522	83	280	421	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1813	1696		1783	1586		1824	1850		1755	1890	
Flt Permitted	0.36	1.00		0.68	1.00		0.46	1.00		0.28	1.00	
Satd. Flow (perm)	682	1696		1284	1586		882	1850		524	1890	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	36	77	81	40	320	101	555	88	298	448	18
RTOR Reduction (vph)	0	65	0	0	272	0	0	6	0	0	1	0
Lane Group Flow (vph)	33	48	0	81	88	0	101	637	0	298	465	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.2	11.2		11.2	11.2		44.5	40.0		47.5	41.5	
Effective Green, g (s)	11.2	11.2		11.2	11.2		44.5	40.0		47.5	41.5	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.60	0.54		0.64	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	102	256		193	239		586	997		434	1057	
v/s Ratio Prot		0.03			0.06		0.01	0.34		c0.06	0.25	
v/s Ratio Perm	0.05			c0.06			0.09			c0.38		
v/c Ratio	0.32	0.19		0.42	0.37		0.17	0.64		0.69	0.44	
Uniform Delay, d1	28.1	27.5		28.6	28.3		6.4	12.0		7.8	9.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.4		1.5	1.0		0.1	3.1		3.6	1.3	
Delay (s)	30.0	27.9		30.0	29.3		6.4	15.2		11.4	10.9	
Level of Service	C	C		C	C		A	B		B	B	
Approach Delay (s)		28.3			29.4			14.0			11.1	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

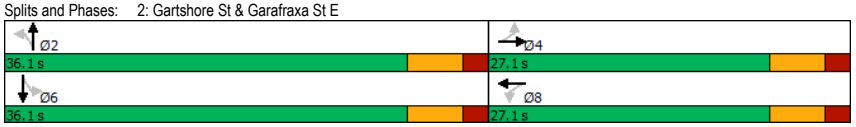
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	111	289	110	345	82	176	11	200
Future Volume (vph)	111	289	110	345	82	176	11	200
Lane Group Flow (vph)	119	382	118	397	88	289	12	392
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.57	0.68	0.54	0.70	0.19	0.31	0.02	0.43
Control Delay	29.6	24.2	27.7	25.8	11.0	9.0	9.1	9.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	29.6	24.2	27.7	25.8	11.0	9.0	9.1	9.8
Queue Length 50th (m)	11.0	34.9	10.8	38.1	5.6	15.3	0.7	21.1
Queue Length 95th (m)	#26.4	60.0	25.5	64.1	13.2	29.1	3.0	39.9
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	237	638	249	640	457	919	553	907
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.60	0.47	0.62	0.19	0.31	0.02	0.43

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 60.9
Natural Cycle: 65
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	289	66	110	345	24	82	176	93	11	200	165
Future Volume (vph)	111	289	66	110	345	24	82	176	93	11	200	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	1812		1787	1841		1806	1802		1824	1747	
Flt Permitted	0.36	1.00		0.38	1.00		0.49	1.00		0.58	1.00	
Satd. Flow (perm)	687	1812		720	1841		925	1802		1119	1747	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	119	311	71	118	371	26	88	189	100	12	215	177
RTOR Reduction (vph)	0	13	0	0	4	0	0	29	0	0	45	0
Lane Group Flow (vph)	119	369	0	118	393	0	88	260	0	12	347	0
Confl. Peds. (#/hr)			2	2			1		1	1		1
Heavy Vehicles (%)	1%	3%	1%	2%	3%	8%	1%	0%	1%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.6	18.6		18.6	18.6		30.1	30.1		30.1	30.1	
Effective Green, g (s)	18.6	18.6		18.6	18.6		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.49	0.49		0.49	0.49	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	553		219	562		457	890		553	863	
v/s Ratio Prot		0.20			c0.21			0.14			c0.20	
v/s Ratio Perm	0.17			0.16			0.10			0.01		
v/c Ratio	0.57	0.67		0.54	0.70		0.19	0.29		0.02	0.40	
Uniform Delay, d1	17.8	18.4		17.6	18.7		8.6	9.1		7.9	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.8	4.0		4.6	4.8		0.9	0.8		0.1	1.4	
Delay (s)	23.5	22.5		22.2	23.5		9.5	9.9		7.9	11.1	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		22.7			23.2			9.8			11.0	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	60.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	156	122	577	372	27
Future Volume (Veh/h)	28	156	122	577	372	27
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	31	171	134	634	409	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1326	424	439			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1326	424	439			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	73	88			
cM capacity (veh/h)	150	628	1126			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	202	134	634	439
Volume Left	31	134	0	0
Volume Right	171	0	0	30
cSH	421	1126	1700	1700
Volume to Capacity	0.48	0.12	0.37	0.26
Queue Length 95th (m)	19.2	3.1	0.0	0.0
Control Delay (s)	21.2	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	21.2	1.5		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.9		
Intersection Capacity Utilization	49.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	23	254	374	29	75	53
Future Volume (Veh/h)	23	254	374	29	75	53
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	25	276	407	32	82	58
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	957	111	140			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	957	111	140			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	88	71	72			
cM capacity (veh/h)	207	937	1449			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	301	439	140
Volume Left	25	407	0
Volume Right	276	0	58
cSH	725	1449	1700
Volume to Capacity	0.42	0.28	0.08
Queue Length 95th (m)	15.6	8.8	0.0
Control Delay (s)	13.4	8.0	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	8.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	56.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	181	136	292	68	40	263
Future Volume (Veh/h)	181	136	292	68	40	263
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	148	317	74	43	286
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	726	354			391	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	726	354			391	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	48	79			96	
cM capacity (veh/h)	380	694			1179	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	345	391	329
Volume Left	197	0	43
Volume Right	148	74	0
cSH	472	1700	1179
Volume to Capacity	0.73	0.23	0.04
Queue Length 95th (m)	45.2	0.0	0.9
Control Delay (s)	30.7	0.0	1.4
Lane LOS	D		A
Approach Delay (s)	30.7	0.0	1.4
Approach LOS	D		

Intersection Summary			
Average Delay	10.4		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	63	0	1	25	0	1
Future Volume (Veh/h)	63	0	1	25	0	1
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	68	0	1	27	0	1
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	16	14			28	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	16	14			28	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	93	100			100	
cM capacity (veh/h)	1003	1065			1585	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	68	28	0
Volume Left	68	0	0
Volume Right	0	27	0
cSH	1003	1700	1700
Volume to Capacity	0.07	0.02	0.00
Queue Length 95th (m)	1.7	0.0	0.0
Control Delay (s)	8.9	0.0	0.0
Lane LOS	A		
Approach Delay (s)	8.9	0.0	Err
Approach LOS	A		

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	Err%	ICU Level of Service	H
Analysis Period (min)	15		

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix G

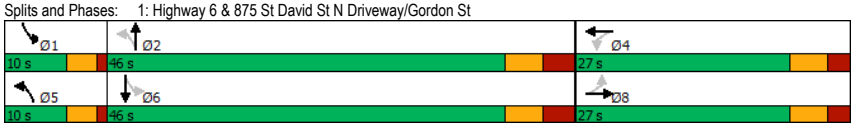
Total 2032 Traffic Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	2	4	46	8	12	330	307	391
Future Volume (vph)	2	4	46	8	12	330	307	391
Lane Group Flow (vph)	2	18	54	193	14	488	361	468
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.02	0.08	0.32	0.55	0.02	0.49	0.60	0.38
Control Delay	27.0	17.6	33.3	12.2	3.2	11.8	8.8	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.6	33.3	12.2	3.2	11.8	8.8	7.3
Queue Length 50th (m)	0.2	0.6	6.6	1.1	0.4	33.7	11.6	19.8
Queue Length 95th (m)	1.8	5.3	15.1	14.7	1.7	57.7	23.5	53.6
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	284	508	414	585	719	988	599	1245
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.13	0.33	0.02	0.49	0.60	0.38

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 70.7
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	11	46	8	156	12	330	85	307	391	7
Future Volume (vph)	2	4	11	46	8	156	12	330	85	307	391	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1820	1681		1779	1535		1825	1774		1706	1861	
Flt Permitted	0.50	1.00		0.75	1.00		0.49	1.00		0.39	1.00	
Satd. Flow (perm)	958	1681		1396	1535		950	1774		707	1861	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	2	5	13	54	9	184	14	388	100	361	460	8
RTOR Reduction (vph)	0	11	0	0	163	0	0	9	0	0	0	0
Lane Group Flow (vph)	2	7	0	54	30	0	14	479	0	361	468	0
Confl. Peds. (#/hr)	2		3	3		2	1					1
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	6%	1%	7%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Effective Green, g (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.59	0.57		0.71	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	111	195		162	178		568	1015		581	1191	
v/s Ratio Prot		0.00			0.02		0.00	0.27		c0.05	0.25	
v/s Ratio Perm	0.00			c0.04			0.01			c0.39		
v/c Ratio	0.02	0.03		0.33	0.17		0.02	0.47		0.62	0.39	
Uniform Delay, d1	28.9	29.0		30.0	29.4		6.4	9.3		4.9	6.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		1.2	0.5		0.0	1.6		1.5	1.0	
Delay (s)	29.0	29.0		31.2	29.9		6.4	10.8		6.4	7.4	
Level of Service	C	C		C	C		A	B		A	A	
Approach Delay (s)		29.0			30.2			10.7			6.9	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	12.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		

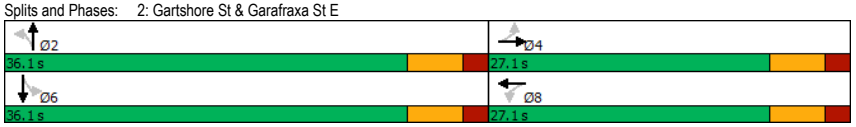
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	142	251	50	212	53	197	9	121
Future Volume (vph)	142	251	50	212	53	197	9	121
Lane Group Flow (vph)	160	338	56	257	60	287	10	214
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.54	0.62	0.24	0.50	0.10	0.31	0.02	0.24
Control Delay	24.9	22.6	18.7	20.5	9.5	9.6	8.9	7.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.9	22.6	18.7	20.5	9.5	9.6	8.9	7.4
Queue Length 50th (m)	14.5	29.8	4.6	22.3	3.4	15.8	0.6	8.9
Queue Length 95th (m)	29.8	51.0	12.2	39.6	9.1	30.8	2.6	20.1
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	362	659	280	621	591	918	565	894
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.51	0.20	0.41	0.10	0.31	0.02	0.24

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 59.8
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	142	251	50	50	212	17	53	197	59	9	121	69
Future Volume (vph)	142	251	50	50	212	17	53	197	59	9	121	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.97		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1718	1837		1722	1747		1787	1790		1824	1714	
Flt Permitted	0.57	1.00		0.44	1.00		0.62	1.00		0.58	1.00	
Satd. Flow (perm)	1027	1837		796	1747		1174	1790		1121	1714	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	160	282	56	56	238	19	60	221	66	10	136	78
RTOR Reduction (vph)	0	12	0	0	5	0	0	16	0	0	31	0
Lane Group Flow (vph)	160	326	0	56	252	0	60	271	0	10	183	0
Confl. Peds. (#/hr)	2					2	2		1	1		2
Heavy Vehicles (%)	6%	2%	2%	6%	8%	16%	2%	2%	7%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.4	17.4		17.4	17.4		30.1	30.1		30.1	30.1	
Effective Green, g (s)	17.4	17.4		17.4	17.4		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	299	535		232	509		591	902		565	864	
v/s Ratio Prot		c0.18			0.14			c0.15			0.11	
v/s Ratio Perm	0.16			0.07			0.05			0.01		
v/c Ratio	0.54	0.61		0.24	0.50		0.10	0.30		0.02	0.21	
Uniform Delay, d1	17.8	18.2		16.1	17.5		7.7	8.6		7.4	8.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.3	2.9		1.1	1.6		0.3	0.9		0.1	0.6	
Delay (s)	21.1	21.1		17.3	19.1		8.1	9.5		7.5	8.8	
Level of Service	C	C		B	B		A	A		A	A	
Approach Delay (s)		21.1			18.8			9.3			8.7	
Approach LOS		C			B			A			A	

Intersection Summary

HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	59.7	Sum of lost time (s)	12.2
Intersection Capacity Utilization	69.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	18	102	106	256	453	33
Future Volume (Veh/h)	18	102	106	256	453	33
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	19	109	113	272	482	35
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	998	500	517			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	998	500	517			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	92	81	89			
cM capacity (veh/h)	237	563	1039			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	128	113	272	517
Volume Left	19	113	0	0
Volume Right	109	0	0	35
cSH	468	1039	1700	1700
Volume to Capacity	0.27	0.11	0.16	0.30
Queue Length 95th (m)	8.4	2.8	0.0	0.0
Control Delay (s)	15.6	8.9	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.6	2.6		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.9		
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	102	328	154	79	37	22
Future Volume (Veh/h)	102	328	154	79	37	22
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	111	357	167	86	40	24
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	472	52	64			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	472	52	64			
tC, single (s)	6.4	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	77	64	89			
cM capacity (veh/h)	491	1004	1513			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	468	253	64
Volume Left	111	167	0
Volume Right	357	0	24
cSH	805	1513	1700
Volume to Capacity	0.58	0.11	0.04
Queue Length 95th (m)	29.0	2.8	0.0
Control Delay (s)	15.5	5.4	0.0
Lane LOS	C	A	
Approach Delay (s)	15.5	5.4	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	11.0		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	48	220	202	143	216
Future Volume (Veh/h)	62	48	220	202	143	216
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	52	239	220	155	235
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	894	349			459	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	894	349			459	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	75	93			86	
cM capacity (veh/h)	270	699			1113	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	119	459	390
Volume Left	67	0	155
Volume Right	52	220	0
cSH	369	1700	1113
Volume to Capacity	0.32	0.27	0.14
Queue Length 95th (m)	10.4	0.0	3.7
Control Delay (s)	19.3	0.0	4.3
Lane LOS	C		A
Approach Delay (s)	19.3	0.0	4.3
Approach LOS	C		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	2	23	0	0	0	17	51	0	1	0
Future Volume (Veh/h)	0	0	2	23	0	0	0	17	51	0	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2	25	0	0	0	18	55	0	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	46	74	1	48	46	46	1			73		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	46	74	1	48	46	46	1			73		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	100	100			100		
cM capacity (veh/h)	955	816	1084	950	845	1024	1622			1527		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	2	25	73	1
Volume Left	0	25	0	0
Volume Right	2	0	55	0
cSH	1084	950	1622	1527
Volume to Capacity	0.00	0.03	0.00	0.00
Queue Length 95th (m)	0.0	0.6	0.0	0.0
Control Delay (s)	8.3	8.9	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.3	8.9	0.0	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	2.4		
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	9	61	68	26	0
Future Volume (Veh/h)	0	9	61	68	26	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	10	66	74	28	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	234	28	28			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	234	28	28			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	96			
cM capacity (veh/h)	723	1047	1585			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	10	140	28
Volume Left	0	66	0
Volume Right	10	0	0
cSH	1047	1585	1700
Volume to Capacity	0.01	0.04	0.02
Queue Length 95th (m)	0.2	1.0	0.0
Control Delay (s)	8.5	3.6	0.0
Lane LOS	A	A	
Approach Delay (s)	8.5	3.6	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	23.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	16	1	1	0
Future Volume (Veh/h)	0	0	16	1	1	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	17	1	1	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	36	1	1			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	36	1	1			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	99			
cM capacity (veh/h)	966	1084	1622			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	18	1
Volume Left	0	17	0
Volume Right	0	0	0
cSH	1700	1622	1700
Volume to Capacity	0.00	0.01	0.00
Queue Length 95th (m)	0.0	0.2	0.0
Control Delay (s)	0.0	6.8	0.0
Lane LOS	A	A	
Approach Delay (s)	0.0	6.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	10.9%	ICU Level of Service	A
Analysis Period (min)	15		

Timings
1: Highway 6 & 875 St David St N Driveway/Gordon St

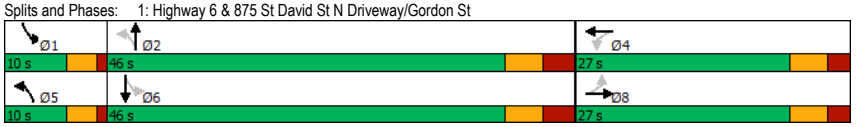
Total 2032 PM Ops

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	34	85	38	95	511	284	413
Future Volume (vph)	31	34	85	38	95	511	284	413
Lane Group Flow (vph)	33	113	90	377	101	634	302	457
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.32	0.34	0.45	0.71	0.16	0.64	0.66	0.43
Control Delay	35.4	13.9	34.9	13.1	5.0	16.9	15.0	12.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	13.9	34.9	13.1	5.0	16.9	15.0	12.6
Queue Length 50th (m)	4.1	4.4	11.5	4.9	3.2	54.1	11.1	34.0
Queue Length 95th (m)	11.7	16.5	23.8	27.9	10.7	112.5	#37.9	72.0
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	188	539	366	692	658	987	455	1065
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.21	0.25	0.54	0.15	0.64	0.66	0.43

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 73.8
Natural Cycle: 85
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



HCM Signalized Intersection Capacity Analysis
1: Highway 6 & 875 St David St N Driveway/Gordon St

Total 2032 PM Ops

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	34	72	85	38	317	95	511	85	284	413	17
Future Volume (vph)	31	34	72	85	38	317	95	511	85	284	413	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1814	1696		1783	1584		1824	1848		1755	1890	
Flt Permitted	0.34	1.00		0.68	1.00		0.47	1.00		0.29	1.00	
Satd. Flow (perm)	658	1696		1284	1584		893	1848		533	1890	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	36	77	90	40	337	101	544	90	302	439	18
RTOR Reduction (vph)	0	65	0	0	285	0	0	6	0	0	1	0
Lane Group Flow (vph)	33	48	0	90	92	0	101	628	0	302	456	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.6	11.6		11.6	11.6		44.6	40.1		47.6	41.6	
Effective Green, g (s)	11.6	11.6		11.6	11.6		44.6	40.1		47.6	41.6	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.60	0.54		0.64	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	102	263		199	245		589	992		437	1052	
v/s Ratio Prot		0.03			0.06		0.01	0.34		c0.06	0.24	
v/s Ratio Perm	0.05			c0.07			0.09			c0.38		
v/c Ratio	0.32	0.18		0.45	0.38		0.17	0.63		0.69	0.43	
Uniform Delay, d1	28.1	27.4		28.7	28.3		6.5	12.1		7.9	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.3		1.6	1.0		0.1	3.1		3.8	1.3	
Delay (s)	29.9	27.8		30.3	29.3		6.5	15.2		11.7	11.0	
Level of Service	C	C		C	C		A	B		B	B	
Approach Delay (s)		28.2			29.5			14.0			11.2	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

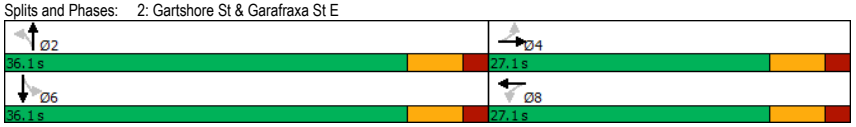
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	109	276	105	330	78	172	10	210
Future Volume (vph)	109	276	105	330	78	172	10	210
Lane Group Flow (vph)	117	365	113	379	84	280	11	411
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.53	0.65	0.49	0.67	0.19	0.30	0.02	0.45
Control Delay	27.3	23.3	25.5	24.7	10.9	8.8	9.0	10.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.3	23.3	25.5	24.7	10.9	8.8	9.0	10.1
Queue Length 50th (m)	10.7	32.7	10.2	35.8	5.3	14.6	0.6	22.5
Queue Length 95th (m)	25.0	56.6	23.8	60.3	12.8	28.2	2.8	42.6
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	254	643	265	650	444	924	560	912
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.46	0.57	0.43	0.58	0.19	0.30	0.02	0.45

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 60.6
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	276	63	105	330	22	78	172	88	10	210	172
Future Volume (vph)	109	276	63	105	330	22	78	172	88	10	210	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	1812		1787	1859		1806	1804		1824	1747	
Flt Permitted	0.38	1.00		0.41	1.00		0.47	1.00		0.59	1.00	
Satd. Flow (perm)	732	1812		762	1859		895	1804		1128	1747	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	117	297	68	113	355	24	84	185	95	11	226	185
RTOR Reduction (vph)	0	14	0	0	4	0	0	28	0	0	45	0
Lane Group Flow (vph)	117	351	0	113	375	0	84	252	0	11	366	0
Confl. Peds. (#/hr)			2	2			1		1	1		1
Heavy Vehicles (%)	1%	3%	1%	2%	2%	8%	1%	0%	1%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.3	18.3		18.3	18.3		30.1	30.1		30.1	30.1	
Effective Green, g (s)	18.3	18.3		18.3	18.3		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	221	547		230	561		444	896		560	867	
v/s Ratio Prot		0.19			c0.20			0.14			c0.21	
v/s Ratio Perm	0.16			0.15			0.09			0.01		
v/c Ratio	0.53	0.64		0.49	0.67		0.19	0.28		0.02	0.42	
Uniform Delay, d1	17.6	18.3		17.3	18.5		8.5	8.9		7.8	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.3	3.5		3.4	4.0		0.9	0.8		0.1	1.5	
Delay (s)	21.9	21.8		20.8	22.5		9.4	9.7		7.8	11.2	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		21.8			22.1			9.6			11.1	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	16.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	12.2
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	27	149	118	579	367	25
Future Volume (Veh/h)	27	149	118	579	367	25
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	30	164	130	636	403	27
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1312	416	430			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1312	416	430			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	80	74	89			
cM capacity (veh/h)	153	636	1140			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	194	130	636	430
Volume Left	30	130	0	0
Volume Right	164	0	0	27
cSH	428	1140	1700	1700
Volume to Capacity	0.45	0.11	0.37	0.25
Queue Length 95th (m)	17.5	2.9	0.0	0.0
Control Delay (s)	20.2	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	20.2	1.5		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	254	374	33	99	78
Future Volume (Veh/h)	29	254	374	33	99	78
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	276	407	36	108	85
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1000	150	193			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1000	150	193			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	69	71			
cM capacity (veh/h)	192	891	1386			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	308	443	193
Volume Left	32	407	0
Volume Right	276	0	85
cSH	646	1386	1700
Volume to Capacity	0.48	0.29	0.11
Queue Length 95th (m)	19.6	9.4	0.0
Control Delay (s)	15.5	8.2	0.0
Lane LOS	C	A	
Approach Delay (s)	15.5	8.2	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	8.9		
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	181	136	284	68	40	278
Future Volume (Veh/h)	181	136	284	68	40	278
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	148	309	74	43	302
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	734	346			383	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	734	346			383	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	48	79			96	
cM capacity (veh/h)	376	702			1187	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	345	383	345
Volume Left	197	0	43
Volume Right	148	74	0
cSH	470	1700	1187
Volume to Capacity	0.73	0.23	0.04
Queue Length 95th (m)	45.6	0.0	0.9
Control Delay (s)	31.1	0.0	1.3
Lane LOS	D		A
Approach Delay (s)	31.1	0.0	1.3
Approach LOS	D		

Intersection Summary			
Average Delay	10.4		
Intersection Capacity Utilization	64.3%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	11	62	0	0	0	3	25	0	1	0
Future Volume (Veh/h)	0	0	11	62	0	0	0	3	25	0	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	12	67	0	0	0	3	27	0	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	18	31	1	30	18	16	1			30		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18	31	1	30	18	16	1			30		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	93	100	100	100			100		
cM capacity (veh/h)	997	862	1084	968	877	1063	1622			1583		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	67	30	1
Volume Left	0	67	0	0
Volume Right	12	0	27	0
cSH	1084	968	1622	1583
Volume to Capacity	0.01	0.07	0.00	0.00
Queue Length 95th (m)	0.3	1.7	0.0	0.0
Control Delay (s)	8.4	9.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.4	9.0	0.0	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	20.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	41	9	28	74	0
Future Volume (Veh/h)	0	41	9	28	74	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	10	30	80	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	130	80	80			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	130	80	80			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	99			
cM capacity (veh/h)	859	980	1518			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	40	80
Volume Left	0	10	0
Volume Right	45	0	0
cSH	980	1518	1700
Volume to Capacity	0.05	0.01	0.05
Queue Length 95th (m)	1.1	0.2	0.0
Control Delay (s)	8.8	1.9	0.0
Lane LOS	A	A	
Approach Delay (s)	8.8	1.9	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		2.9	
Intersection Capacity Utilization		18.6%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2	1	1	0
Future Volume (Veh/h)	0	0	2	1	1	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2	1	1	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	6	1	1			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6	1	1			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1014	1084	1622			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	3	1
Volume Left	0	2	0
Volume Right	0	0	0
cSH	1700	1622	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	4.8	0.0
Lane LOS	A	A	
Approach Delay (s)	0.0	4.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		3.6	
Intersection Capacity Utilization		6.7%	ICU Level of Service A
Analysis Period (min)		15	

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix H

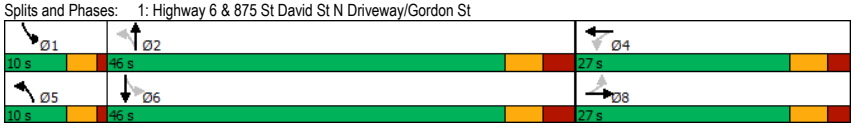
Total 2037 Traffic Operations

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	2	4	44	8	12	337	275	399
Future Volume (vph)	2	4	44	8	12	337	275	399
Lane Group Flow (vph)	2	18	52	189	14	481	324	477
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.02	0.08	0.31	0.55	0.02	0.49	0.54	0.38
Control Delay	27.0	17.7	33.1	12.3	3.2	11.7	7.2	7.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.0	17.7	33.1	12.3	3.2	11.7	7.2	7.3
Queue Length 50th (m)	0.2	0.6	6.4	1.1	0.4	33.1	10.0	20.1
Queue Length 95th (m)	1.8	5.3	14.8	14.7	1.7	56.7	20.8	54.8
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	293	509	415	583	715	990	605	1246
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.01	0.04	0.13	0.32	0.02	0.49	0.54	0.38

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 70.6
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	4	11	44	8	153	12	337	72	275	399	7
Future Volume (vph)	2	4	11	44	8	153	12	337	72	275	399	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.89		1.00	0.86		1.00	0.97		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1820	1681		1779	1536		1825	1779		1706	1861	
Flt Permitted	0.52	1.00		0.75	1.00		0.49	1.00		0.40	1.00	
Satd. Flow (perm)	987	1681		1396	1536		942	1779		716	1861	
Peak-hour factor, PHF	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Adj. Flow (vph)	2	5	13	52	9	180	14	396	85	324	469	8
RTOR Reduction (vph)	0	11	0	0	159	0	0	8	0	0	0	0
Lane Group Flow (vph)	2	7	0	52	30	0	14	473	0	324	477	0
Confl. Peds. (#/hr)	2		3	3		2	1					1
Heavy Vehicles (%)	0%	0%	0%	2%	0%	5%	0%	6%	1%	7%	3%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Effective Green, g (s)	8.6	8.6		8.6	8.6		43.3	42.3		52.3	47.3	
Actuated g/C Ratio	0.12	0.12		0.12	0.12		0.59	0.57		0.71	0.64	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	114	195		162	178		563	1018		587	1191	
v/s Ratio Prot		0.00			0.02		0.00	0.27		c0.04	0.26	
v/s Ratio Perm	0.00			c0.04			0.01			c0.35		
v/c Ratio	0.02	0.03		0.32	0.17		0.02	0.46		0.55	0.40	
Uniform Delay, d1	28.9	29.0		30.0	29.4		6.4	9.2		4.7	6.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		1.2	0.4		0.0	1.5		0.6	1.0	
Delay (s)	29.0	29.0		31.1	29.9		6.4	10.7		5.3	7.4	
Level of Service	C	C		C	C		A	B		A	A	
Approach Delay (s)		29.0			30.1			10.6			6.6	
Approach LOS		C			C			B			A	

Intersection Summary

HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	73.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	69.0%	ICU Level of Service	C
Analysis Period (min)	15		

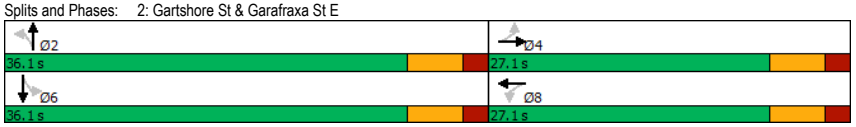
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	133	262	52	223	56	183	10	122
Future Volume (vph)	133	262	52	223	56	183	10	122
Lane Group Flow (vph)	149	352	58	269	63	276	11	215
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.51	0.64	0.26	0.52	0.11	0.30	0.02	0.24
Control Delay	24.3	23.1	19.2	20.9	9.6	9.4	9.0	7.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.3	23.1	19.2	20.9	9.6	9.4	9.0	7.5
Queue Length 50th (m)	13.4	31.5	4.8	23.6	3.6	15.0	0.6	9.1
Queue Length 95th (m)	28.0	53.6	12.7	41.6	9.4	29.1	2.8	20.1
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	348	656	266	618	588	911	568	891
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.43	0.54	0.22	0.44	0.11	0.30	0.02	0.24

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 60
Natural Cycle: 65
Control Type: Semi Act-Uncoord

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	133	262	52	52	223	16	56	183	62	10	122	69
Future Volume (vph)	133	262	52	52	223	16	56	183	62	10	122	69
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.99		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1718	1837		1722	1750		1787	1780		1824	1715	
Flt Permitted	0.55	1.00		0.42	1.00		0.62	1.00		0.59	1.00	
Satd. Flow (perm)	993	1837		760	1750		1173	1780		1132	1715	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	149	294	58	58	251	18	63	206	70	11	137	78
RTOR Reduction (vph)	0	12	0	0	4	0	0	18	0	0	31	0
Lane Group Flow (vph)	149	340	0	58	265	0	63	258	0	11	184	0
Confl. Peds. (#/hr)	2					2	2		1	1		2
Heavy Vehicles (%)	6%	2%	2%	6%	8%	16%	2%	2%	7%	0%	8%	0%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	17.6	17.6		17.6	17.6		30.1	30.1		30.1	30.1	
Effective Green, g (s)	17.6	17.6		17.6	17.6		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.29	0.29		0.29	0.29		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	291	539		223	514		589	894		568	861	
v/s Ratio Prot		c0.19			0.15			c0.14			0.11	
v/s Ratio Perm	0.15			0.08			0.05			0.01		
v/c Ratio	0.51	0.63		0.26	0.52		0.11	0.29		0.02	0.21	
Uniform Delay, d1	17.6	18.3		16.2	17.6		7.8	8.7		7.5	8.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.0	3.3		1.3	1.7		0.4	0.8		0.1	0.6	
Delay (s)	20.6	21.7		17.5	19.3		8.2	9.5		7.5	8.9	
Level of Service	C	C		B	B		A	A		A	A	
Approach Delay (s)		21.3			19.0			9.2			8.8	
Approach LOS		C			B			A			A	

Intersection Summary

HCM 2000 Control Delay	15.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	19	103	111	258	434	35
Future Volume (Veh/h)	19	103	111	258	434	35
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	20	110	118	274	462	37
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	990	480	499			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	990	480	499			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	92	81	89			
cM capacity (veh/h)	238	577	1055			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	130	118	274	499
Volume Left	20	118	0	0
Volume Right	110	0	0	37
cSH	474	1055	1700	1700
Volume to Capacity	0.27	0.11	0.16	0.29
Queue Length 95th (m)	8.4	2.9	0.0	0.0
Control Delay (s)	15.4	8.8	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	15.4	2.7		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		3.0		
Intersection Capacity Utilization		48.5%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	57	328	154	50	33	17
Future Volume (Veh/h)	57	328	154	50	33	17
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	62	357	167	54	36	18
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	433	45	54			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	433	45	54			
tC, single (s)	6.4	6.3	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.4	2.3			
p0 queue free %	88	65	89			
cM capacity (veh/h)	518	1014	1526			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	419	221	54
Volume Left	62	167	0
Volume Right	357	0	18
cSH	888	1526	1700
Volume to Capacity	0.47	0.11	0.03
Queue Length 95th (m)	19.5	2.8	0.0
Control Delay (s)	12.6	6.0	0.0
Lane LOS	B	A	
Approach Delay (s)	12.6	6.0	0.0
Approach LOS	B		

Intersection Summary				
Average Delay		9.5		
Intersection Capacity Utilization		47.9%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	62	48	198	202	143	219
Future Volume (Veh/h)	62	48	198	202	143	219
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	67	52	215	220	155	238
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	873	325			435	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	873	325			435	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	93			86	
cM capacity (veh/h)	279	721			1135	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	119	435	393
Volume Left	67	0	155
Volume Right	52	220	0
cSH	381	1700	1135
Volume to Capacity	0.31	0.26	0.14
Queue Length 95th (m)	10.0	0.0	3.6
Control Delay (s)	18.7	0.0	4.3
Lane LOS	C		A
Approach Delay (s)	18.7	0.0	4.3
Approach LOS	C		

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	58.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	24	0	0	0	1	53	0	1	0
Future Volume (Veh/h)	0	0	0	24	0	0	0	1	53	0	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	26	0	0	0	1	58	0	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	31	60	1	31	31	30	1			59		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	31	60	1	31	31	30	1			59		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	97	100	100	100			100		
cM capacity (veh/h)	977	831	1084	977	862	1044	1622			1545		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	0	26	59	1
Volume Left	0	26	0	0
Volume Right	0	0	58	0
cSH	1700	977	1622	1545
Volume to Capacity	0.01	0.03	0.00	0.00
Queue Length 95th (m)	0.0	0.6	0.0	0.0
Control Delay (s)	0.0	8.8	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	0.0	8.8	0.0	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	13.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	54	25	0
Future Volume (Veh/h)	0	0	0	54	25	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	59	27	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	86	27	27			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	86	27	27			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	915	1048	1587			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	59	27
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1587	1700
Volume to Capacity	0.05	0.00	0.02
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	0	1	1	0
Future Volume (Veh/h)	0	0	0	1	1	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	1	1	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	2	1	1			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2	1	1			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1021	1084	1622			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	1	1
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1622	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	0.0	0.0
Lane LOS	A		
Approach Delay (s)	0.0	0.0	0.0
Approach LOS	A		

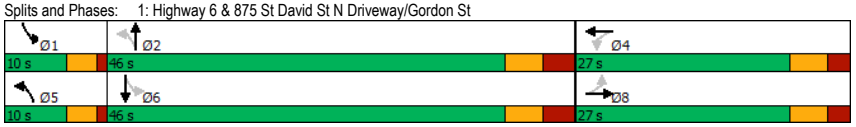
Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	34	85	38	95	522	284	421
Future Volume (vph)	31	34	85	38	95	522	284	421
Lane Group Flow (vph)	33	113	90	377	101	645	302	466
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	10.0	46.0	10.0	46.0
Total Split (%)	32.5%	32.5%	32.5%	32.5%	12.0%	55.4%	12.0%	55.4%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.32	0.34	0.45	0.71	0.16	0.65	0.68	0.44
Control Delay	35.4	13.9	34.9	13.1	5.0	17.2	15.8	12.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	35.4	13.9	34.9	13.1	5.0	17.2	15.8	12.7
Queue Length 50th (m)	4.1	4.4	11.5	4.9	3.2	55.7	11.1	34.9
Queue Length 95th (m)	11.7	16.5	23.8	27.9	10.7	115.8	#39.3	73.7
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	188	539	366	692	650	986	446	1065
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.18	0.21	0.25	0.54	0.16	0.65	0.68	0.44

Intersection Summary

Cycle Length: 83
Actuated Cycle Length: 73.8
Natural Cycle: 85
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	34	72	85	38	317	95	522	85	284	421	17
Future Volume (vph)	31	34	72	85	38	317	95	522	85	284	421	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1814	1696		1783	1584		1824	1849		1755	1890	
Flt Permitted	0.34	1.00		0.68	1.00		0.46	1.00		0.28	1.00	
Satd. Flow (perm)	658	1696		1284	1584		879	1849		518	1890	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	36	77	90	40	337	101	555	90	302	448	18
RTOR Reduction (vph)	0	65	0	0	285	0	0	6	0	0	1	0
Lane Group Flow (vph)	33	48	0	90	92	0	101	639	0	302	465	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	11.6	11.6		11.6	11.6		44.6	40.1		47.6	41.6	
Effective Green, g (s)	11.6	11.6		11.6	11.6		44.6	40.1		47.6	41.6	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.60	0.54		0.64	0.56	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	102	263		199	245		581	992		429	1052	
v/s Ratio Prot		0.03			0.06		0.01	0.35		c0.06	0.25	
v/s Ratio Perm	0.05			c0.07			0.09			c0.39		
v/c Ratio	0.32	0.18		0.45	0.38		0.17	0.64		0.70	0.44	
Uniform Delay, d1	28.1	27.4		28.7	28.3		6.5	12.2		8.0	9.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	0.3		1.6	1.0		0.1	3.2		4.3	1.3	
Delay (s)	29.9	27.8		30.3	29.3		6.5	15.5		12.3	11.1	
Level of Service	C	C		C	C		A	B		B	B	
Approach Delay (s)		28.2			29.5			14.3			11.5	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

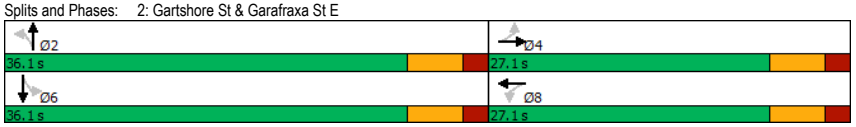
c Critical Lane Group

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	113	289	110	345	82	179	11	216
Future Volume (vph)	113	289	110	345	82	179	11	216
Lane Group Flow (vph)	122	382	118	397	88	292	12	421
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (s)	27.1	27.1	27.1	27.1	36.1	36.1	36.1	36.1
Total Split (%)	42.9%	42.9%	42.9%	42.9%	57.1%	57.1%	57.1%	57.1%
Yellow Time (s)	4.1	4.1	4.1	4.1	4.1	4.1	4.1	4.1
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio	0.58	0.68	0.54	0.70	0.20	0.32	0.02	0.46
Control Delay	30.4	24.2	27.7	25.8	11.2	9.1	9.1	10.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.4	24.2	27.7	25.8	11.2	9.1	9.1	10.4
Queue Length 50th (m)	11.4	34.9	10.8	38.1	5.6	15.6	0.7	23.7
Queue Length 95th (m)	#27.8	60.0	25.5	64.1	13.4	29.6	3.0	44.1
Internal Link Dist (m)		303.5		128.8		131.6		933.4
Turn Bay Length (m)	38.0		37.0		20.0		28.0	
Base Capacity (vph)	237	638	249	640	431	919	551	907
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.51	0.60	0.47	0.62	0.20	0.32	0.02	0.46

Intersection Summary

Cycle Length: 63.2
Actuated Cycle Length: 60.9
Natural Cycle: 65
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 2: Gartshore St & Garafraxa St E



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	113	289	66	110	345	24	82	179	93	11	216	176
Future Volume (vph)	113	289	66	110	345	24	82	179	93	11	216	176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.99		1.00	0.95		1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1807	1812		1787	1841		1806	1803		1824	1748	
Flt Permitted	0.36	1.00		0.38	1.00		0.46	1.00		0.58	1.00	
Satd. Flow (perm)	687	1812		720	1841		874	1803		1116	1748	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	122	311	71	118	371	26	88	192	100	12	232	189
RTOR Reduction (vph)	0	13	0	0	4	0	0	28	0	0	45	0
Lane Group Flow (vph)	122	369	0	118	393	0	88	264	0	12	376	0
Confl. Peds. (#/hr)			2	2			1		1	1		1
Heavy Vehicles (%)	1%	3%	1%	2%	3%	8%	1%	0%	1%	0%	2%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	18.6	18.6		18.6	18.6		30.1	30.1		30.1	30.1	
Effective Green, g (s)	18.6	18.6		18.6	18.6		30.1	30.1		30.1	30.1	
Actuated g/C Ratio	0.31	0.31		0.31	0.31		0.49	0.49		0.49	0.49	
Clearance Time (s)	6.1	6.1		6.1	6.1		6.1	6.1		6.1	6.1	
Vehicle Extension (s)	5.0	5.0		5.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	209	553		219	562		431	891		551	863	
v/s Ratio Prot		0.20			c0.21			0.15			c0.22	
v/s Ratio Perm	0.18			0.16			0.10			0.01		
v/c Ratio	0.58	0.67		0.54	0.70		0.20	0.30		0.02	0.44	
Uniform Delay, d1	17.9	18.4		17.6	18.7		8.7	9.1		7.9	9.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.3	4.0		4.6	4.8		1.1	0.8		0.1	1.6	
Delay (s)	24.2	22.5		22.2	23.5		9.7	10.0		7.9	11.5	
Level of Service	C	C		C	C		A	A		A	B	
Approach Delay (s)		22.9			23.2			9.9			11.4	
Approach LOS		C			C			A			B	

Intersection Summary

HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	60.9	Sum of lost time (s)	12.2
Intersection Capacity Utilization	75.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	28	157	124	590	375	27
Future Volume (Veh/h)	28	157	124	590	375	27
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	31	173	136	648	412	30
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1347	427	442			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1347	427	442			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	72	88			
cM capacity (veh/h)	145	625	1123			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	204	136	648	442
Volume Left	31	136	0	0
Volume Right	173	0	0	30
cSH	416	1123	1700	1700
Volume to Capacity	0.49	0.12	0.38	0.26
Queue Length 95th (m)	20.0	3.1	0.0	0.0
Control Delay (s)	21.7	8.6	0.0	0.0
Lane LOS	C	A		
Approach Delay (s)	21.7	1.5		0.0
Approach LOS	C			

Intersection Summary				
Average Delay		3.9		
Intersection Capacity Utilization		49.5%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	29	254	374	34	102	78
Future Volume (Veh/h)	29	254	374	34	102	78
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	276	407	37	111	85
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1004	154	196			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1004	154	196			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	83	69	71			
cM capacity (veh/h)	191	887	1383			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	308	444	196
Volume Left	32	407	0
Volume Right	276	0	85
cSH	643	1383	1700
Volume to Capacity	0.48	0.29	0.12
Queue Length 95th (m)	19.7	9.4	0.0
Control Delay (s)	15.6	8.2	0.0
Lane LOS	C	A	
Approach Delay (s)	15.6	8.2	0.0
Approach LOS	C		

Intersection Summary				
Average Delay		8.9		
Intersection Capacity Utilization		59.9%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	181	136	297	68	40	290
Future Volume (Veh/h)	181	136	297	68	40	290
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	197	148	323	74	43	315
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	761	360			397	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	761	360			397	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	46	79			96	
cM capacity (veh/h)	362	689			1173	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	345	397	358
Volume Left	197	0	43
Volume Right	148	74	0
cSH	455	1700	1173
Volume to Capacity	0.76	0.23	0.04
Queue Length 95th (m)	48.8	0.0	0.9
Control Delay (s)	33.7	0.0	1.3
Lane LOS	D		A
Approach Delay (s)	33.7	0.0	1.3
Approach LOS	D		

Intersection Summary			
Average Delay	11.0		
Intersection Capacity Utilization	65.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	11	63	0	0	0	3	25	0	1	0
Future Volume (Veh/h)	0	0	11	63	0	0	0	3	25	0	1	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	12	68	0	0	0	3	27	0	1	0
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	18	31	1	30	18	16	1			30		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	18	31	1	30	18	16	1			30		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	99	93	100	100	100			100		
cM capacity (veh/h)	997	862	1084	968	877	1063	1622			1583		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	12	68	30	1
Volume Left	0	68	0	0
Volume Right	12	0	27	0
cSH	1084	968	1622	1583
Volume to Capacity	0.01	0.07	0.00	0.00
Queue Length 95th (m)	0.3	1.7	0.0	0.0
Control Delay (s)	8.4	9.0	0.0	0.0
Lane LOS	A	A		
Approach Delay (s)	8.4	9.0	0.0	0.0
Approach LOS	A	A		

Intersection Summary			
Average Delay	6.4		
Intersection Capacity Utilization	20.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	41	9	28	75	0
Future Volume (Veh/h)	0	41	9	28	75	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	45	10	30	82	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	132	82	82			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	132	82	82			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	99			
cM capacity (veh/h)	856	978	1515			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	45	40	82
Volume Left	0	10	0
Volume Right	45	0	0
cSH	978	1515	1700
Volume to Capacity	0.05	0.01	0.05
Queue Length 95th (m)	1.1	0.2	0.0
Control Delay (s)	8.9	1.9	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	1.9	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	18.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	2	1	1	0
Future Volume (Veh/h)	0	0	2	1	1	0
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2	1	1	0
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	6	1	1			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	6	1	1			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	100			
cM capacity (veh/h)	1014	1084	1622			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	0	3	1
Volume Left	0	2	0
Volume Right	0	0	0
cSH	1700	1622	1700
Volume to Capacity	0.00	0.00	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	0.0	4.8	0.0
Lane LOS	A	A	
Approach Delay (s)	0.0	4.8	0.0
Approach LOS	A		

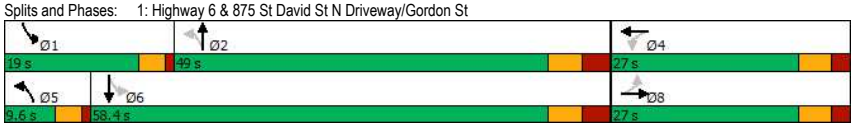
Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	31	34	85	38	95	522	284	421
Future Volume (vph)	31	34	85	38	95	522	284	421
Lane Group Flow (vph)	33	113	90	377	101	645	302	466
Turn Type	Perm	NA	Perm	NA	pm+pt	NA	pm+pt	NA
Protected Phases		8		4	5	2	1	6
Permitted Phases	8		4		2		6	
Detector Phase	8	8	4	4	5	2	1	6
Switch Phase								
Minimum Initial (s)	7.0	7.0	7.0	7.0	5.0	35.0	5.0	35.0
Minimum Split (s)	27.0	27.0	27.0	27.0	9.5	46.0	9.5	46.0
Total Split (s)	27.0	27.0	27.0	27.0	9.6	49.0	19.0	58.4
Total Split (%)	28.4%	28.4%	28.4%	28.4%	10.1%	51.6%	20.0%	61.5%
Yellow Time (s)	3.7	3.7	3.7	3.7	3.0	3.8	3.0	3.8
All-Red Time (s)	2.3	2.3	2.3	2.3	1.0	3.2	1.0	3.2
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.0	7.0	4.0	7.0
Lead/Lag					Lead	Lag	Lead	Lag
Lead-Lag Optimize?					Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	Max	None	Max
v/c Ratio	0.38	0.35	0.45	0.71	0.15	0.66	0.61	0.41
Control Delay	44.8	15.7	40.6	14.0	5.6	20.6	10.3	11.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.8	15.7	40.6	14.0	5.6	20.6	10.3	11.7
Queue Length 50th (m)	5.0	5.3	13.9	5.9	3.9	68.5	13.2	38.5
Queue Length 95th (m)	13.8	18.9	27.6	32.1	10.8	141.7	30.1	72.3
Internal Link Dist (m)		72.4		1007.5		421.8		1511.2
Turn Bay Length (m)	15.0		27.0		90.0		26.0	
Base Capacity (vph)	141	476	316	643	655	982	571	1146
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.24	0.28	0.59	0.15	0.66	0.53	0.41

Intersection Summary

Cycle Length: 95
Actuated Cycle Length: 85.9
Natural Cycle: 85
Control Type: Semi Act-Uncoord

Splits and Phases: 1: Highway 6 & 875 St David St N Driveway/Gordon St



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	34	72	85	38	317	95	522	85	284	421	17
Future Volume (vph)	31	34	72	85	38	317	95	522	85	284	421	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.97		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.87		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1814	1696		1782	1581		1824	1849		1755	1890	
Flt Permitted	0.30	1.00		0.68	1.00		0.50	1.00		0.26	1.00	
Satd. Flow (perm)	574	1696		1283	1581		951	1849		475	1890	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	33	36	77	90	40	337	101	555	90	302	448	18
RTOR Reduction (vph)	0	65	0	0	285	0	0	5	0	0	1	0
Lane Group Flow (vph)	33	48	0	90	92	0	101	640	0	302	465	0
Confl. Peds. (#/hr)	7		2	2		7	2		1	1		2
Heavy Vehicles (%)	0%	0%	0%	2%	0%	2%	0%	1%	4%	4%	1%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		pm+pt	NA	
Protected Phases		8			4		5	2		1	6	
Permitted Phases	8			4			2			6		
Actuated Green, G (s)	13.3	13.3		13.3	13.3		50.7	46.4		60.4	52.1	
Effective Green, g (s)	13.3	13.3		13.3	13.3		50.7	46.4		60.4	52.1	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.58	0.54		0.70	0.60	
Clearance Time (s)	6.0	6.0		6.0	6.0		4.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	5.0		2.0	5.0	
Lane Grp Cap (vph)	88	260		196	242		599	989		478	1135	
v/s Ratio Prot		0.03			0.06		0.01	0.35		c0.07	0.25	
v/s Ratio Perm	0.06			c0.07			0.09			c0.37		
v/c Ratio	0.38	0.18		0.46	0.38		0.17	0.65		0.63	0.41	
Uniform Delay, d1	33.0	32.0		33.4	33.0		7.9	14.3		8.4	9.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.3		1.7	1.0		0.0	3.3		2.0	1.1	
Delay (s)	35.6	32.3		35.1	34.0		8.0	17.6		10.4	10.3	
Level of Service	D	C		D	C		A	B		B	B	
Approach Delay (s)		33.1			34.2			16.3			10.3	
Approach LOS		C			C			B			B	

Intersection Summary

HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	86.7	Sum of lost time (s)	17.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix I

Detailed Left Turn Analysis

Table A: Left Turn Warrant Analysis Along Gartshore Street (Existing Total Conditions)

Existing Traffic Volume	AM Peak Hour	PM Peak Hour
Gordon Street: Northbound		
Advancing	173	291
Opposing	45	118
Left Turn Volume (%)	130 (75%)	266 (91%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -10
Storage Length (m)	**Not Warranted**	**Not Warranted**
Dickson Drive: Southbound		
Advancing	203	222
Opposing	199	263
Left Turn Volume (%)	26 (13%)	5 (2%)
Figure from MTO Geometric Standards	Figure 9A -8	Figure 9A -7
Storage Length (m)	**Not Warranted**	**Not Warranted**

Table B: Left Turn Warrant Analysis Along Gartshore Street (2032 Background Conditions)

2032 Background Traffic Volume	AM Peak Hour	PM Peak Hour
Gordon Street: Northbound		
Advancing	201	402
Opposing	48	125
Left Turn Volume (%)	154 (77%)	374 (93%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -10
Storage Length (m)	**Not Warranted**	**15 m**
Dickson Drive: Southbound		
Advancing	353	291
Opposing	390	347
Left Turn Volume (%)	143 (41%)	40 (14%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**15 m**	**Not Warranted**

Table C: Left Turn Warrant Analysis Along Gartshore Street (2037 Background Conditions)

2037 Background Traffic Volume	AM Peak Hour	PM Peak Hour
Gordon Street: Northbound		
Advancing	204	403
Opposing	50	128
Left Turn Volume (%)	154 (75%)	374 (93%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -10
Storage Length (m)	**Not Warranted**	**15 m**
Dickson Drive: Southbound		
Advancing	362	303
Opposing	400	360
Left Turn Volume (%)	143 (40%)	40 (13%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**15 m**	**Not Warranted**

Table D: Left Turn Warrant Analysis Along Gartshore Street (2032 Total Conditions)

2032 Total Traffic Volume	AM Peak Hour	PM Peak Hour
South Driveway: Northbound		
Advancing	129	37
Opposing	26	74
Left Turn Volume (%)	61 (47%)	9 (24%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**Not Warranted**	**Not Warranted**
Gordon Street: Northbound		
Advancing	233	407
Opposing	59	177
Left Turn Volume (%)	154 (66%)	374 (92%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -10
Storage Length (m)	**Not Warranted**	**15 m**

Table D: Left Turn Warrant Analysis Along Gartshore Street (2032 Total Conditions) continued

2032 Total Traffic Volume	AM Peak Hour	PM Peak Hour
Dickson Drive: Southbound		
Advancing	359	318
Opposing	422	352
Left Turn Volume (%)	143 (40%)	40 (13%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**15 m**	**Not Warranted**

Table E: Left Turn Warrant Analysis Along Gartshore Street (2037 Total Conditions)

2037 Total Traffic Volume	AM Peak Hour	PM Peak Hour
South Driveway: Northbound		
Advancing	120	37
Opposing	27	75
Left Turn Volume (%)	53 (44%)	9 (24%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**Not Warranted**	**Not Warranted**
Gordon Street: Northbound		
Advancing	236	408
Opposing	61	180
Left Turn Volume (%)	154 (65%)	374 (92%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -10
Storage Length (m)	**Not Warranted**	**15 m**
Dickson Drive: Southbound		
Advancing	368	330
Opposing	432	365
Left Turn Volume (%)	143 (39%)	40 (12%)
Figure from MTO Geometric Standards	Figure 9A -10	Figure 9A -8
Storage Length (m)	**15 m**	**Not Warranted**

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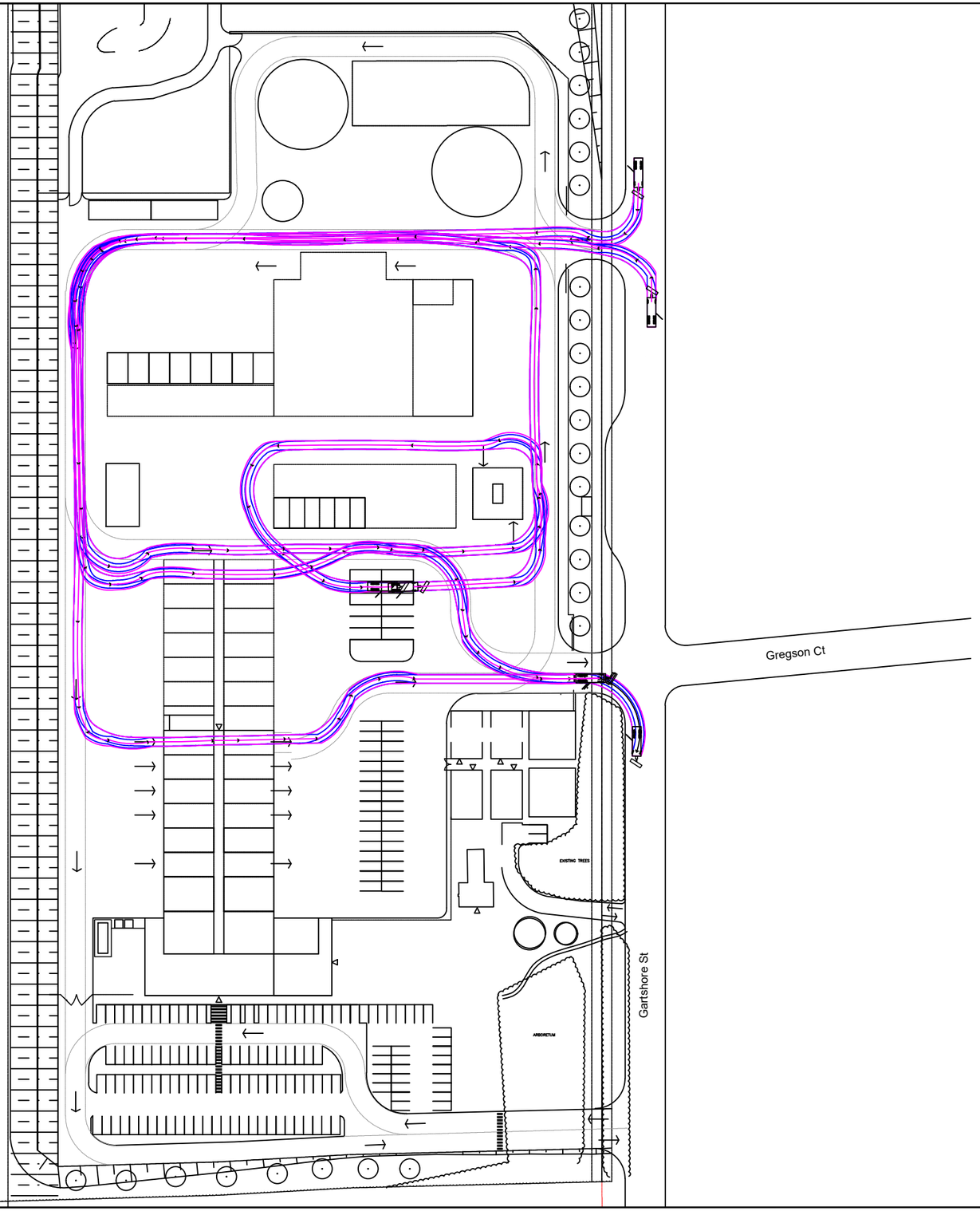
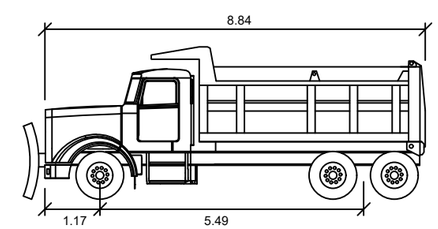
Appendix J

Swept Path Analysis





2015 Tandem Plow Truck

	meters		
Width	: 2.59	Lock to Lock Time	: 6.0
Track	: 2.59	Steering Angle	: 35.0
		Articulating Angle	: AA

LEGEND

VEHICLE TIRE PATH

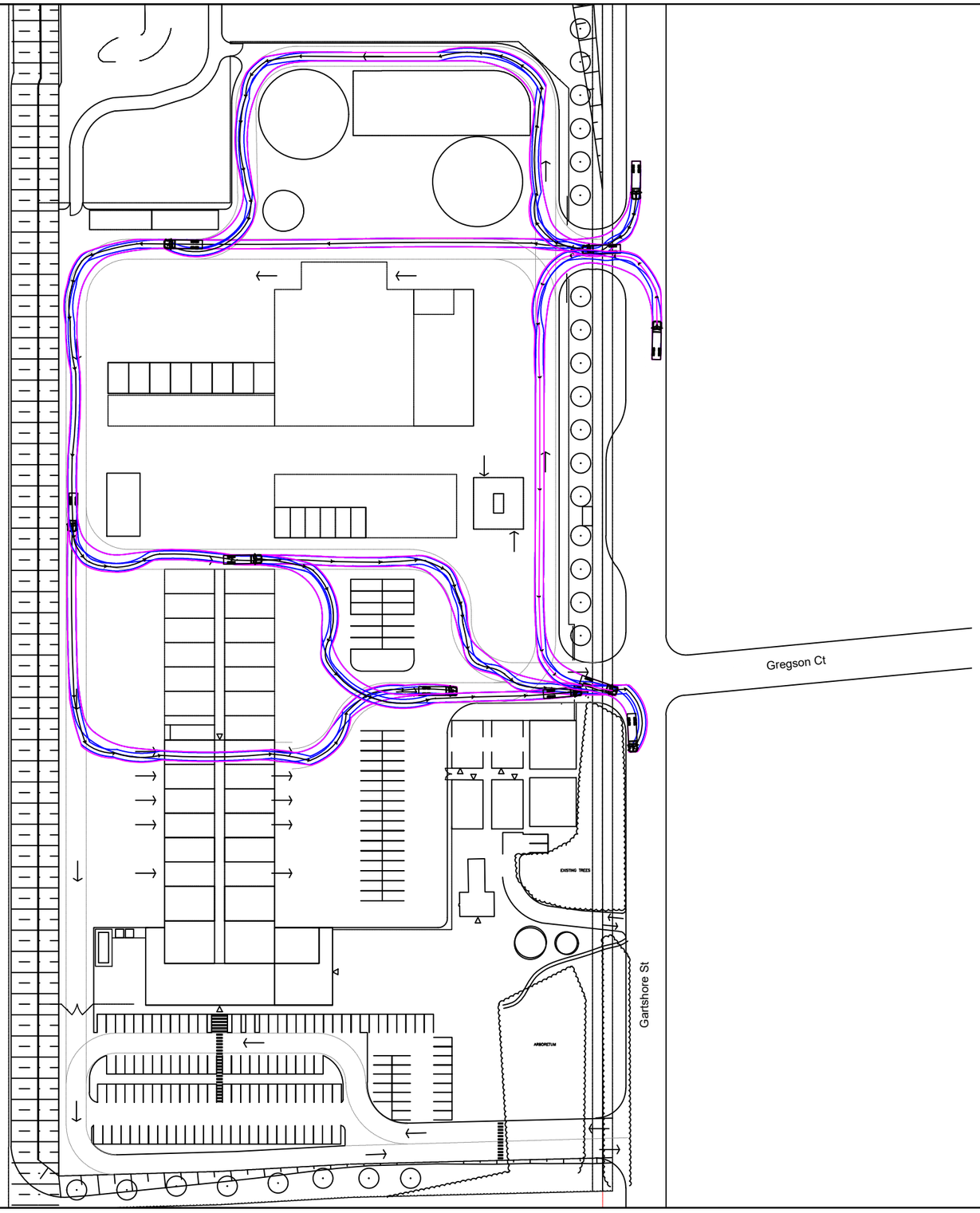
VEHICLE BODY PATH

BURNSIDE

CENTRE WELLINGTON OPERATIONS CENTRE

SNOW PLOW SWEPT PATH ANALYSIS

R.J Burnside & Associates Limited
RL/ BW/ HC
MAY 10, 2023 N.T.S



HSU

		meters
Width	:	2.60
Track	:	2.60
Lock to Lock Time	:	6.0
Steering Angle	:	40.0

LEGEND

VEHICLE TIRE PATH

VEHICLE BODY PATH

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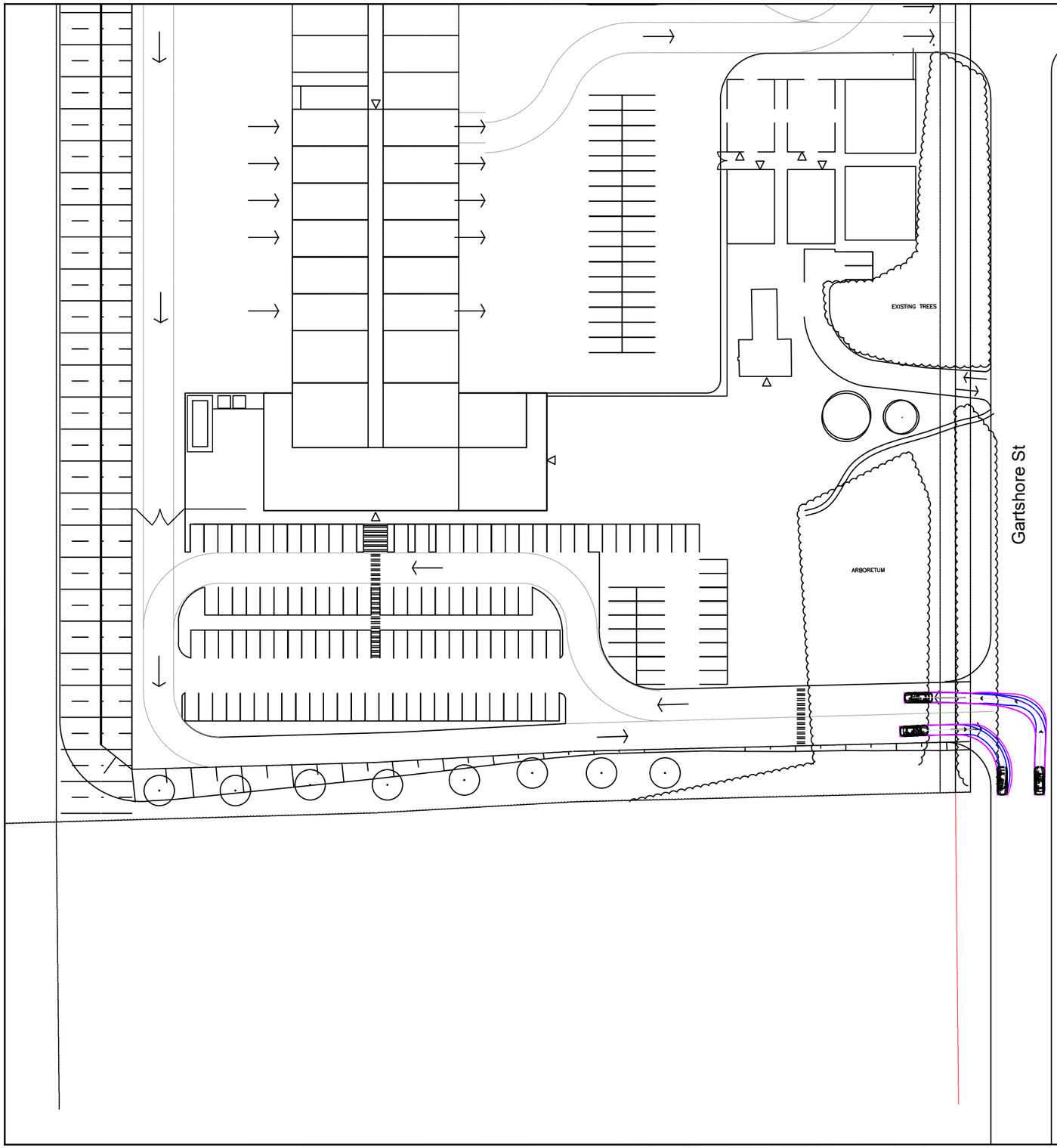
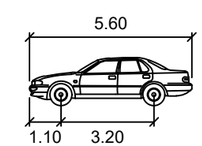
CENTRE WELLINGTON OPERATIONS CENTRE

HSU TRUCK SWEPT PATH ANALYSIS

R.J Burnside & Associates Limited
RL/ BW/ HC
MAY 10, 2023

N.T.S





P

		meters
Width	:	2.00
Track	:	2.00
Lock to Lock Time	:	6.0
Steering Angle	:	35.9

LEGEND

VEHICLE TIRE PATH

VEHICLE BODY PATH

BURNSIDE

CENTRE WELLINGTON
OPERATIONS CENTRE

PASSENGER CAR SWEPT PATH
ANALYSIS

R.J Burnside & Associates Limited
RL/ BW/ HC
MAY 10, 2023 N.T.S

R.J. Burnside & Associates Limited

Township of Centre Wellington
Noise Impact Assessment

Proposed Operations Centre
Centre Wellington Operations Centre, Fergus, ON

R.J. Burnside & Associates Limited
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February 2023
300055234.0000

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0	February 2023	Initial Submission to Centre Wellington

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Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by Centre Wellington to prepare a Noise Impact Assessment for the Centre Wellington Operations Centre public works centre. The property is located at 965 Gartshore Street, Fergus, Ontario.

The proposed facility is a public works centre. The site will house snowplows, municipal works vehicles, materials such as salt and sand for winter road maintenance, a front-end loader, a fuel depot, and all facilities needed to maintain the equipment. The site will also contain an administration building which will have HVAC units and an emergency generator.

As the proposed equipment which will generate noise emissions are not yet available for measurement Burnside relied upon sound level measurements of similar equipment which was taken at other facilities Burnside has attended in the past, as well as manufacturer sound level data for other similar equipment.

The sound levels from these sources were modeled to determine the impacts at the nearest noise sensitive receptors. The resulting sound levels were compared to the applicable Ministry of the Environment, Conservation and Parks (MECP limits of a Class 2 Area in order to determine whether mitigation measures were necessary. Ambient noise calculations were not performed; therefore, reliance was made on the exclusion limits.

The assessment revealed that the stationary sound levels from the proposed sources within the development, at most points of reception on the proposed development are above the MECP limits; therefore, stationary noise mitigation measures are required.

The required measures include:

- An acoustic barrier and berm combination of a minimum height of 5.1 m along the south west property line. For the northern half of this property line the height may be lowered to 4.7 m.

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by Centre Wellington to prepare a Noise Impact Assessment for the new Centre Wellington Operations Centre public works centre. The property is located at 965 Gartshore Street, Fergus, Ontario.

The purpose of this assessment is to examine potential noise impacts relating to the proposed Centre Wellington Operations Centre on the above noted property.

1.1 Objective

This report has been prepared in support of the new Centre Wellington Operations Centre public works centre. This report will be included in a submission for Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA). The potential noise impacts were determined using Predictor V2022.12 3D noise modeling software. Sound levels were predicted based on the equipment planned for Centre Wellington Operations Centre.

The potential noise impacts were evaluated by comparing the predicted by comparing predicted sound levels at the representative points of reception with the Class 2 Ministry of the Environment, Conservation and Parks (MECP) exclusion limits.

1.2 Study Area

The proposed Centre Wellington Operations Centre is located on Gartshore Street in Fergus, Ontario. The site location map is provided in Figure 1.

The proposed development is in an area currently zoned by Fergus as A - Agriculture. The zoning map is provided in Figure 2.

The Site Plan is shown in Figure 3.

1.3 Proposed Facility Use

The proposed facility is a public works centre. The site will house snowplows, municipal works vehicles, materials such as salt and sand for winter road maintenance, a front-end loader, a fuel depot, and all facilities needed to maintain the equipment. The site will also contain an administration building which will have HVAC units and an emergency generator.

2.0 Applicable Noise Criteria

2.1 MECP Noise Policies

Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning (NPC-300) is the MECP Publication which provides advice, sound level limits and guidance that maybe used when land use planning decisions are made under the Planning Act, and the Niagara Escarpment Planning and Development Act. This guidance is for land use planning authorities, developers and consultants. It is intended to minimize the potential conflict between proposed noise sensitive land uses and sources of noise emissions.

2.1.1 Stationary Noise

The applicable stationary noise criteria are dependent on the Class Area as well as the ambient sound levels present at each point of reception. The applicable criteria are the greater of the exclusion limits, provided in the MECP tables in Appendix A, or the lowest hourly ambient sound level predicted for a given point of reception.

The proposed Centre Wellington Operations Centre public works centre is located in a Class 2 Semi-Urban Area.

The MECP criteria for the outdoor receptors considered in this report are 50 dBA from 07:00 – 23:00.

The MECP criteria for the plane of window receptors considered in this report are 50 dBA from 07:00 –23:00 and 45 dBA from 23:00 – 07:00.

MECP tables showing all criteria for all Classes of Urban Areas and all time periods are shown in Appendix A.

2.2 Regional and Municipal Policies

In addition to the preceding MECP noise criteria from NPC-300, the proposed development is also subject to any municipal policies or regulations issued by the Town or the County. The Township of Centre Wellington and the County of Wellington do not have a noise development policy at this time.

3.0 Stationary Noise Sources and Receptors

3.1 Noise Measurement Procedure

As the proposed noise sources do not yet exist reliance was made on conservative sound emission data from previous Burnside measurements of similar equipment, or manufacturer published data of other similar equipment. No direct sound level measurements were undertaken.

3.2 Internal Stationary Noise

Internal stationary noise is defined as the on-site stationary noise of the proposed development. The potential impact of internal stationary noise is assessed at neighbouring noise sensitive land uses and at noise sensitive locations within the proposed development itself, if appropriate.

3.2.1 Internal Stationary Noise Points of Reception

The proposed Centre Wellington Operations Centre public works centre is in proximity to the following noise sensitive land uses:

- POR01: 99 Harper Crescent
  - Located southwest of the proposed site.
- OPOR01: 99 Harper Crescent
  - 30 m from POR01 dwelling in the direction of the sources.
- POR02: Future approved residence no address
  - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR02: Future approved residence no address
  - 30 m from POR02 dwelling in the direction of the sources.
- POR03: Future approved residence no address
  - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR03: Future approved residence no address
  - 30 m from POR03 dwelling in the direction of the sources.
- POR04: Future approved residence no address
  - Located south of the proposed site in an approved but not constructed subdivision.
- OPOR04: Future approved residence no address
  - 30 m from POR04 dwelling in the direction of the sources.
- POR05: 950 Gartshore Street
  - Located north of the proposed site.
- OPOR05: 950 Gartshore Street
  - 30 m from POR05 dwelling in the direction of the sources.

These points of reception are shown in Figure 4.

3.2.2 Internal Stationary Noise Sources

The proposed development contains the following sources of stationary noise:

- **EX001: Emergency Generator**
  - The unit is assumed to operate for 20 minutes during the day when testing operations would take place. Emergency operations of the generator are exempt.
  - As the mechanical details are unavailable at this time Burnside has assumed a sound power of 112 dBA.
- **EX002 – EX003: HVAC units**
  - Burnside has assumed 1 ton of air conditioning is required per 400 square feet of building. The proposed building has an air-conditioned area of approximately 18,500 ft^2. Burnside has therefore assumed two 25-ton units, which have an assumed sound power of 95 dBA. A noise reference is provided in Appendix D.
- **EX005: Front End Loader**
  - One front end loader will operate continuously in the worst-case hour, during daytime only. Burnside has assumed a sound power of 107 dBA based on a manufacture reported sound data of an equivalent machine. A reference is provided in Appendix D.
- **EX006: Truck Movements**
  - 10 trucks of various types are assumed to travel through the property in a worst-case hour. This rate applies for all times of day. These sources include snowplows, material delivery trucks, and other municipal equipment. Burnside has assumed a sound power of 101 dBA based on a commonly used and MECP accepted estimate.
- **EX007: Fuel Trucks**
  - One fuel truck is assumed to travel a shorter route through the site for fuel delivery during the daytime only. Burnside has assumed a sound power of 101 dBA based on a commonly used and MECP accepted estimate.
- **EX008-EX009: Mechanical Shop Noise**
  - Two mechanics shops for working on the vehicles stored at the site will emit noise through their open garage doors. It's assumed that the sources will operate for 20 minutes of each worst-case hour. Burnside has assumed a sound power of 102 dBA based on a measurement of a similar source at another facility. A reference is provided in Appendix D.
- **EX010: Car Wash Noise**
  - The car wash bay of the maintenance department will emit noise through the open garage door. It is assumed the washes will be conducted with pressure washers and the washers will be operational for 30 minutes of the worst case hour. Burnside has assumed a sound power of 99 dBA, which is based on Burnside's measurement of a similar source elsewhere in Ontario. A reference is provided in Appendix D.

The location of each noise source is shown in Figure 5.

4.0 Stationary Noise Impact Assessment

4.1 Methodology

Sound levels associated with stationary noise are predicted with Predictor V2022.12 3D noise modeling software. Predictor follows the ISO 9613/2 method of sound level calculation as implemented in the ISO 17534-3 Quality Assurance standard.

The following settings are used:

- Calculation height: 4.5 m.
- Default Ground attenuation Factor: 0.5 (0 is reflective).
- No Barrier effect for direct sight – Active.
- Dmax According to ISO 9613 – Active.
- Avoid overestimating barrier effect – Active.
- Terrain model: Use full DTM.
- Temperature: 283.15 K.
- Pressure: 101.33 kPa.
- Air humidity: 70%.[1]

4.2 Applicable Criteria

As the proposed development is not located near any major roads so no ambient sound levels were calculated. Instead, the MECP exclusion limits for a Class 2 area were be used. The applicable sound level criteria for stationary noise are presented in Table 1.

4.3 Predicted Internal Stationary Sound Levels

The predicted internal stationary sound levels of the proposed development onto the neighboring noise sensitive land uses and noise sensitive locations within the development itself are presented in Table 2. Figure 6 presents the predicted unmitigated daytime sound level contours. Figure 7 and Figure 8 present the evening and nighttime levels respectively. All contours are calculated at a height of 4.5 m. Sample Printouts of the internal stationary noise modeling are provided in Appendix B. The results demonstrate that sound levels are predicted as high as 56 dBA, which is 6 dB above criteria.

Therefore, as the unmitigated internal stationary sound levels are not compliant with the applicable sound level criteria for all PORs, mitigation is required.

4.4 Predicted Mitigated Internal Stationary Sound Levels

An acoustic barrier along the south-west property line is proposed to mitigate the noise exceedances. The acoustic barrier is 2.6 m tall along the most southern 190 m of the

[1] ISO 9613 Requirement

property line. The northern 245 m of the south-west property line requires a shorter barrier of 2.2 m tall. Both barriers are proposed to sit atop a 2.5 m earth berm, constructed at a 3:1 slope within the 15 m allowance. A secondary test model demonstrated that if a policy of closing the mechanic shop doors was enforced at the facility the barrier requirement would drop to 2.2 m tall for the full distance. The 2.5 m berm would still be required as well.

Acoustical barriers must be constructed in a structurally sound manner, designed to withstand wind and snow loading. The barrier must have a minimum surface density of 20 kg/m^2. The barrier must be constructed without cracks or surface gaps. Any gaps that are under the barriers that are necessary for drainage purposes should be localized and minimized, so that the acoustical performance of the barrier is maintained.

With these mitigation measures included, the internal stationary sound levels were reassessed. The results of this mitigated assessment are shown in Table 3, which indicates that compliance is now met. Figure 9 presents the predicted mitigated daytime sound level contours. Figure 10 and Figure 11 present the evening and nighttime levels respectively. All contours are calculated at a height of 4.5 m. Sample Printouts of the internal stationary noise modeling are provided in Appendix C.

Therefore, with the inclusion of the mitigation measures described above, the internal stationary sound levels will be compliant with the applicable sound level criteria for all PORs.

The proposed alignment for the acoustic berm/barriers is shown in Figure 12.

4.5 Predicted Emergency Generator Stationary Sound Levels

The emergency generator is assessed separately as required in NPC-300. NPC-300 also allows an additional 5 dBA above the exclusion limits. Daytime testing of the generator is the only aspect required to be assessed. Any emergency operation outside of daytime hours is considered exempt. The mitigation measures presented in Section 4.4 are included in the analysis of the emergency generator.

The predicted internal stationary sound levels of the proposed development onto the neighboring noise sensitive land uses and noise sensitive locations within the development itself are presented in Table 4. Figure 13 presents the predicted unmitigated daytime sound level contours. The contours are calculated at a height of 4.5 m. Sample printouts of the internal stationary noise modeling are provided in Appendix E. The results demonstrate that sound levels meet the criteria with the inclusion of the mitigation measures included for the internal stationary assessment.

Therefore, with the inclusion of the mitigation measures described above the emergency generator stationary sound levels will be compliant with the applicable sound level criteria for all PORs.

5.0 Noise Mitigation Measures

Based on the predicted sound levels it was determined that noise mitigation measures are required for Centre Wellington Operations Centre.

5.1 Internal Stationary Noise Mitigation Requirements

The assessment of the proposed Centre Wellington Operations Centre's internal stationary sources determined that the following noise mitigation measures were required to meet the applicable MECP noise standards:

An acoustic barrier along the south-west property line is proposed to mitigate the noise exceedances. The acoustic barrier is 2.6 m tall along the most southern 190 m of the property line. The northern 245 m of the south-west property line requires a shorter barrier of 2.2 m tall. Both barriers are proposed to sit atop a 2.5 m earth berm, constructed at a 3:1 slope within the 15 m allowance.

Acoustical barriers must be constructed in a structurally sound manner, designed to withstand wind and snow loading. The barrier must have a minimum surface density of 20 kg/m^2. The barrier must be constructed without cracks or surface gaps. Any gaps that are under the barriers that are necessary for drainage purposes should be localized and minimized, so that the acoustical performance of the barrier is maintained.

6.0 Implementation Procedures

The following implementation procedures are recommended to ensure that each requirement of this study is implemented at the correct stage of the development process:

- Prior to Issuance of Building Permit an Acoustical Consultant should be retained to review the shop drawings of the required acoustic barriers. Improperly constructed acoustic barriers can result in the developer being required to repair or replace the barrier in order to receive a certification of completion for the development's acoustic requirements.

Prior to operations beginning at the site, an acoustic engineer should confirm that the acoustic barrier and berm have been properly constructed.

7.0 Conclusion

The results of Centre Wellington Operations Centre Noise Impact Assessment demonstrate that if all noise mitigation measures prescribed in section 5.1 are implemented, the sound levels will meet the MECP noise guideline requirements. The Implementation Procedures of Section 6.0 should be followed carefully to ensure that no requirements of the noise study are overlooked.

8.0 References

Environmental Noise Guideline. Stationary and Transportation Sources – Approval and Planning. Publication NPC-300. Ministry of the Environment, Conservation and Parks, August 2013 (released October 21, 2013).

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Tables

Table 1: Applicable Stationary Sound Level Criteria

POR #	Time of Day	Ambient Sound Level	NPC-300 Exclusion Limit	Applicable Sound Level Criteria
POR01	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR02	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR03	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR04	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
POR05	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	45 dBA	45 dBA
OPOR01	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR02	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR03	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR04	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-
OPOR05	Daytime	-	50 dBA	50 dBA
	Evening	-	50 dBA	50 dBA
	Nighttime	-	-	-

Table 2: Predicted Internal Stationary Sound Levels (Unmitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	47 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	42 dBA	45 dBA	Yes
POR02	Daytime	55 dBA	50 dBA	No
	Evening	46 dBA	50 dBA	Yes
	Nighttime	45 dBA	45 dBA	Yes
POR03	Daytime	55 dBA	50 dBA	No
	Evening	49 dBA	50 dBA	Yes
	Nighttime	48 dBA	45 dBA	No
POR04	Daytime	54 dBA	50 dBA	No
	Evening	48 dBA	50 dBA	Yes
	Nighttime	48 dBA	45 dBA	No
POR05	Daytime	49 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
OPOR01	Daytime	48 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR02	Daytime	56 dBA	50 dBA	No
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR03	Daytime	55 dBA	50 dBA	No
	Evening	49 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR04	Daytime	54 dBA	50 dBA	No
	Evening	48 dBA	50 dBA	Yes
	Nighttime	-	-	-
OPOR05	Daytime	50 dBA	50 dBA	Yes
	Evening	48 dBA	50 dBA	Yes
	Nighttime	-	-	-

Table 3: Predicted Internal Stationary Sound Levels (Mitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	46 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	41 dBA	45 dBA	Yes
POR02	Daytime	50 dBA	50 dBA	Yes
	Evening	46 dBA	50 dBA	Yes
	Nighttime	44 dBA	45 dBA	Yes
POR03	Daytime	50 dBA	50 dBA	Yes
	Evening	45 dBA	50 dBA	Yes
	Nighttime	44 dBA	45 dBA	Yes
POR04	Daytime	49 dBA	50 dBA	Yes
	Evening	43 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
POR05	Daytime	50 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	43 dBA	45 dBA	Yes
OPOR01	Daytime	44 dBA	50 dBA	Yes
	Evening	39	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR02	Daytime	48 dBA	50 dBA	Yes
	Evening	39 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR03	Daytime	46 dBA	50 dBA	Yes
	Evening	40 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR04	Daytime	45 dBA	50 dBA	Yes
	Evening	40 dBA	50 dBA	Yes
	Nighttime	-	-	Yes
OPOR05	Daytime	50 dBA	50 dBA	Yes
	Evening	44 dBA	50 dBA	Yes
	Nighttime	-	-	Yes

Table 4: Predicted Emergency Generator Stationary Sound Levels (Mitigated)

POR #	Time of Day	Impact	Criteria	Compliance?
POR01	Daytime	50 dBA	55 dBA	Yes
POR02	Daytime	55 dBA	55 dBA	Yes
POR03	Daytime	48 dBA	55 dBA	Yes
POR04	Daytime	44 dBA	55 dBA	Yes
POR05	Daytime	30 dBA	55 dBA	Yes
OPOR01	Daytime	49 dBA	55 dBA	Yes
OPOR02	Daytime	53 dBA	55 dBA	Yes
OPOR03	Daytime	46 dBA	55 dBA	Yes
OPOR04	Daytime	45 dBA	55 dBA	Yes
OPOR05	Daytime	30 dBA	55 dBA	Yes

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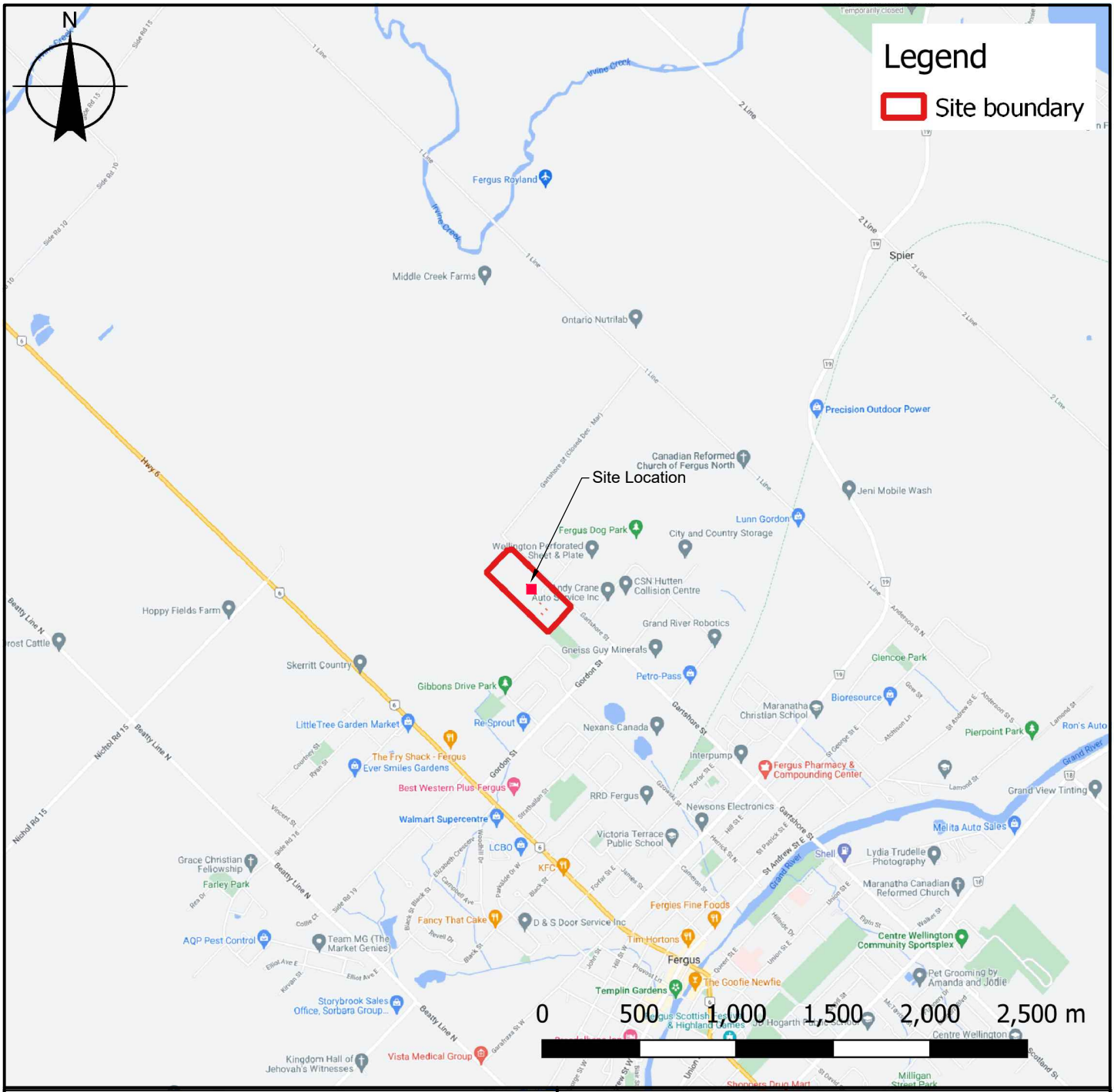
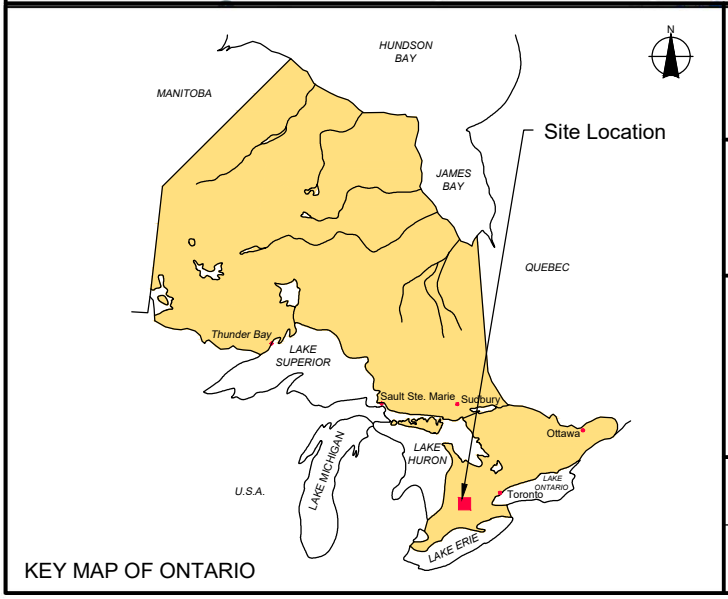
Figures





KEY MAP OF ONTARIO

BURNSIDE

Client

Township of Centre Wellington

Figure Title

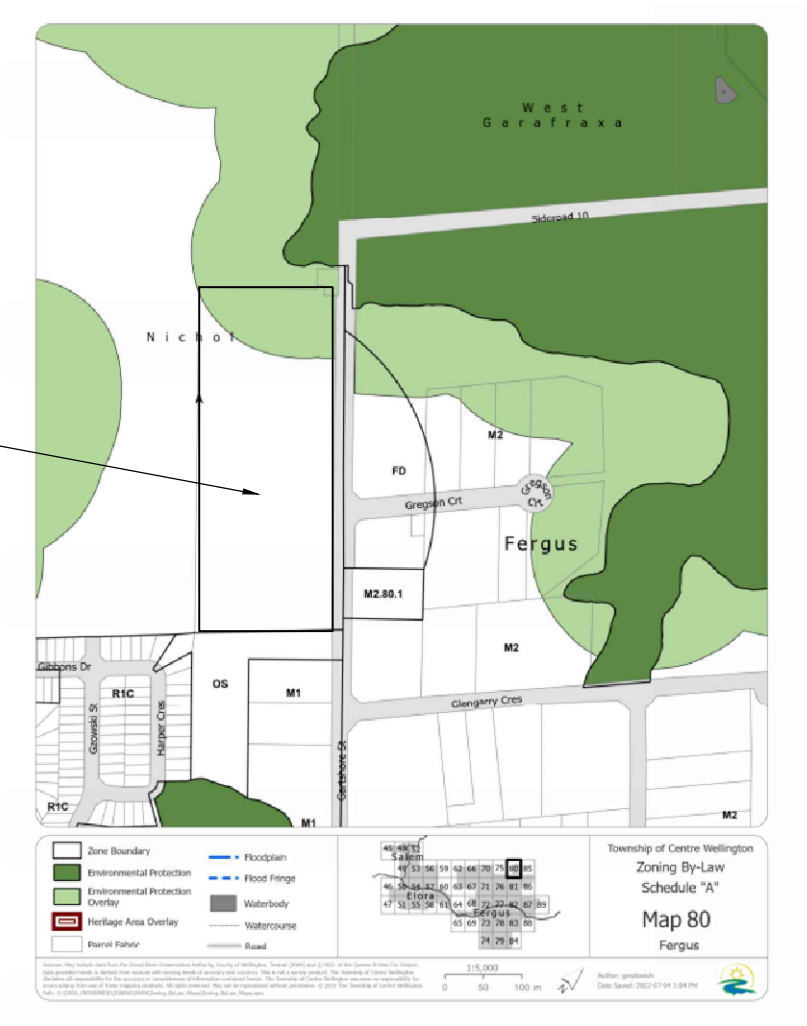
Site Location Map

Centre Wellington Operations Centre

Drawn	Checked	Date	Figure No.
BM	HW	February 2023	1
Scale		Project No.	
1:3000		300055234.0000	

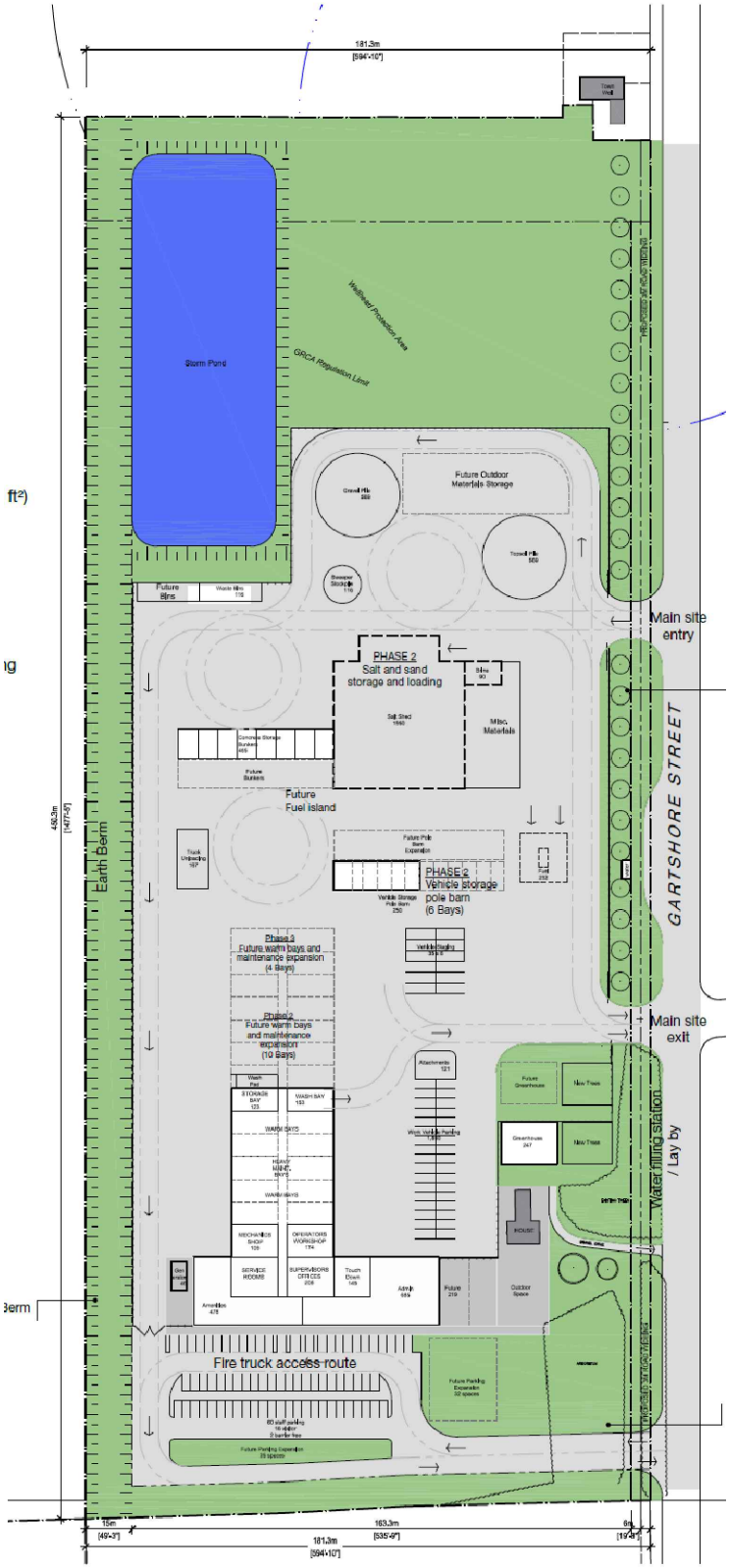
File: C:\Users\BMiller\RJB\055234 Centre Wellington Operations Ctr - Documents\02_Tech Proj Doc\Reports\Noise\Cad Figures\Fergus Operations CAD Figures.dwg Date Plotted: February 9, 2023 - 11:51 AM

Site Location



BURNSIDE	Figure Title **Zoning Map** Centre Wellington Operations Centre			
Client **Township of Centre Wellington**	Drawn BM	Checked HW	Date February 2023	Figure No. **2**
	Scale N/A		Project No. 300055234.0000	

File: C:\Users\BMiller\RJB\055234 Centre Wellington Operations Ctr - Documents\02_Tech Proj Doc\Reports\Noise\Cad Figures\Fergus Operations CAD Figures.dwg Date Plotted: February 8, 2023 - 1:39 PM



BURNSIDE

Figure Title

Site Plan

Centre Wellington Operations Centre

Client

Town of Centre Wellington

Drawn	Checked	Date	Figure No.
BM	HW	February 2023	**3**
Scale		Project No.	
N/A		300055234.0000	

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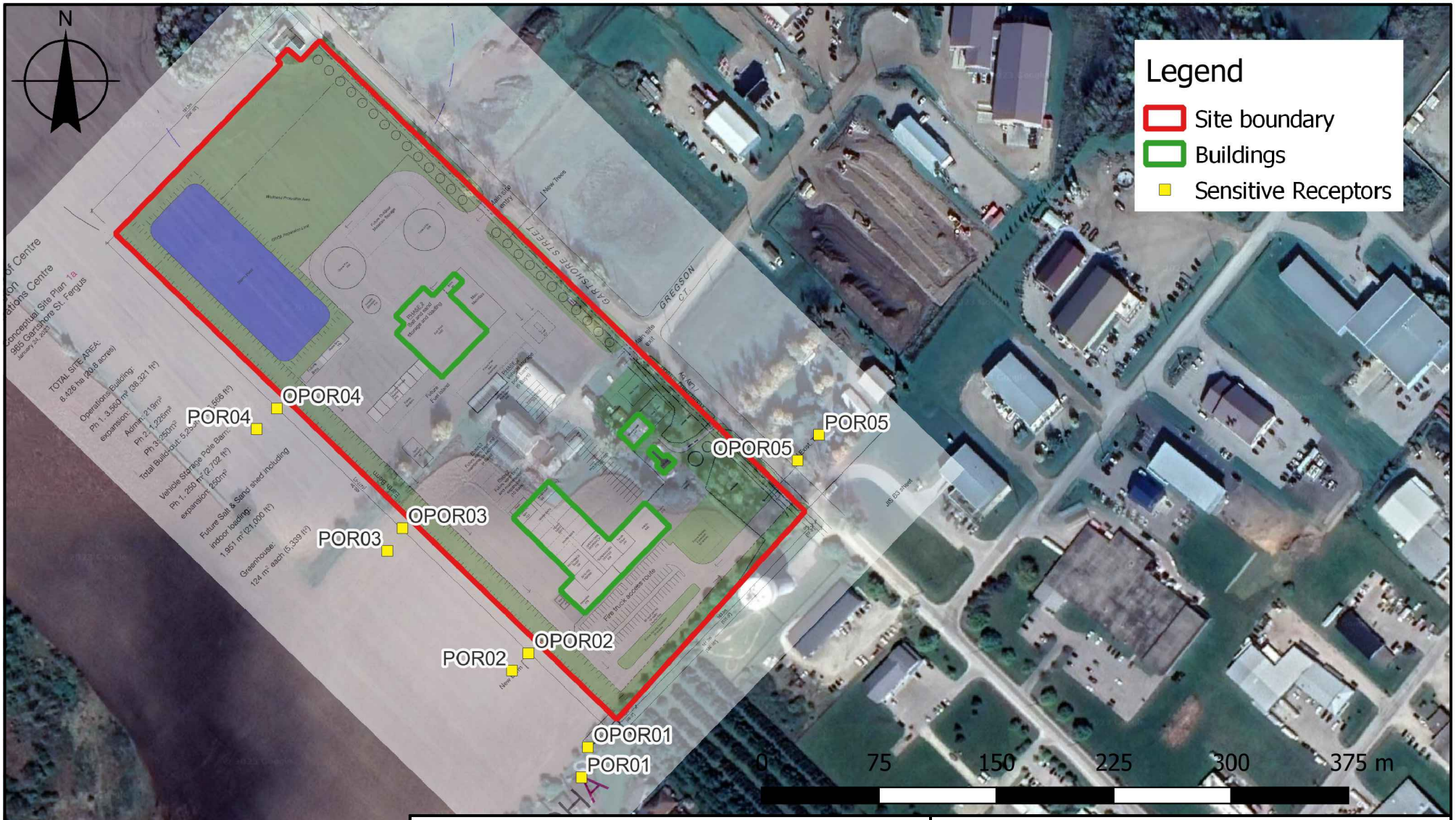

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Figure Title

Stationary Noise - Points of Reception

Centre Wellington Operations Centre

Client

Township of Centre Wellington

Drawn	Checked	Date	Figure No.
BM	HW	February 2023	4
Scale		Project No.	
1:3500		300055234.0000	

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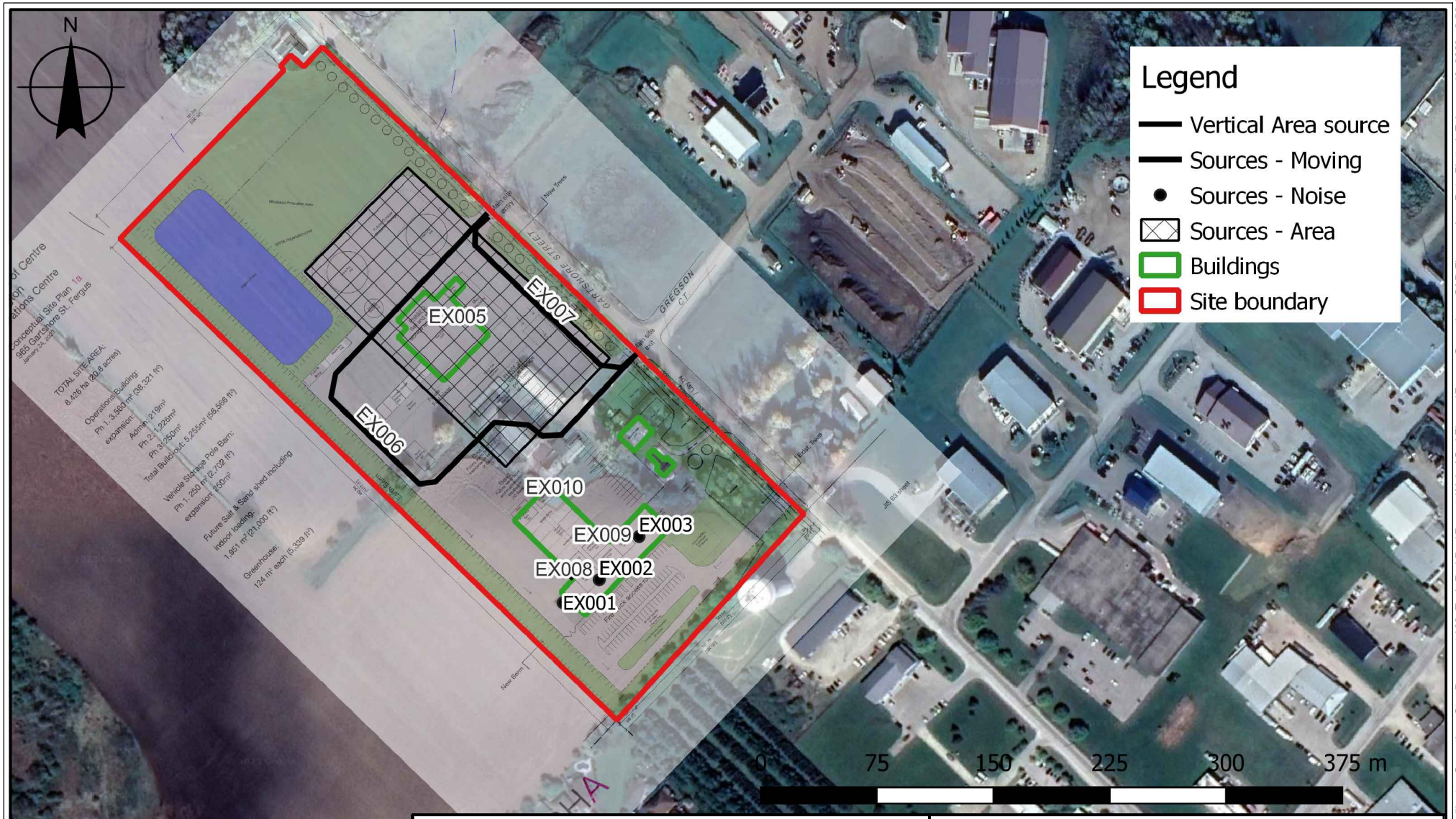


BURNSIDE

Figure Title

Internal Stationary Noise Sources

Centre Wellington Operations Centre

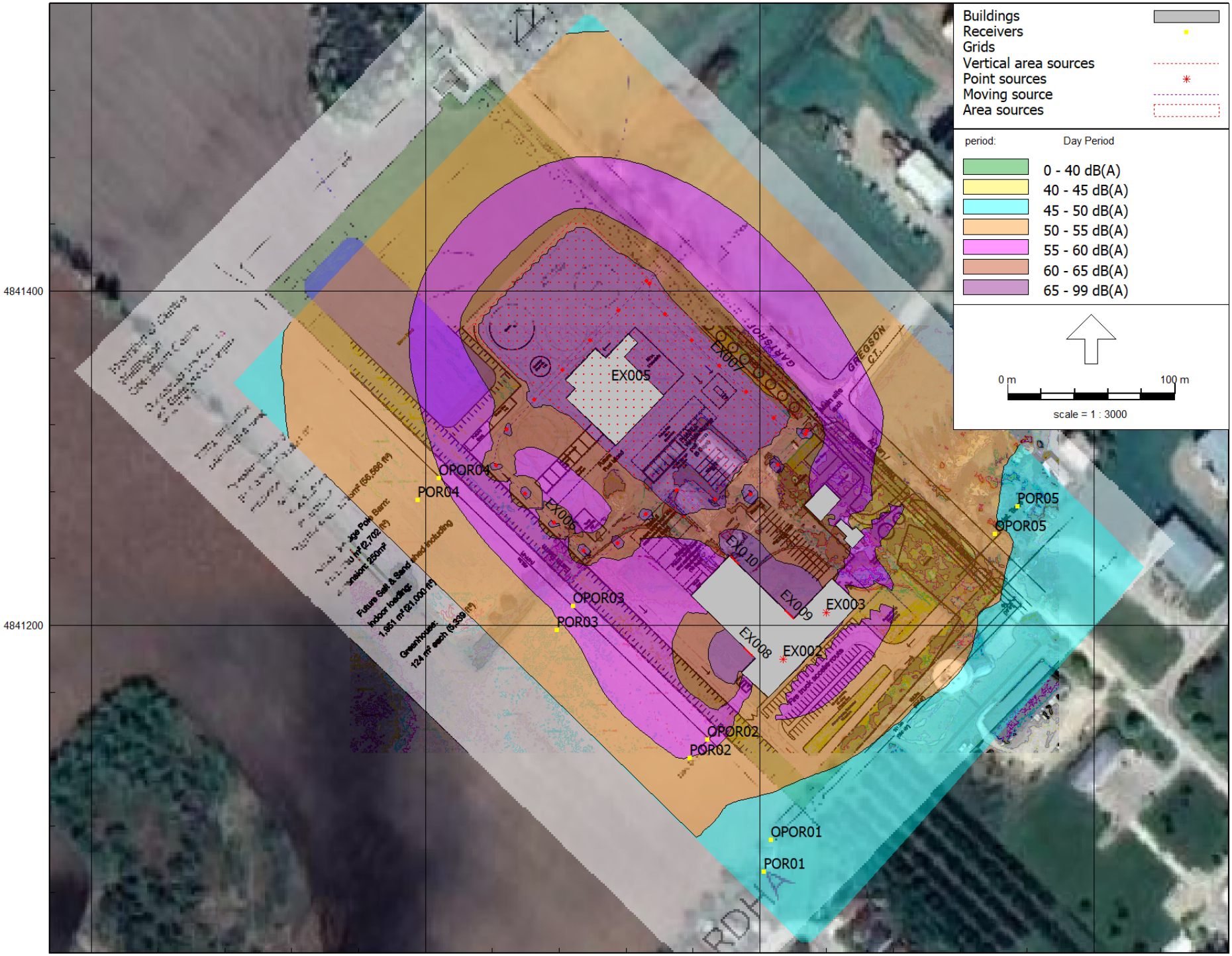
Client

Township of Centre Wellington

Drawn	Checked	Date	Figure No.
BM	HW	February 2023	5
Scale		Project No.	
1:3500		300055234.0000	

File: C:\Users\BMiller\RJB\055234 Centre Wellington Operations Ctr - Documents\02_Tech Proj Doc\Reports\Noise\Cad Figures\Fergus Operations CAD Figures.dwg Date Plotted: February 13, 2023 - 9:56 AM

Figure 6: Unmitigated Daytime Internal Stationary Noise
Internal Stationary Noise Model - unmitigated
9 Feb 2023, 09:33



ISO 9613, [Normal Operations - Internal Stationary Noise Model - unmitigated] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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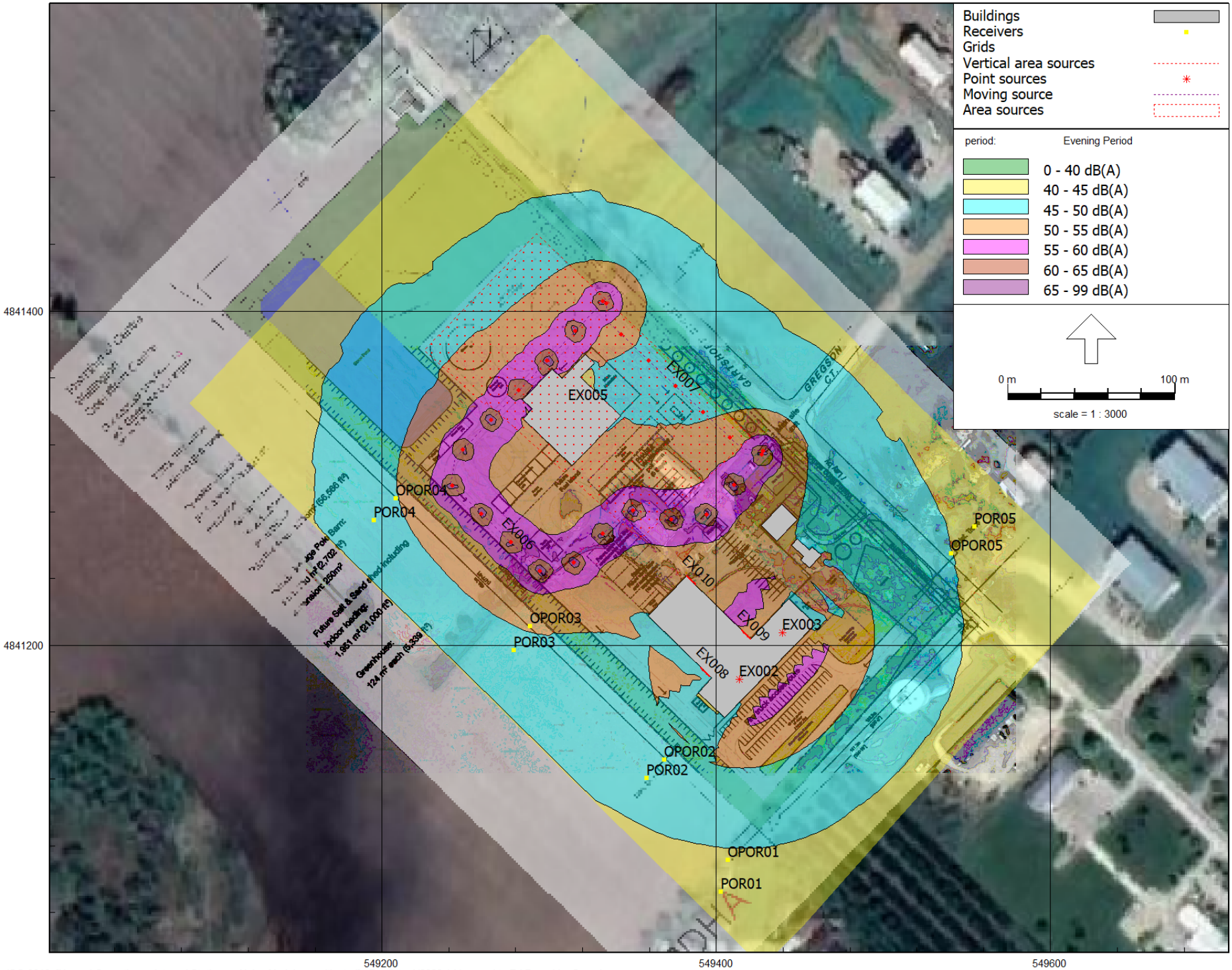
Figure 7: Unmitigated Evening Internal Stationary Noise
Internal Stationary Noise Model - unmitigated
9 Feb 2023, 09:35



ISO 9613, [Normal Operations - Internal Stationary Noise Model - unmitigated] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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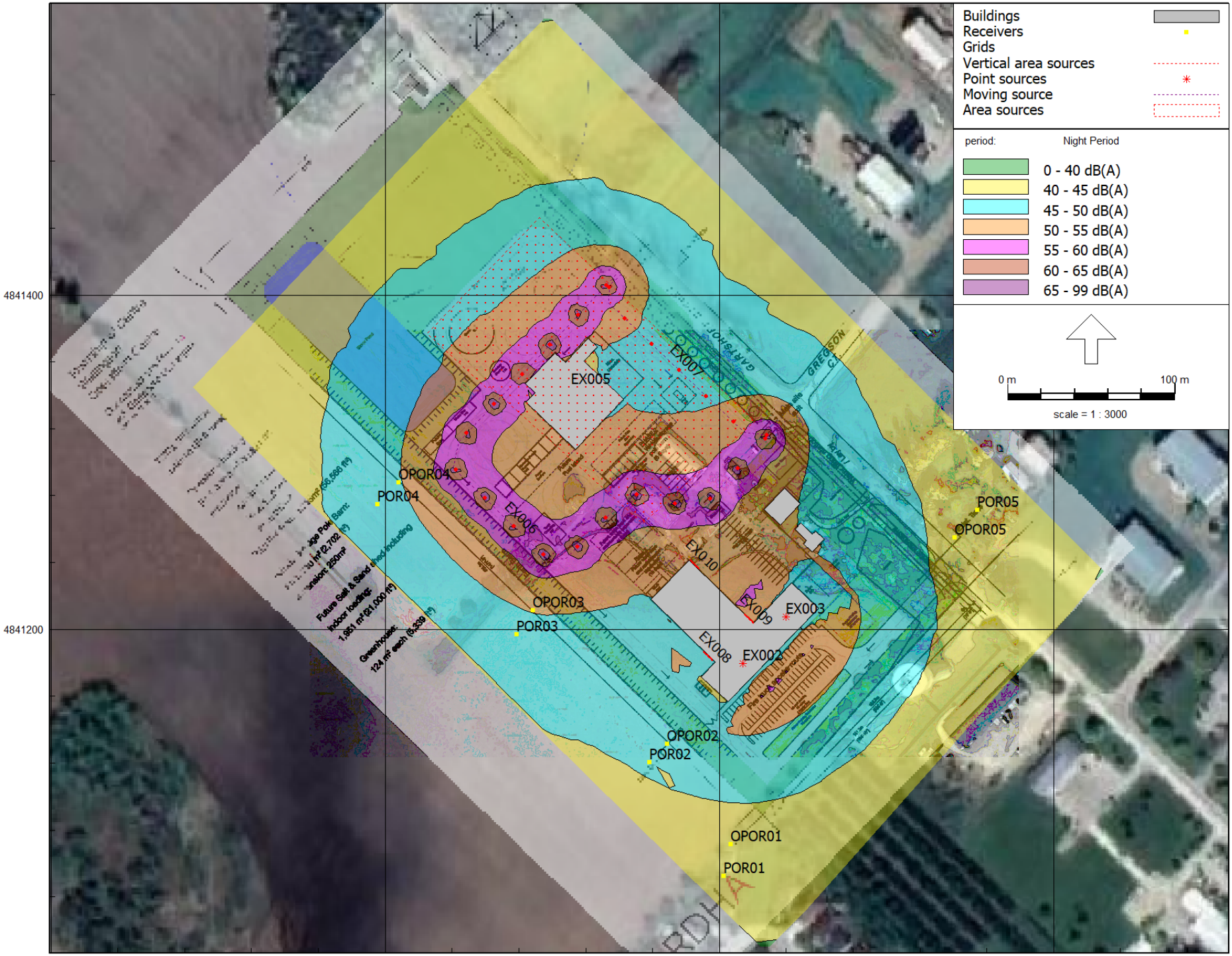
Figure 8: Unmitigated Nighttime Internal Stationary Noise
Internal Stationary Noise Model - unmitigated
9 Feb 2023, 09:36



ISO 9613, [Normal Operations - Internal Stationary Noise Model - unmitigated] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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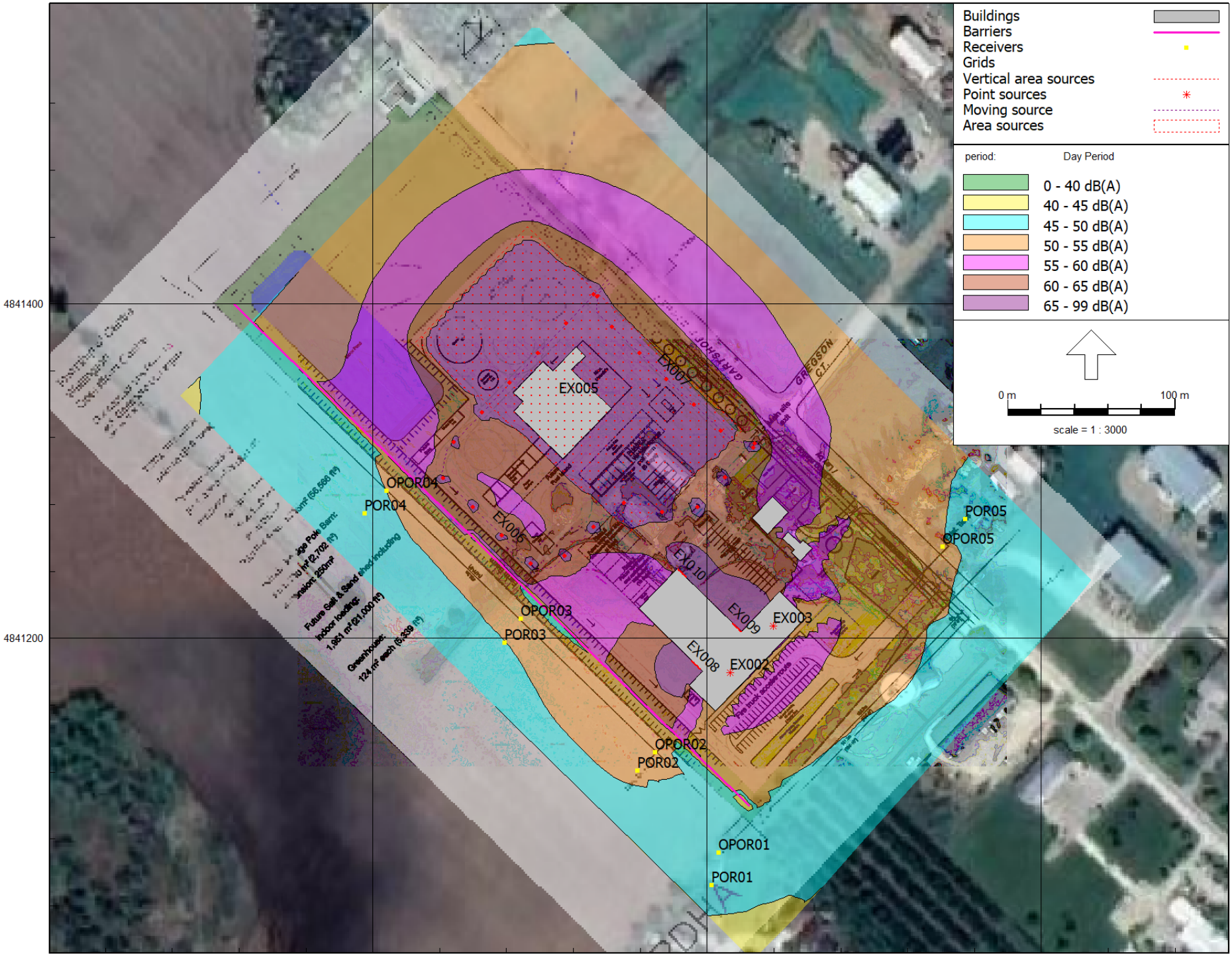
Figure 9: Mitigated Daytime Internal Stationary Noise
Internal Stationary Noise Model - final split barrier model
9 Feb 2023, 08:42



ISO 9613, [Normal Operations - Internal Stationary Noise Model - final split barrier model] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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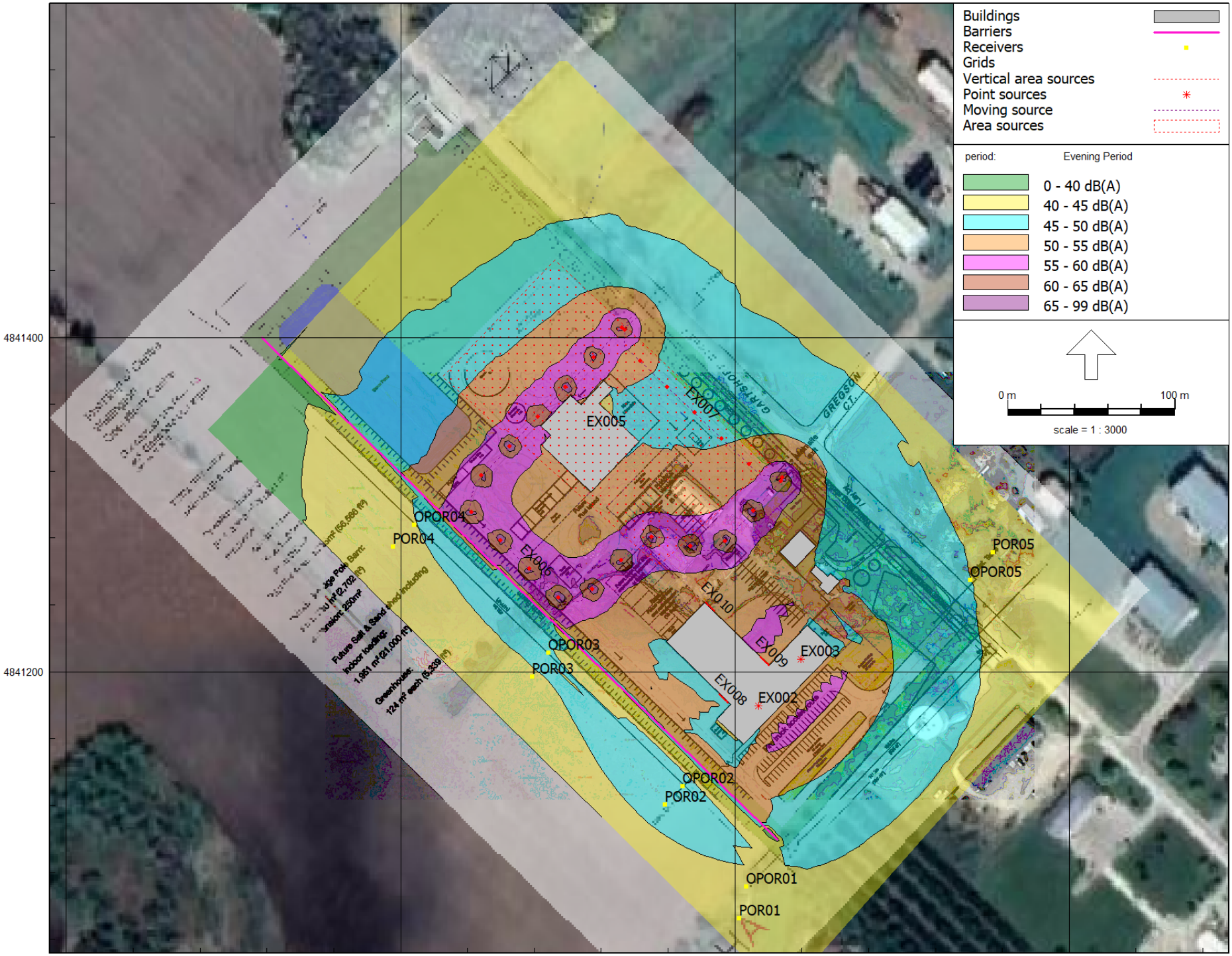
Figure 10: Mitigated Evening Internal Stationary Noise
Internal Stationary Noise Model - final split barrier model
9 Feb 2023, 08:46



ISO 9613, [Normal Operations - Internal Stationary Noise Model - final split barrier model] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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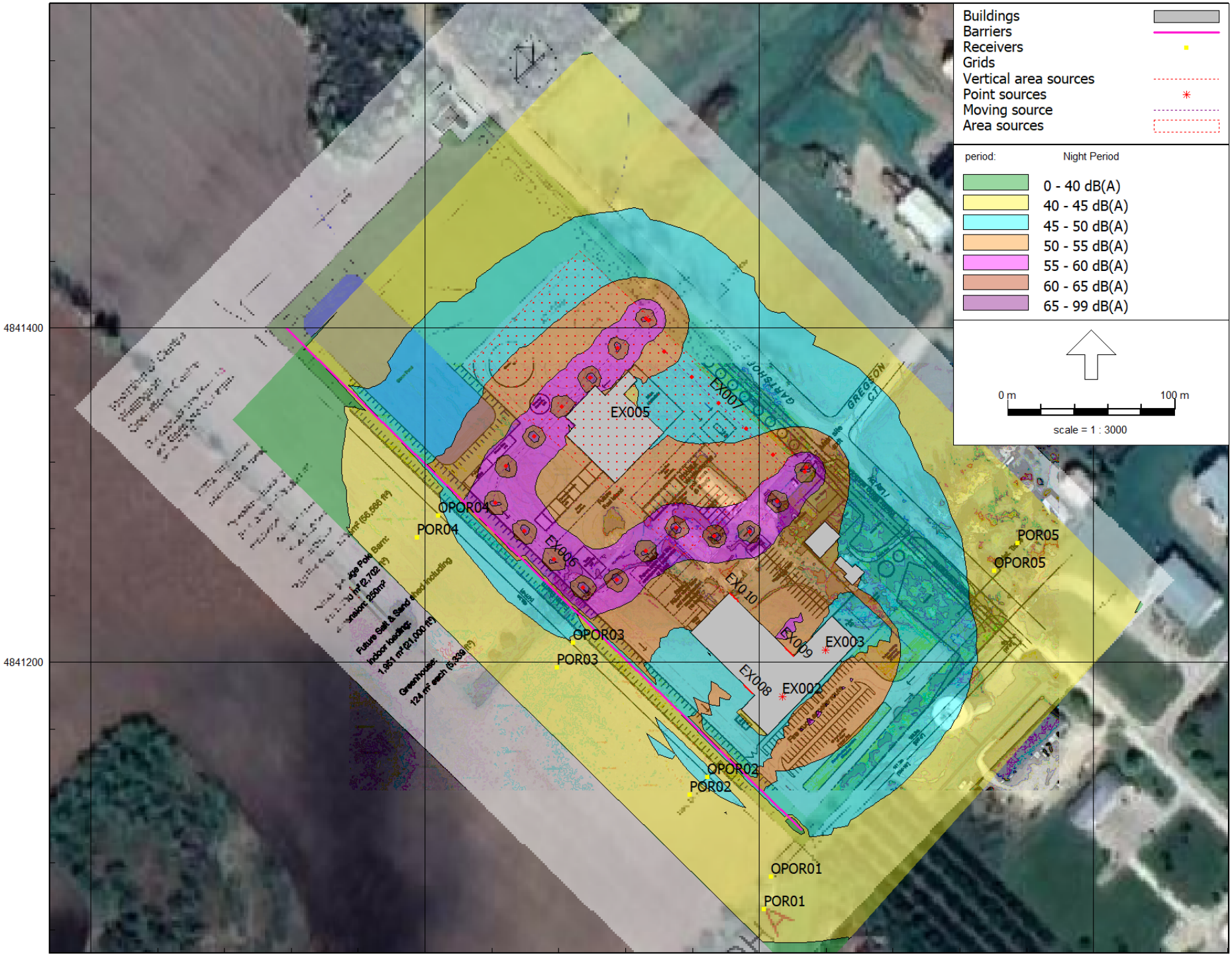
Figure 11: Mitigated Nighttime Internal Stationary Noise
Internal Stationary Noise Model - final split barrier model
9 Feb 2023, 08:47



ISO 9613, [Normal Operations - Internal Stationary Noise Model - final split barrier model] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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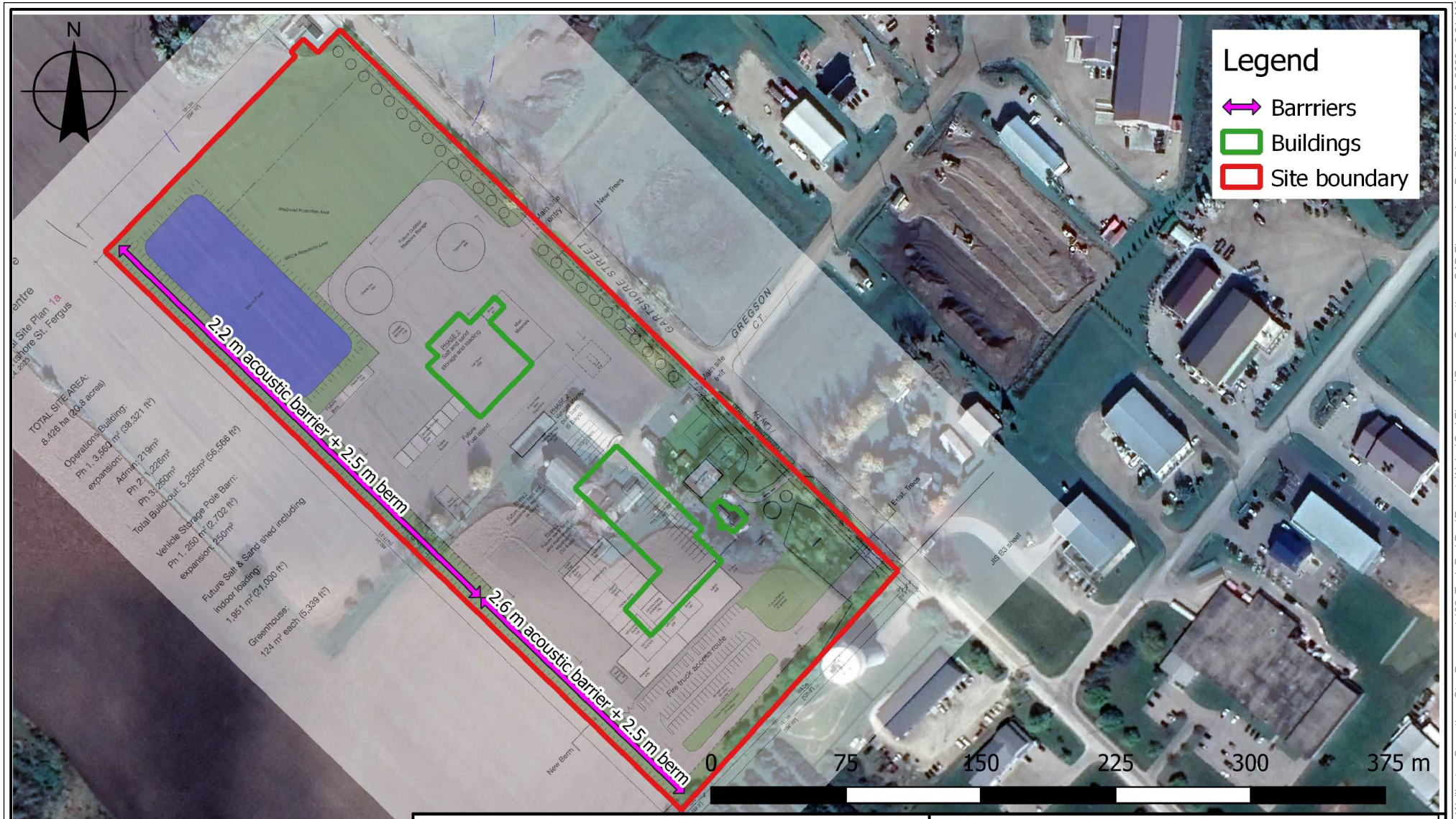

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Figure Title

Noise Mitigation Measures - Barrier Alignments

Centre Wellington Operations Centre

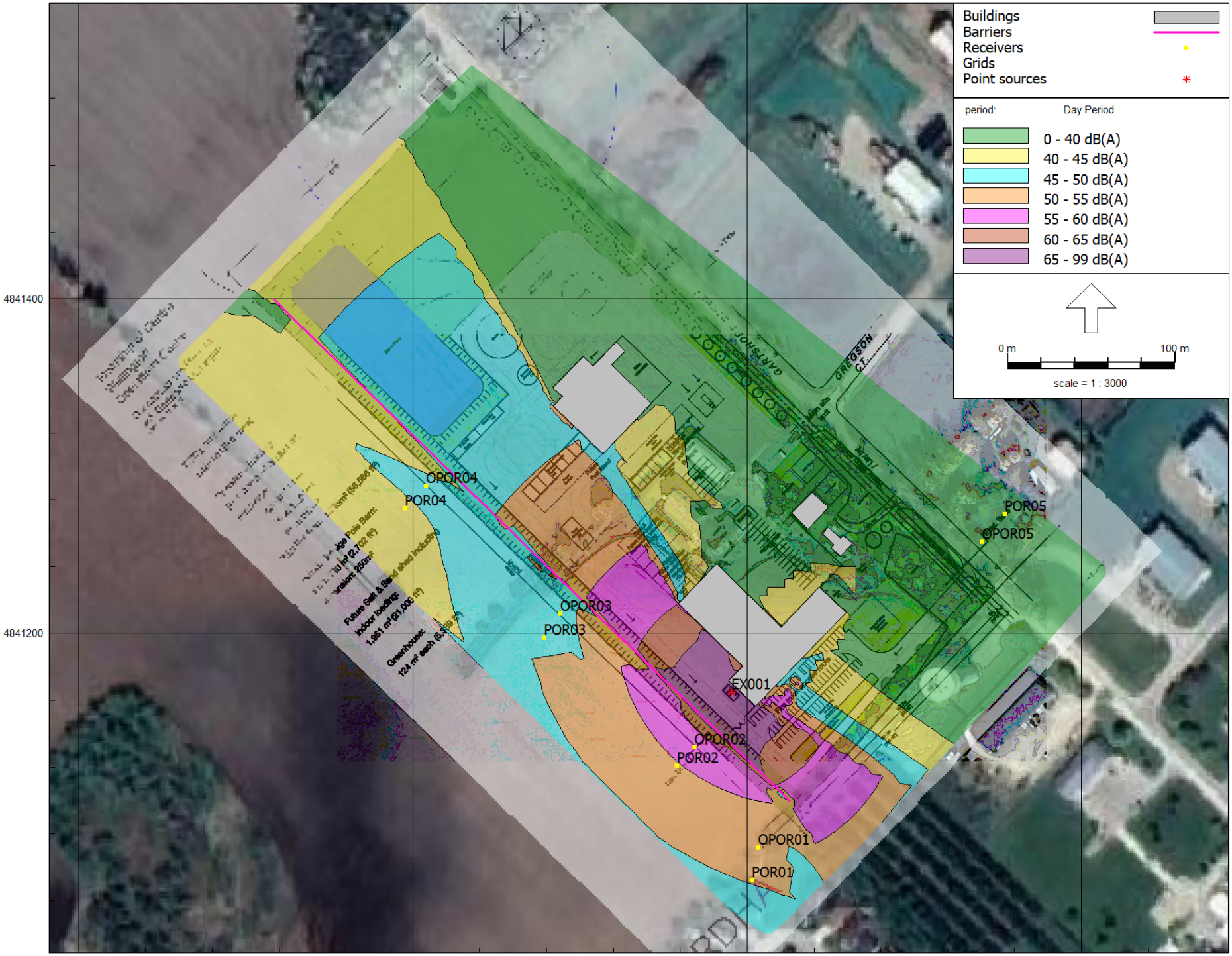
Client

Township of Centre Wellington

Drawn	Checked	Date	Figure No.
BM	HW	February 2023	12
Scale		Project No.	
1:3500		300055234.0000	

File: C:\Users\staresinic\RJB\055234 Centre Wellington Operations Ctr - Documents\02_Tech Proj Doc\Reports\Noise\Cad Figures\Fergus Operations CAD Figures.dwg Date Plotted: May 2, 2023 - 8:31 AM

Figure 13: Mitigated Daytime Emergency Generator Stationary Noise
Internal Stationary Noise Model - Emerg Gen Only
9 Feb 2023, 08:14



ISO 9613, [Normal Operations - Internal Stationary Noise Model - Emerg Gen Only] , Predictor V2022.1 Licensed to RJ Burnside, Canada

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Appendix A

MECP Sound Level Limits

APPENDIX A

Summary of the traffic data:

APPENDIX A

Table A-1: Sound Level Limit for Outdoor Living Areas – Road and Rail

Time Period	Leq(16)(dBA)
16-hour, 07:00 – 23:00	55

Table A-2: Indoor Sound Level Limits – Road and Rail

Type of Space	Time Period	Leq (dBA)	
		Road	Rail
Living/dining, den areas of residences, hospitals, nursing homes, schools, daycare centres, etc.	07:00 – 23:00	45	40
Living/dining, den areas of residences, hospitals, nursing homes, etc. (except schools or daycare centres)	23:00 – 07:00	45	40
Sleeping quarters	07:00 – 23:00	45	40
Sleeping quarters	23:00 – 07:00	40	35

Table A-3: Road Noise Control Measures – Outdoor Living Areas

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 60 dBA	Noise control measures may be applied, otherwise warning clause Type A.
> 60 dBA	Noise control measures should be implemented to reduce the levels to 55 dBA, otherwise warning clause Type B.

Table A-4: Plane of a Window – Ventilation Requirements
Daytime Period, 07:00 – 23:00 Hours

Sound Levels	Measures
≤ 55 dBA	Noise control measures may not be required.
> 55 dBA and ≤ 65 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 65 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

Table A-5: Plane of a Window – Ventilation Requirements
Nighttime Period, 23:00 – 07.00 Hours

Sound Levels	Measures
≤ 50 dBA	Noise control measures may not be required.
> 50 dBA and ≤ 60 dBA	The dwelling should be designed with a provision of for the installation of central air conditioning in the future, at the occupant's discretion. Warning clause Type C is also recommended.
> 60 dBA	Installation of central air conditioning should be implemented with a warning clause Type D. In addition, building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2.

Table A-6: Indoor Living Areas – Building Components

Sound Levels	Measures
> 60 dBA nighttime > 65 dBA daytime	Building components including windows, walls and doors, where applicable, should be designed so that the indoor sound levels comply with the sound level limits in Table B-2. The acoustical performance of the building components (windows, doors and walls) should be specified.

Table A-7: MECP Table C-5 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Outdoor Points of Reception

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	55 dBA
19:00 – 23:00	50 dBA	45 dBA	40 dBA	55 dBA

Table A-8: MECP Table C-6 of NPC-300: Exclusion Limit Values of One-Hour Equivalent Sound Level (Leq, dBA) Plane of Window of Noise Sensitive Spaces

Time of Day	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 19:00	50 dBA	50 dBA	45 dBA	60 dBA
19:00 – 23:00	50 dBA	50 dBA	40 dBA	60 dBA
23:00 – 07:00	45 dBA	45 dBA	40 dBA	55 dBA

Table A-9: MECP Table C-7 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBAI) Outdoor Points of Reception

Time of Day	Actual number of impulses in Period of one hour	Class 1 Area	Class 2 Area	Class 3 Area	Class 4 Area
07:00 – 23:00	9 or more	50	50	45	55
07:00 – 23:00	7 to 8	55	55	50	60
07:00 – 23:00	5 to 6	60	60	55	65
07:00 – 23:00	4	65	65	60	70
07:00 – 23:00	3	70	70	65	75
07:00 – 23:00	2	75	75	70	80
07:00 – 23:00	1	80	80	75	85

Table A-10: MECP Table C-8 of NPC-300: Exclusion Limit Values of Impulsive Sound Level (LLM, dBAI) Plane of Window – Noise Sensitive Spaces (Day/Night)

Actual number of impulses in Period of one hour	Class 1 Area (7:00-23:00) / (23:00-7:00)	Class 2 Area (7:00-23:00) / (23:00-7:00)	Class 3 Area (7:00-19:00) / (19:00-7:00)	Class 4 Area (7:00-23:00) / (23:00-7:00)
9 or more	50/45	50/45	45/40	60/55
7 to 8	55/50	55/50	50/45	65/60
5 to 6	60/55	60/55	55/50	70/65
4	65/60	65/60	60/55	75/70
3	70/65	70/65	65/60	80/75
2	75/70	75/70	70/65	85/80
1	80/75	80/75	75/70	90/85

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Appendix B

Sample Unmitigated Internal Stationary Noise Modeling Printouts

Appendix B: Predictor Inputs

Area Source Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1	--	207	0	######	-61	650	EX005	Front End I	Polygon	549262.7	4841345	1.5	1.5

Moving Source Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	208	0	######	-37	17	EX006	Trucking M	Polyline	549340.7	4841415	549435.9	4841323
2	--	209	0	######	-54	7	EX007	Fuel Truck	Polyline	549341.5	4841412	549436.8	4841324

Point Source Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
1	--	211	0	######	EX002	EX002	Point	549413.9	4841180	1.5	1.5	7.5	6
2	--	212	0	######	EX003	EX003	Point	549439.6	4841208	1.5	1.5	7.5	6

Vertical_Area Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	228	0	######	-2456	136	EX008	Mechanica	Line	549390.9	4841186	549396.1	4841181
2	--	229	0	######	-2728	136	EX010	Car Wash I	Line	549382.7	4841241	549387.9	4841236
3	--	230	0	######	-2592	136	EX009	Mechanica	Line	549415.4	4841209	549420.6	4841204

Grid Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1	--	233	0	######	-2865	5894	Grid		Polygon	549298.2	4841570	4.5	4.5

Receiver Limit of 88

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X	Y	Terrain L	HDef.
1	--	214	0	######	-2161	2	POR01	POR01	Point	549402.8	4841052	0	Relative
2	--	215	0	######	-2167	1	OPOR(	OPOR01	Point	549406.9	4841072	0	Relative
3	--	216	0	######	-2173	2	POR02	POR02	Point	549358.4	4841121	0	Relative
4	--	217	0	######	-2179	1	OPOR(	OPOR02	Point	549368.9	4841131	0	Relative
5	--	218	0	######	-2185	2	POR03	POR03	Point	549278.8	4841197	0	Relative
6	--	219	0	######	-2191	1	OPOR(	OPOR03	Point	549288.6	4841211	0	Relative
7	--	220	0	######	-2197	2	POR04	POR04	Point	549195.4	4841275	0	Relative
8	--	221	0	######	-2203	1	OPOR(	OPOR04	Point	549208.2	4841288	0	Relative
9	--	222	0	######	-2209	2	POR05	POR05	Point	549554.5	4841271	0	Relative
10	--	223	0	######	-2215	1	OPOR(	OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20

Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn

Barrier Limit of 20

Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn

Building Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
1	--	199	0	######			Polygo	613951.2	4850138	0	0	0	0
2	--	200	0	######			Polygo	613946.1	4850143	0	0	0	0
3	--	201	0	######			Polygo	613898.5	4850147	0	0	0	0
4	--	202	0	######			Polygo	613928.9	4850223	0	0	0	0
5	--	203	0	######			Polygo	549301.8	4841365	9	9	9	0
6	--	204	0	######			Polygo	549359.1	4841218	6	6	6	0
7	--	205	0	######			Polygo	549445.2	4841260	6	6	6	0
8	--	206	0	######			Polygo	549426.8	4841272	3	3	3	0

Day — Limit 100 Sources, 88 PORs

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	41.8	41.8	42.3	42.3	41.7	41.7	46.1	46.1	46.2	46.2	45.8	45.8
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4
EX007 - Fuel Trucks	0	15.8	15.8	18.7	18.7	15.7	15.7	19.6	19.6	22.3	22.3	17.8	17.8
EX002 - EX002	0	41	41	41.3	41.3	42.4	42.4	41.1	41.1	45.6	45.6	42.6	42.6
EX003 - EX003	0	39.1	39.1	39.2	39.2	40.2	40.2	37.1	37.1	37.6	37.6	37.1	37.1
EX008 - Mechanical Sh...	0	39.8	39.8	39.3	39.3	40.6	40.6	53.2	53.2	53.1	53.1	54.7	54.7
EX010 - Car Wash Noise	0	22.4	22.4	24.9	24.9	22.4	22.4	18.5	18.5	18.7	18.7	19.3	19.3
EX009 - Mechanical Sh...	0	30.9	30.9	30.4	30.4	31.9	31.9	33.6	33.6	33.7	33.7	34.7	34.7
Total		47	47	47.3	47.3	47.7	47.7	54.4	54.4	54.8	54.8	55.6	55.6
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Evening — Limit 100 Sources

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	39.8	39.8	40.1	40.1	41.2	41.2	39.8	39.8	44.4	44.4	41.4	41.4
EX003 - EX003	0	37.8	37.8	38	38	39	39	35.8	35.8	36.4	36.4	35.8	35.8
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
Total		42.7	42.7	43.2	43.2	43.8	43.8	43	43	46.3	46.3	43.9	43.9
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Night — Limit 100 Sources

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	34.6	34.6	36.7	36.7	35	35	38.1	38.1	40.4	40.4	38.4	38.4
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	38	38	38.3	38.3	39.4	39.4	38.1	38.1	42.6	42.6	39.6	39.6
EX003 - EX003	0	36.1	36.1	36.2	36.2	37.2	37.2	34.1	34.1	34.6	34.6	34	34
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
Total		41.2	41.2	41.9	41.9	42.3	42.3	41.9	41.9	45.1	45.1	42.7	42.7
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Limit of 88

Description	X	Y	Height	Day	Evenin	Night	Li
POR05	5E+05	5E+06	4.5	49.4	44.1	43.1	58.9
POR05	5E+05	5E+06	1.5	49	42.4	41.2	56.4
POR04	5E+05	5E+06	4.5	53.5	47.8	47.7	64.1
POR04	5E+05	5E+06	1.5	53.1	45.9	45.8	62.3
POR03	5E+05	5E+06	4.5	54.7	48.5	48.2	64.5
POR03	5E+05	5E+06	1.5	54.4	46.7	46.4	62.9
POR02	5E+05	5E+06	4.5	54.8	46.3	45	60.1
POR02	5E+05	5E+06	1.5	54.4	43	41.9	58.9
POR01	5E+05	5E+06	4.5	47.3	43.2	41.9	54.5
POR01	5E+05	5E+06	1.5	47	42.7	41.2	52.8

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Appendix C

Sample Mitigated Internal Stationary Noise Modeling Printouts

Appendix C: Predictor Inputs

Area Source Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1	--	207	0	######	-61	650	EX005	Front End I	Polygon	549262.7	4841345	1.5	1.5

Moving Source Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	208	0	######	-37	17	EX006	Trucking M	Polyline	549340.7	4841415	549435.9	4841323
2	--	209	0	######	-54	7	EX007	Fuel Truck	Polyline	549341.5	4841412	549436.8	4841324

Point Source Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
1	--	211	0	######	EX002	EX002	Point	549413.9	4841180	1.5	1.5	7.5	6
2	--	212	0	######	EX003	EX003	Point	549439.6	4841208	1.5	1.5	7.5	6

Vertical_Area Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	228	0	######	-2456	136	EX008	Mechanica	Line	549390.9	4841186	549396.1	4841181
2	--	229	0	######	-2728	136	EX010	Car Wash I	Line	549382.7	4841241	549387.9	4841236
3	--	230	0	######	-2592	136	EX009	Mechanica	Line	549415.4	4841209	549420.6	4841204

Grid Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1	--	233	0	######	-2865	5894	Grid		Polygon	549298.2	4841570	4.5	4.5

Receiver Limit of 88

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X	Y	Terrain L	HDef.
1	--	214	0	######	-2161	2	POR01	POR01	Point	549402.8	4841052	0	Relative
2	--	215	0	######	-2167	1	OPOR(	OPOR01	Point	549406.9	4841072	0	Relative
3	--	216	0	######	-2173	2	POR02	POR02	Point	549358.4	4841121	0	Relative
4	--	217	0	######	-2179	1	OPOR(	OPOR02	Point	549368.9	4841131	0	Relative
5	--	218	0	######	-2185	2	POR03	POR03	Point	549278.8	4841197	0	Relative
6	--	219	0	######	-2191	1	OPOR(	OPOR03	Point	549288.6	4841211	0	Relative
7	--	220	0	######	-2197	2	POR04	POR04	Point	549195.4	4841275	0	Relative
8	--	221	0	######	-2203	1	OPOR(	OPOR04	Point	549208.2	4841288	0	Relative
9	--	222	0	######	-2209	2	POR05	POR05	Point	549554.5	4841271	0	Relative
10	--	223	0	######	-2215	1	OPOR(	OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20

Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn

Barrier Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	224	0	######	-2221	1			Polyline	549290.1	4841231	549425.4	4841100
2	--	231	0	######	-2864	1			Polyline	549290.2	4841231	549117	4841400

Building Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
1	--	199	0	######			Polygo	613951.2	4850138	0	0	0	0
2	--	200	0	######			Polygo	613946.1	4850143	0	0	0	0
3	--	201	0	######			Polygo	613898.5	4850147	0	0	0	0
4	--	202	0	######			Polygo	613928.9	4850223	0	0	0	0
5	--	203	0	######			Polygo	549301.8	4841365	9	9	9	0
6	--	204	0	######			Polygo	549359.1	4841218	6	6	6	0
7	--	205	0	######			Polygo	549445.2	4841260	6	6	6	0
8	--	206	0	######			Polygo	549426.8	4841272	3	3	3	0

Day — Limit 100 Sources, 88 PORs

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	37.9	37.9	39.1	39.1	37.5	37.5	39.8	39.8	42	42	38.1	38.1
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	32.5	32.5
EX007 - Fuel Trucks	0	14.7	14.7	18.6	18.6	13.7	13.7	14.7	14.7	20	20	11	11
EX002 - EX002	0	37.2	37.2	41.3	41.3	38.1	38.1	39.9	39.9	45.6	45.6	38.6	38.6
EX003 - EX003	0	35.2	35.2	39.2	39.2	35.2	35.2	33.5	33.5	37.6	37.6	30.8	30.8
EX008 - Mechanical Sh...	0	36.9	36.9	37.6	37.6	37.8	37.8	44.8	44.8	46.6	46.6	45.7	45.7
EX010 - Car Wash Noise	0	19.3	19.3	24.9	24.9	18.6	18.6	17.9	17.9	18.5	18.5	18.9	18.9
EX009 - Mechanical Sh...	0	29.6	29.6	30.4	30.4	30.5	30.5	32.7	32.7	33.7	33.7	33.6	33.6
Total		43.4	43.4	45.9	45.9	43.8	43.8	47.5	47.5	50.4	50.4	47.5	47.5
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Evening — Limit 100 Sources

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	32.5	32.5
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	35.9	35.9	40.1	40.1	36.8	36.8	38.6	38.6	44.4	44.4	37.3	37.3
EX003 - EX003	0	34	34	38	38	34	34	32.3	32.3	36.4	36.4	29.6	29.6
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
Total		38.8	38.8	42.6	42.6	39.3	39.3	40.4	40.4	45.5	45.5	39.1	39.1
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Night — Limit 100 Sources

Group / source	Reduct [dB]	POR01 result	POR01_ corr.	POR01 result	POR01 corr.	OPORI result	OPOR01_ corr.	POR02_A result	POR02_A corr.	POR02_B result	POR02_B corr.	OPOR02_ result	OPOR02_ corr.
EX005 - Front End Loa...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX006 - Trucking Mov...	0	30.5	30.5	33	33	30.7	30.7	32.9	32.9	36	36	32.5	32.5
EX007 - Fuel Trucks	0	--	--	--	--	--	--	--	--	--	--	--	--
EX002 - EX002	0	34.2	34.2	38.3	38.3	35	35	36.9	36.9	42.6	42.6	35.6	35.6
EX003 - EX003	0	32.2	32.2	36.2	36.2	32.2	32.2	30.5	30.5	34.6	34.6	27.8	27.8
EX008 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
EX010 - Car Wash Noise	0	--	--	--	--	--	--	--	--	--	--	--	--
EX009 - Mechanical Sh...	0	--	--	--	--	--	--	--	--	--	--	--	--
Total		37.3	37.3	41.1	41.1	37.8	37.8	39	39	44	44	37.8	37.8
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--						

Limit of 88

Description	X	Y	Height	Day	Evenin	Night	Li
POR05	5E+05	5E+06	4.5	49.5	44.1	43.1	58.9
POR05	5E+05	5E+06	1.5	49	42.4	41.2	56.4
POR04	5E+05	5E+06	4.5	49	43.1	42.7	58.6
POR04	5E+05	5E+06	1.5	46.2	39.6	39.2	55.2
POR03	5E+05	5E+06	4.5	50	44.7	43.9	58.9
POR03	5E+05	5E+06	1.5	46.9	40.5	39.7	55.2
POR02	5E+05	5E+06	4.5	50.4	45.5	44	55.6
POR02	5E+05	5E+06	1.5	47.5	40.4	39	52.5
POR01	5E+05	5E+06	4.5	45.9	42.6	41.1	52
POR01	5E+05	5E+06	1.5	43.4	38.8	37.3	49.3

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Appendix D

Noise Date References

PACKAGED ELECTRIC / ELECTRIC

LCH

Energence® Rooftop Units
High Efficiency - 60 Hz

COMMERCIAL
PRODUCT SPECIFICATIONS

Bulletin No. 210608
June 2020
Supersedes June 2019

ENERGENCE™ Saving Energy with Intelligence

PRODIGY™ CONTROL SYSTEM

SMARTWIRE™ SYSTEM

Environ™ Coil System

MSAV™ MULTI-STAGE AIR VOLUME

Humiditrol

L Connection® NETWORK

ASHRAE 90.1 COMPLIANT

ENERGY STAR

20 to 30 Tons
Net Cooling Capacity – 238,000 to 354,000 Btuh
Optional Electric Heat - 30 to 120 kW

MODEL NUMBER IDENTIFICATION

L C H 300 H 4 B S 1 Y

Brand/Family
L = Energence®

Unit Type
C = Packaged Electric Cooling with optional Electric Heat

Major Design Sequence
H = 1st Generation

Nominal Cooling Capacity - Tons
242 = 20 Tons
300 = 25 Tons
360 = 30 Tons

Cooling Efficiency
H = High Efficiency

Refrigerant Type
4 = R-410A

Blower Type
B = Belt Drive, Constant Air Volume
M = MSAV® (Multi-Stage Air Volume), Belt Drive
V = Variable Air Volume, Belt Drive

Factory Installed Electric Heat
N = No Heat
J = 30 kW Electric Heat
K = 45 kW Electric Heat
L = 60 kW Electric Heat
P = 90 kW Electric Heat
S = 120 kW Electric Heat

Minor Design Sequence
1 = 1st Revision
2 = 2nd Revision
3 = 3rd Revision

Voltage
Y = 208/230V-3 phase-60hz
G = 460V-3 phase-60hz
J = 575V-3 phase-60hz

OUTDOOR SOUND DATA

Unit Model Number	Octave Band Sound Power Levels dBA, re 10^{-12} Watts - Center Frequency - Hz							[1] Sound Rating Number (dBA)
	125	250	500	1000	2000	4000	8000	
242, 300, 360	84	85	90	90	85	80	72	95

Note - The octave band sound power data does not include tonal corrections.
[1] Tested according to AHRI Standard 370-2001 test conditions (includes pure tone penalty).
Sound Rating Number is the overall A-Weighted Sound Power Level, (LWA), dB (100 Hz to 10,000 Hz).

WEIGHT DATA

Model Number	Net		Shipping	
	lbs.	kg	lbs.	kg
242 Base Unit	2997	1359	3207	1455
242 Max. Unit	3409	1546	3619	1642
300 Base Unit	2997	1359	3207	1455
300 Max. Unit	3509	1592	3719	1687
360 Base Unit	2997	1359	3207	1455
360 Max. Unit	3509	1592	3719	1687

OPTIONS / ACCESSORIES

Description		Shipping Weight	
		lbs.	kg
CEILING DIFFUSERS			
Step-Down	LARTD30/36S	625	283
Flush	LAFD30/36S	625	283
Transitions	LASRT30/36	85	39
ECONOMIZER / OUTDOOR AIR / EXHAUST			
Economizer		138	63
Barometric Relief			
Downflow Barometric Relief Dampers		45	20
Horizontal Barometric Relief Dampers		20	9
Outdoor Air Dampers			
Damper Section (downflow)	Motorized	72	33
Damper Section (downflow)	Manual	68	31
Outdoor Air Hood (downflow)		76	34
Power Exhaust			
	Standard Static	99	45
	50% High Static	460	209
	100% High Static with or without VFD	525	238
ELECTRIC HEAT			
30 KW		59	27
45 KW		76	34
60 KW		76	34
90 KW		84	38
120 KW		98	44
HUMIDITROL® DEHUMIDIFICATION SYSTEM			
Humiditrol® Dehumification Option (Net Weight)		100	45
PACKAGING			
LTL Packaging (less than truck load)		300	136
ROOF CURBS			
Hybrid Roof Curbs, Downflow			
14 in. height		115	52
18 in. height		140	64
24 in. height		170	77
Standard Curbs, Horizontal			
30 in. height		445	202
41 in. height		725	329

Measurement data for a Front End Loader from a previous Burnside project

Keating Construction (2004) Ltd.
Elora, Ontario

Table C02: Sound Power Calculations for FEL

Project No.: 300043184.0000

Description: Front End Loader
ement Weighting: A
utput Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 2
Tonal Indicator:
Data Source: Meter
Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	Point 1	Point 2	Point 3	Point 21	# of Points	Average Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
Spherical	Radius (m)	Radius (m)	Radius (m)	Radius (m)		L'p				
(Hz)	7.500	7.500	7.500	7.500	7.5		1			
	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)	Lpfi (dBA)		(dBA)	2	(dB)	(dBA)	(dBA)
FileID	ETS KH003									
Comment										
12.5	0.0				1	0.01	25.5		25.5	
16	8.1				1	8.06	33.5		33.5	37.55
20	9.4				1	9.37	34.9		34.9	
25	16.0				1	15.96	41.4		41.4	
32	34.0				1	34.02	59.5		59.5	65.19
40	38.4				1	38.35	63.8		63.8	
50	41.6				1	41.64	67.1		67.1	
63	61.6				1	61.61	87.1		87.1	87.52
80	51.3				1	51.25	76.7		76.7	
100	55.8				1	55.76	81.2		81.2	
125	60.9				1	60.89	86.4		86.4	90.15
160	61.2				1	61.24	86.7		86.7	
200	64.9				1	64.86	90.3		90.3	
250	66.0				1	65.98	91.5		91.5	95.57
315	65.0				1	65.02	90.5		90.5	
400	67.1				1	67.09	92.6		92.6	
500	69.5				1	69.52	95.0		95.0	99.27
630	70.0				1	69.96	95.4		95.4	
800	69.5				1	69.47	95.0		95.0	
1,000	71.2				1	71.21	96.7		96.7	100.63
1,250	70.2				1	70.21	95.7		95.7	
1,600	69.3				1	69.34	94.8		94.8	
2,000	68.1				1	68.12	93.6		93.6	99.47
2,500	70.0				1	69.97	95.5		95.5	
3,150	69.1				1	69.05	94.5		94.5	
4,000	66.8				1	66.81	92.3		92.3	99.25
5,000	70.4				1	70.42	95.9		95.9	
6,300	67.6				1	67.60	93.1		93.1	
8,000	63.1				1	63.11	88.6		88.6	94.89
10,000	59.5				1	59.48	85.0		85.0	
12,500	53.2				1	53.24	78.7		78.7	
16,000	45.2				1	45.19	70.7		70.7	79.38
20,000	34.1				1	34.10	59.6		59.6	
Overall (dB)	81.1				1.0	81.1	106.6		106.6	106.6

This Reference used for Car wash bay noise - EX010

Description: Bay E Side N
ment Weighting: A
utput Weighting: A
SOURCE TYP: Spherical
Sphere 1/ 4
Tonal Indicator:
Data Source: Meter
Enabled 1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or	Point 1	Point 2	# of Points	Average Lpf	Background: Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Chk Correction: Corrected Avg Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
Spherical	Radius (m)	Radius (m)		L'p	L"p	L'p - L"p							
(Hz)	8.000	8.000	8						Col a	1			
	Lpfi (dBA)	Lpfi (dBA)		(dBA)	(dBA)	(dB)		(dB)	(dBA)	4	(dB)	(dBA)	(dBA)
FileID	5Jan016												
Comment													
12.5	3.3		1	3.34		3.34	yes		3.34	26.4		26.4	
16	8.4		1	8.37		8.37	yes		8.37	31.4		31.4	37.70
20	13.1		1	13.10		13.10	yes		13.10	36.1		36.1	
25	19.4		1	19.41		19.41	yes		19.41	42.4		42.4	
32	21.9		1	21.90		21.90	yes		21.90	44.9		44.9	53.00
40	28.8		1	28.78		28.78	yes		28.78	51.8		51.8	
50	30.1		1	30.13		30.13	yes		30.13	53.2		53.2	
63	34.2		1	34.23		34.23	yes		34.23	57.3		57.3	63.95
80	39.4		1	39.40		39.40	yes		39.40	62.4		62.4	
100	38.3		1	38.28		38.28	yes		38.28	61.3		61.3	
125	42.1		1	42.12		42.12	yes		42.12	65.2		65.2	69.65
160	43.6		1	43.55		43.55	yes		43.55	66.6		66.6	
200	45.3		1	45.26		45.26	yes		45.26	68.3		68.3	
250	46.5		1	46.45		46.45	yes		46.45	69.5		69.5	74.60
315	48.2		1	48.19		48.19	yes		48.19	71.2		71.2	
400	50.2		1	50.19		50.19	yes		50.19	73.2		73.2	
500	52.4		1	52.39		52.39	yes		52.39	75.4		75.4	80.48
630	54.4		1	54.43		54.43	yes		54.43	77.5		77.5	
800	56.2		1	56.20		56.20	yes		56.20	79.2		79.2	
1,000	57.4		1	57.42		57.42	yes		57.42	80.5		80.5	84.74
1,250	57.0		1	57.03		57.03	yes		57.03	80.1		80.1	
1,600	60.0		1	59.99		59.99	yes		59.99	83.0		83.0	
2,000	66.6		1	66.55		66.55	yes		66.55	89.6		89.6	92.89
2,500	66.2		1	66.19		66.19	yes		66.19	89.2		89.2	
3,150	62.0		1	61.96		61.96	yes		61.96	85.0		85.0	
4,000	61.4		1	61.38		61.38	yes		61.38	84.4		84.4	89.65
5,000	62.2		1	62.18		62.18	yes		62.18	85.2		85.2	
6,300	61.2		1	61.21		61.21	yes		61.21	84.2		84.2	
8,000	58.1		1	58.09		58.09	yes		58.09	81.1		81.1	86.55
10,000	54.8		1	54.80		54.80	yes		54.80	77.8		77.8	
12,500	51.1		1	51.12		51.12	yes		51.12	74.2		74.2	
16,000	46.3		1	46.33		46.33	yes		46.33	69.4		69.4	75.74
20,000	40.8		1	40.82		40.82	yes		40.82	63.9		63.9	
Overall (dB)	72.8		1.0	72.8					72.8	95.8		95.8	95.8

This reference was used for EX008 and EX009.
Measurement is of a rail car repair facility.

Description:	BD15 - Bay Door 15
ement Weighting:	A
utput Weighting:	A
SOURCE TYP:	Spherical
Sphere 1/	2
Tonal Indicator:	
Data Source:	Meter
Enabled	1

Relevant: 1 1

Lw Technique: Spherical, Intensity, Parallelepiped, or Area	Point 1	# of Points	Average Lpf	Background Bckgnd Noise	Delta L	Delta L >3 Check	Correction K1	Chk Correction Corrected Avg Lpf	Lwf (dBA)	Adjustment for Weighting from 'A' to 'A'	LwfA (from Lwf)	Octave Sound Power
Spherical	Radius (m)		L'p	L"p	L'p - L"p							
(Hz)	0.400	0.4						Col a	1			
	Lpfi (dBA)		(dBA)	(dBA)	(dB)		(dB)	(dBA)	2	(dB)	(dBA)	(dBA)
FileID												
Comment	old Pinchin Report											
12.5						warn						
16						warn						
20						warn						
25						warn						
32	53.6	1	53.60		53.60	yes		53.60	**53.6**		53.6	53.60
40						warn						
50						warn						
63	63.8	1	63.80		63.80	yes		63.80	**63.8**		63.8	63.80
80						warn						
100						warn						
125	74.4	1	74.40		74.40	yes		74.40	**74.4**		74.4	74.40
160						warn						
200						warn						
250	84.8	1	84.80		84.80	yes		84.80	**84.8**		84.8	84.80
315						warn						
400						warn						
500	92.0	1	92.00		92.00	yes		92.00	**92.0**		92.0	92.00
630						warn						
800						warn						
1,000	96.2	1	96.20		96.20	yes		96.20	**96.2**		96.2	96.20
1,250						warn						
1,600						warn						
2,000	97.0	1	97.00		97.00	yes		97.00	**97.0**		97.0	97.00
2,500						warn						
3,150						warn						
4,000	92.9	1	92.90		92.90	yes		92.90	**92.9**		92.9	92.90
5,000						warn						
6,300						warn						
8,000						warn						
10,000						warn						
12,500						warn						
16,000						warn						
20,000						warn						
Overall (dB)	101.2	1.0	101.2					101.2	101.2		101.2	101.2

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

Sample Mitigated Emergency Stationary Noise Modeling Printouts

Appendix E: Predictor Inputs

Point Source Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X	Y	Height	Rel.H	Abs.H	Terrain L
1	--	210	0	######	EX001	EX001	Point	549390.6	4841165	1.5	1.5	1.5	0

Grid Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Height	Rel.H
1	--	233	0	######	-2865	5894	Grid		Polygon	549298.2	4841570	4.5	4.5

Receiver Limit of 88

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X	Y	Terrain L	HDef.
1	--	214	0	######	-2161	2	POR01	POR01	Point	549402.8	4841052	0	Relative
2	--	215	0	######	-2167	1	OPOR(	OPOR01	Point	549406.9	4841072	0	Relative
3	--	216	0	######	-2173	2	POR02	POR02	Point	549358.4	4841121	0	Relative
4	--	217	0	######	-2179	1	OPOR(	OPOR02	Point	549368.9	4841131	0	Relative
5	--	218	0	######	-2185	2	POR03	POR03	Point	549278.8	4841197	0	Relative
6	--	219	0	######	-2191	1	OPOR(	OPOR03	Point	549288.6	4841211	0	Relative
7	--	220	0	######	-2197	2	POR04	POR04	Point	549195.4	4841275	0	Relative
8	--	221	0	######	-2203	1	OPOR(	OPOR04	Point	549208.2	4841288	0	Relative
9	--	222	0	######	-2209	2	POR05	POR05	Point	549554.5	4841271	0	Relative
10	--	223	0	######	-2215	1	OPOR(	OPOR05	Point	549540.9	4841255	0	Relative

Vertical Grid Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn

Barrier Limit of 20

	Group	Item ID	Grp ID	Date	1st Kid	Kid Cn	Name	Desc.	Shape	X1	Y1	Xn	Yn
1	--	224	0	######	-2221	1			Polyline	549290.1	4841231	549425.4	4841100
2	--	231	0	######	-2864	1			Polyline	549290.2	4841231	549117	4841400

Building Limit of 100

	Group	Item ID	Grp ID	Date	Name	Desc.	Shape	X1	Y1	Height	Rel.H	Abs.H	Terrain L
1	--	199	0	######			Polygo	613951.2	4850138	0	0	0	0
2	--	200	0	######			Polygo	613946.1	4850143	0	0	0	0
3	--	201	0	######			Polygo	613898.5	4850147	0	0	0	0
4	--	202	0	######			Polygo	613928.9	4850223	0	0	0	0
5	--	203	0	######			Polygo	549301.8	4841365	9	9	9	0
6	--	204	0	######			Polygo	549359.1	4841218	6	6	6	0
7	--	205	0	######			Polygo	549445.2	4841260	6	6	6	0
8	--	206	0	######			Polygo	549426.8	4841272	3	3	3	0

Day	Limit 100 Sources, 88 PORs												
Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR	OPOR01_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
	[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9
Total		48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--

Evening	Limit 100 Sources												
Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR	OPOR01_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
	[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	--	--	--	--	--	--	--	--	--	--	--	--
Total		--	--	--	--	--	--	--	--	--	--	--	--
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--

Night	Limit 100 Sources												
Group / source	Reduct	POR01	POR01_	POR01	POR01	OPOR	OPOR01_	POR02_A	POR02_A	POR02_B	POR02_B	OPOR02_	OPOR02_
	[dB]	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.	result	corr.
EX001 - EX001	0	48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9
Total		48.3	48.3	50.2	50.2	49.4	49.4	51.6	51.6	54.7	54.7	52.9	52.9
(no category)		--	--	--	--	--	--	--	--	--	--	--	--
Exceeding		--	--	--	--	--	--	--	--	--	--	--	--

Limit of 88							
Description	X	Y	Height	Day	Evenin	Night	Li
POR05	5E+05	5E+06	4.5	29.7	--	--	34.5
POR05	5E+05	5E+06	1.5	29.1	--	--	33.9
POR04	5E+05	5E+06	4.5	44.3	--	--	49.1
POR04	5E+05	5E+06	1.5	43.5	--	--	48.3
POR03	5E+05	5E+06	4.5	48.2	--	--	53
POR03	5E+05	5E+06	1.5	46	--	--	50.8
POR02	5E+05	5E+06	4.5	54.7	--	--	59.5
POR02	5E+05	5E+06	1.5	51.6	--	--	56.4
POR01	5E+05	5E+06	4.5	50.2	--	--	55
POR01	5E+05	5E+06	1.5	48.3	--	--	53.1

Preliminary Geotechnical Investigation

Site Development for
Proposed Township of Centre Wellington
Operations Centre
965 Gartshore Street
Fergus, Ontario

Client:
Township of Centre Wellington
c/o R.J. Burnside & Associates Ltd.

Attention: H.T. Lam, OALA, CSLA
Principal Senior Landscape Architect

Type of Document:
Preliminary Geotechnical Report

Project Number:
G4599-22-6

JLP Services Inc.
Geotechnical and Environmental Consultants
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Date Submitted:
December 19, 2022

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Enclosure 1: Borehole Location Plan
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Appendix A: Limitations and Use of Report

1. Introduction

JLP Services Inc. (JLP) was retained by R.J. Burnside & Associates Ltd. on behalf of Township of Centre Wellington to carry out a preliminary geotechnical investigation for the Site Development for the Proposed Township of Centre Wellington Operations Centre at 965 Gartshore Street in Fergus, Ontario.

Although final details concerning the proposed development are unavailable at the time of this report, it is understood that the proposed development will consist of a number of buildings with associated site services, roads, parking lots and storm water management facility.

The purpose of this investigation was to reveal the subsurface soil and groundwater conditions at the site and to determine the relevant soil properties for preliminary recommendations for the design and construction of building foundations, floor slab-on-grade, site services, roads, parking lots and storm water management facility.

The conclusions and recommendations given in this report are based on the assumption that the design concept mentioned above will proceed into construction. If changes are made in the design phase and/or during construction, JLP must be retained to review these changes. The outcome of this review may lead to modifications to our recommendations or may require additional field and/or laboratory analyses to determine if the proposed changes are acceptable from a geotechnical standpoint.

2. Site Description

The site is located on the southwest side of Gartshore Street north of Gregson Court and is accessed from Gartshore Street. The site is currently occupied by an operating farm and bound to the south/southwest by farmland and to the north/northeast by industrial properties as well as vacant treed properties.

The ground surface is generally flat with land gently sloping from southeast to northwest. The difference in ground surface elevations is about 3.9m± between the highest and the lowest

borehole locations and is typically about 2 to 3m± from the southeast to the northwest borehole locations. The site was most recently cultivated with soya bean crop.

3. Field Work

The fieldwork was carried out over the period of October 24 to 27, 2022 and consisted of seven (7) boreholes at the locations shown on the Borehole Location Plan, Enclosure 1.

Prior to the commencement of drilling and sampling operations at the site, the borehole locations were cleared of underground utilities by Ontario One Call and private locate contractors.

The boreholes were advanced to the sampling depths by means of a track-mounted, power auger machine, equipped with hollow stem augers and split spoon samplers for soil sampling. Standard Penetration tests were carried out at frequent intervals of depth and the results are shown on the Borehole Logs as N-values. The subsurface soils were visually examined, logged and sampled at the borehole locations.

Ground water conditions were observed in the open boreholes during the drilling and sampling operations. All the boreholes were instrumented with monitoring wells with two (2) nested monitoring wells installed in Boreholes 1 and 7, respectively for groundwater monitoring.

JLP Services Inc. engineering staff supervised and directed the fieldwork. The layout of borehole locations was carried out in the field using a handheld global positioning system with UTM coordinates. The coordinates and ground surface elevation at the borehole locations were obtained using a Sokkia GcX3 global position system referenced to the coordinate system known as NAD83(CSRS), which is the North American Datum of 1983 of the Canadian Spatial Reference System, and the Universal Transverse Mercator (UTM) Zone 17. The Canadian HT2_0 Geoid, Topnet live was used for Real Time Kinematic (RTK) positioning corrections. The approximate coordinates and ground surface elevation at the borehole locations are listed in Table 1 on the following page.

Table 1: Borehole Location and Ground Surface Elevations

Borehole	Northing	Easting	Latitude	Longitude	Ground Surface Elevation (m)
1	4841469	549204	--	--	423.88
2	4841374	549154	--	--	423.47
3	4841224	549288	--	--	425.06
4	4841099	549416	--	--	425.67
5	4841204	549414	--	--	427.34
6	4841366	549376	--	--	427.33
7	4841325	549274	--	--	425.35

4. Subsurface Conditions

Full details of the soil conditions encountered in each borehole are given on the Borehole Logs, Enclosures 2 to 10, inclusive and the following notes are intended to summarize this data.

A layer of **topsoil**, about 200 to 250mm thick, was encountered at the surface of all boreholes. The topsoil consisted of sandy silt, trace gravel, scattered organic inclusions. It was black to dark brown in colour.

The topsoil is considered to be in a generally loose to compact state of compactness and in a moist condition.

It should be noted that the thickness of topsoil may vary significantly between borehole locations and should not be relied upon to estimate the quantity of topsoil for removal.

A layer of discontinuous **sandy silt till** was encountered below the topsoil in Boreholes 1 to 4, inclusive to depths of 1.5 and 1.9 metres below grade. The sandy silt was dark brown to brown in colour and consisted of trace to some gravel, organic inclusions in upper zone. Standard Penetration tests in the sandy silt gave N-values ranging between 5 and 15 blows/300mm. The natural moisture content was found to range between 9 and 21%.

Based on the test results and visual and tactile examination of the soil samples, the deposit of sandy silt till is considered to be in a generally loose to compact state of compactness and in moist condition.

Below the topsoil in Boreholes 5 to 7, and the sandy silt till in Boreholes 1 to 4, respectively a discontinuous deposit of **silty sand** was encountered to depths of 4.5 to 7.3 metres below grade and the full depth of the investigation (i.e. 5.0 to 6.3 metres below grade). The silty sand was brown in colour and was fine grained. It contained scattered silt seams. In Borehole 7, the silty sand contained a coarse sand and gravel seam. Standard Penetration tests in this material gave N-values ranging from 2 to 73 blows/300mm. The natural moisture content was found to range from 5 to 25%.

Typical grain size distribution curves for the silty sand can be found on Enclosures 11 to12 , inclusive.

Based on the test results and visual and tactile examination of the soil samples, the deposit of silty sand is considered to be in a generally very loose to very dense state of compactness and in moist to saturated condition.

The deposits of silty sand in Boreholes 1, and 4 to 7, inclusive were underlain by a discontinuous deposit of **sandy silt till** extending to the full depth of the investigation (i.e. 5.2 to 25.3 metres below grade). The sandy silt till was brown to grey in colour and consisted of trace clay, trace to some gravel inclusions and/or occasional cobbles. Standard Penetration tests in this material gave N-values ranging from 10 to greater than 100 blows/300mm. The natural moisture content was found to range from 8 to 21%.

Typical grain size distribution curves for the sandy silt till can be found on Enclosures 13 to14 , inclusive.

Based on the test results and visual and tactile examination of the soil samples, the deposit of sandy silt till is considered to be in a compact to very dense state of compactness and in moist to wet condition.

5.0 Groundwater Conditions

Monitoring wells were installed in each of the boreholes, with additional deep monitoring wells installed at Boreholes 1 and 7. The monitoring wells were sealed with bentonite between 0.3 metres below grade and 0.3 metres above the top of well screen level, for groundwater level monitoring. Free water surfaces were measured at depths and elevations noted in Table 2 below.

Table 2: Observed Groundwater Levels

Location	Ground Elevation (m)	December 5, 2022	
		Depth Below Existing Grade* (m±)	Water Level Elevation* (m±)
MW 1 Shallow (S)	423.88	1.34	422.54
MW 1 Deep (D)	423.88	2.43	421.45
MW 2	423.47	1.23	422.24
MW 3	425.06	2.64	422.42
MW 4	425.67	2.21	423.46
MW 5	427.34	3.82	423.52
MW 6	427.33	3.88	423.45
MW 7 Shallow (S)	425.35	2.72	422.63
MW 7 Deep (D)	425.35	11.78	413.57

*Groundwater levels recorded by R.J. Burnside & Associates Ltd.

An examination of the soil samples indicated that the materials were generally moist to saturated.

It is noted that no sub-artesian water pressure was encountered in any of the boreholes.

Based on the foregoing and the moisture content profiles of the soil samples, the groundwater table at the site is considered to be located at about 1.2 to 3.8 metres below grade, Elevations 423.5m to 422.5m. The groundwater is believed to be perched within the pervious silty sand deposit between or above the sandy silt till deposits.

Seasonal fluctuation of the groundwater level should be anticipated.

6.0 Discussion and Recommendations

6.1 General

The boreholes generally encountered a surficial deposit of topsoil, followed by discontinuous deposits of sandy silt till and silty sand. The groundwater level at the site appears to range between about 1.2 to 3.8 metres below grade, with the localized groundwater table considered to be a perched condition. Seasonal fluctuation of the shallow groundwater level should be anticipated.

Final details concerning the proposed development are unavailable at the time of this report, although it is understood that the proposed development will consist of a number of buildings with associated site services, roads, parking lots and storm water management facility. Based on the foregoing, the following discussion is therefore considered preliminary. It should be reviewed when more details are available.

6.2 Site Grading

It is assumed some re-grading will be required at the site depending on the final design grades of the proposed development.

Following clearing and grubbing as required, the surficial topsoil may be removed and stockpiled for re-use and/or off-site disposal. The design site grades may be achieved by cut and fill operations. All cut and fill to support the proposed buildings, site services and pavement areas should be carried out following the procedure for “engineered fill”.

The procedure for "engineered fill" construction would consist of the following:

1. All vegetation, surficial topsoil and any other deleterious materials encountered should be removed from the proposed building areas, site services and pavement areas. Any organic, excessively wet or otherwise deleterious materials should not be used as "engineered fill" material.
2. Existing groundwater monitoring wells and/or potable water wells, if any, should be properly decommissioned in accordance with the Ontario Water Resources Act, R.R.O. 1990, Ontario (O.Reg.) 903 – amended to O.Reg. 128/03.
3. The exposed subgrade should be proof rolled with a heavy-duty equipment, such as a loaded dump truck, and examined by geotechnical personnel from JLP. Any loose or soft areas encountered during the proof-rolling process should be further sub-excavated and replaced with approved on-site or imported soil material compacted to a minimum of 98% of the Standard Proctor Maximum Dry Density (SPMDD).
4. Low areas can then be brought up to the design pre-grade level with approved on-site or imported soil material placed in maximum 200mm thick lifts and compacted to a minimum of 98% of the SPMDD.
5. Moisture conditioning should be applied to the approved on-site and/or imported soil materials for effective compaction. Some of the on-site soil materials may require air drying before they can be properly compacted.
6. The "engineered fill" under all structures to be supported should extend to at least 1.0 metre laterally beyond the edge of their perimeter at the founding level and at least a distance equal to the depths of the fill pad, at the level of the approved subgrade.
7. Temporary fill slopes should be no steeper than 1 vertical to 2 horizontal and should be protected from surface erosion.
8. All imported fill materials should be assessed by JLP prior to transport to the site in accordance with the "On-Site and Excess Soil Management Regulation", O.Reg. 406/19 and supporting amendments.
9. All imported fill materials should be free from organics and debris and should be tested geotechnically by JLP prior to transport to the site.

10. All topsoil and unsuitable material removal, subgrade preparation, fill placement and compaction should be monitored on a full-time basis by geotechnical staff from JLP to approve materials and to verify that the specified degree of compaction have been achieved.
11. The "engineered fill" should be in place at least three months prior to the construction of buildings over it to minimize potential settlement.

6.3 Site Services

The inverts of the proposed site services are not available at the time of this report. However, it is expected that the sanitary sewer, storm sewer and watermain inverts will be located at depths ranging between 2 and 4 metres below the finished grades. All sewers and watermains should be protected from frost actions by at least 1.4m of soil cover or equivalent thermal insulation.

Reference to the Borehole Logs indicates that the subgrade will consist of native sandy silt till, silty sand in generally compact state or "engineered fill" constructed during site grading. The subgrade will generally provide adequate support for the pipes and allow the use of OPSD 802.010 and/or OPSD 802.031 Class 'B' bedding using OPSS.MUNI 1010 Granular 'A' material.

Clear crushed stone should <u>not</u> be used as bedding as fine-grained particles may migrate into the voids of the stone and cause undesirable settlements. Where the exposed subgrade is less competent than the materials identified in the Borehole Logs, the bedding thickness may have to be increased.

If the trench excavation is above the observed groundwater level, the sides of the open cut excavation should either be cut back at a side slope of 1 vertical to 1 horizontal or supported with trench box or temporary shoring system.

If the trench excavation is below the observed groundwater level, construction dewatering by means of pumping from sump within the excavation or by pumping from well-points may be required to lower the groundwater level to at least 600 mm below the bottom of the trench to

facilitate construction. The sides of the open cut excavation should either be cut back at a side slope of 1 vertical to 2 horizontal or supported with trench box or temporary shoring system. The excavated materials will be generally suitable for re-use as trench backfill provided that they are free of topsoil, organic material and cobbles/boulders. If the on-site materials become wet, they should be air dried prior to re-use as trench backfill. The trench backfill should be placed in maximum 300mm thick layers and uniformly compacted to at least 95% of its Standard Proctor Maximum Dry Density (SPMDD).

The backfill around maintenance holes, catchbasins, valve chambers, thrust blocks and/or service connections should consist of free-draining granular material, such as the OPSS Granular 'B' Type I material and compacted to a minimum of 95% of its SPMDD.

To minimize potential problems and wetting of the subgrade material, backfilling operations should follow closely after excavations, so that only a minimal length of trench is exposed at a time. Should construction be carried out in the winter season, particular attention should be given to make sure no frozen material is used for backfill.

Cobbles and/or boulders may be present in the native sandy silt till deposit, and some difficulty or delays may be anticipated during excavation. Cobbles and/or boulders with nominal diameter larger than 150mm should <u>not</u> be re-used as trench backfill.

6.4 Storm Water Management Facility

Grain size distribution curves were prepared for representative samples of the subsoils obtained at the boreholes. These grain size distribution analyses were performed following applicable ASTM laboratory procedures and are found on Enclosures 11 to 14, inclusive.

The grain size distribution curves were compared to the family of curves presented in the Supplementary Standard SB-6 of the 2012 Building Code Compendium. According to the Unified Soils Classification System and taking into consideration the specific physical nature of the soils, the samples in question are considered to have the properties noted in the following Table 3.

Table 3: Soil Permeability and T-time Estimation

Sample Number	Material					Unified Soils Classification Group	Estimated Co-efficient of Permeability (k) (cm/sec)	Estimated T-time (min/cm)
	Description	Gravel (%)	Sand (%)	Silt (%)	Clay (%)			
BH1/SS6	Silty Sand	-	84	15	1	(SM)	10^{-3} - 10^{-5}	10
BH1/SS12	Sandy Silt Till	4	34	57	5	(ML)	10^{-5} - 10^{-6}	40
BH7/SS7	Silty Sand	-	72	25	3	(SM)	10-3 - 10-5	15

If a storm water management pond is to be constructed for the proposed development, a low permeability liner may be required to maintain a permanent wet pond. The low permeability liner may be constructed with a minimum 1m thick layer of clayey soils conforming to OPSS.MUNI 1205 requirements. Alternatively, a geosynthetic clay liner, such as Bentofix CNSL, or a synthetic liner, such as Nilex Geomembrane PVC 40 mil or similar products, may be used.

If a geosynthetic or synthetic liner is used, a minimum 300mm thick marker layer should be placed above the liner as an indicator/protective soil cover. The liner should be installed as per manufacturer's guidelines and up to a minimum of 0.6m above the design flood level in the pond. An underdrainage system may be required to relieve the hydrostatic uplift against the liner if the bottom of pond is lower than the highest observed groundwater level in the vicinity of the pond.

6.5 Pavement Design and Construction

All topsoil and any deleterious materials encountered should be stripped from the proposed road pavement areas. The exposed subgrade should be re-compacted from the surface to at least 98% of its standard Proctor maximum dry density (SPMDD) prior to construction of the road pavement. Any loose areas which are detected should be sub-excavated and backfilled with approved imported granular fill. All granular fill materials should be placed in 150 to 200mm thick lifts and compacted to 100% of the SPMDD.

Considering the probable traffic requirements, subgrade conditions and a functional design life of 25 years, the following pavement structure designs are recommended:

Table 4: Recommended Pavement Structures

Pavement Components	Passenger Car Parking (Light Duty) (mm)	Driveway/Fire Route (Medium Duty) (mm)
Asphaltic Concrete – HL3	40	40
Asphaltic Concrete – HL4	50	50
Granular 'A' Base Course	150	150
Granular 'B' Type II Modified Subbase Course	250	450

The granular base and sub-base materials should meet Ontario Provincial Standard Specification OPSS.MUNI.1010 and local requirements and should be compacted to 100% of the Standard Proctor Maximum Dry Density (SPMDD) as per OPSS.MUNI.501 requirements. The asphaltic concrete should conform to OPSS.MUNI.1150 and should be compacted to a minimum of 92.0% of the Maximum Relative Density (MRD) as per OPSS.MUNI.310 requirements.

Frequent inspections by geotechnical personnel from JLP Services Inc. should be carried out during construction to verify the compaction of the subgrade, base courses and asphaltic concrete by in-situ density testing using nuclear gauges.

6.6 Building Foundations

The proposed buildings to be constructed at the site are assumed to be primarily slab-on-grade structures with or without basements. The proposed buildings can be supported on spread footings founded a minimum of 0.2m into the native undisturbed sandy silt till or silty sand in compact state of compactness or into the properly constructed "engineered fill" and designed to a geotechnical reaction of 150 kPa at Serviceability Limit States (S.L.S.) and a factored geotechnical resistance of 225 kPa at Ultimate Limit States (U.L.S.).

All exterior footings or footings in unheated areas should be located at least 1.4 metres below finished grade or provided with equivalent thermal insulation for adequate frost protection.

Elevation differences between adjacent footings should not be more than a half of the horizontal distance between them.

It is estimated that the total and differential settlements of spread footings designed to these bearing pressures will be less than 25mm and 20mm respectively, which are normally considered acceptable for the proposed structure.

It is recommended that all foundation excavations be inspected by geotechnical personnel from JLP to ensure the founding soils are similar to those identified in the boreholes or are competent "engineered fill" and that they are capable of supporting the design bearing pressures.

Based on the 2012 Building Code Compendium, the classification of soils for seismic design should be based on the average properties of the top 30 metres of the soil profile. The depth of the deepest borehole was 25.3 metres below existing grade and was terminated in very dense sandy silt till. Assuming this deposit extends to depth, the soils at the site may be classified as Site Class 'D' under the site classification for seismic site response of 2012 Building Code Compendium.

6.7 Basement Walls

The basement walls, if constructed, of the proposed buildings may be designed to resist lateral earth pressures and the magnitude of which can be determined from the equation below:

$$p = K(\gamma d + q)$$

where;

p	=	lateral earth pressure, kN/m^2
K	=	active earth pressure coefficient, K = Ka = 0.33, if retaining structure is permitted to move, otherwise, K = Ko = 0.50
γ	=	bulk unit weight of backfill, use 21 kN/m^3
d	=	depth below finished grade, metres
q	=	adjacent surcharge acting close to the wall, kN/m^2

The above equation assumes that there is no hydrostatic pressure build up against the basement walls. As such, the basement walls should be dampproofed and protected with a synthetic vertical drainage layer. A perimeter subdrain system should be installed at footing level outside the building envelope to facilitate drainage. The perimeter subdrain system should consist of 150mm diameter perforated pipe surrounded with a minimum of 300mm of 19mm clear stone all wrapped with a filter fabric, such as Texel 100C or other products with equivalent apparent opening size (AOS).

Water collected in the perimeter drainage system should be directed to the local storm drainage system either by gravity or by a permanent sump pump. Surface runoff around the proposed buildings should be directed away from the building.

Alternatively, the basement walls and floors can be sealed tight using waterproofing systems and designed to resist full hydrostatic pressures.

6.8 Floor Slabs

All topsoil and any deleterious materials encountered should be stripped from the proposed building areas. Any loose material encountered should be sub-excavated and replaced with approved fill. The exposed subgrade should be re-compacted from the surface to a minimum of 98% of the Standard Proctor Maximum Dry Density (SPMDD).

Backfill around the footings and basement walls should be compacted to a minimum of 98% of the SPMDD. The backfill should consist of approved imported granular materials, such as OPSS Granular 'B' Type I (natural sand, some gravel). All fills should be placed in 150 to 200mm thick lifts and compacted to a minimum of 95% of the SPMDD.

A layer of free-draining material, such as OPSS 1010 Granular 'A' or OPSS.MUNI 1004 19mm Clear Stone should be placed under the floor slabs to provide a uniform bearing surface and act as a moisture barrier. This layer should be at least 150mm thick and in the case of Granular 'A' compacted to at least 100% Standard Proctor maximum dry density or in the case of 19mm Clear Stone, nominally compacted in thin lifts.

The basement floors should be located at least 0.5 metres above the highest observed groundwater level, otherwise sub-floor drainage systems together with continual pumping from the drainage systems will be required.

Around the perimeter of the proposed buildings, the ground surface should be sloped on a positive grade away from the structure to promote surface water run-off and reduce groundwater infiltration adjacent to the foundations.

Frequent field review and testing by geotechnical personnel from JLP should be carried out during construction to verify the competency of the subgrade and compaction of granular base and/or backfill by in-situ density testing using nuclear gauges.

6.9 Excavation and Groundwater Control

Excavation to reach the footing founding levels will likely extend to about 1.4 metres below design pre-grades. Excavations must be carried out in accordance with the current Occupation Health and Safety Act (OHSA) and local regulations. For guidance, the side slopes should be cut back to 1 vertical to 1 horizontal as the native sandy silt till, silty sand or "engineered fill" using native soils as fill are considered to be Type 3 soils within the meaning of the OHSA.

Minor seepage from perched water in the native soil deposits or "engineered fill" should be anticipated during construction. However, it should be possible to control and remove seepage water from these sources or surface water from precipitation by pumping on as and where required basis.

7.0 Statement of Limitation

The Statement of Limitation including the Terms and Conditions of this report is presented on Appendix 'A' is an integral part of this report.

8.0 Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

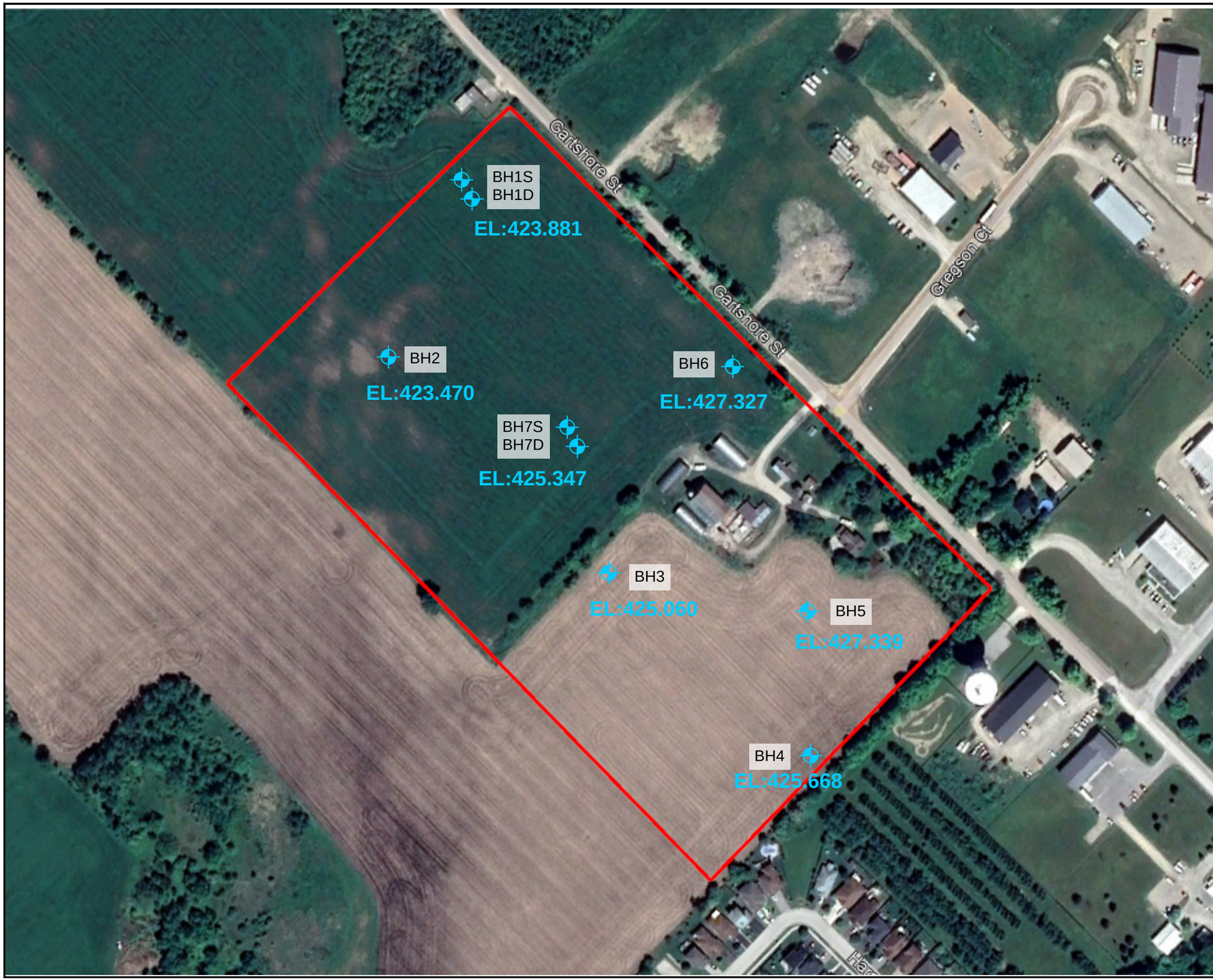
JLP Services Inc.

LICENSED PROFESSIONAL ENGINEER
Dec 19, 2022
A. H-M. LEE
PROVINCE OF ONTARIO

J. Board, B.A.
General Manager

Alexander Lee, M.Sc. (Eng.), P.Eng.
Senior Geotechnical Engineer

Enclosures



Legend

- Project Area
- Borehole (JLP, 2022)
- Borehole with Monitor (JLP, 2022)

N

Notes:
1. The soil types and boundaries are applicable only at the location of the boreholes. Between boreholes, they are assumed and may change substantially. The topsoil thicknessess quoted in the report are used for discussion purposes only and should not be used for estimating purposes.
2. The Ground Surface elevations at the borehole locations were derived from the Temporary Benchmark (TBM) as shown.
3. The soil samples will be retained for three months from the date of issue of the final report and then discarded, unless the client has requested to extend the storage period wit fees.

JLP
Geotechnical & Environmental Consultants

Borehole Location Plan
Site Development, Operation Centre
965 Gartshore Street
Fergus, Ontario

Date: Dec 19, 2022	Ref. No. G4599-22-11	
Prepared By: CL	Checked By: AJ	FIG. No. 3
Source: Google Earth	Scale: N.T.S.	

BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 26-10-22 **COMPLETED** 26-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.43 m / Elev 421.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining. (0.3)	SS 1	1-3-4-6 (7)					
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining.	SS 2	3-2-3-4 (5)					
422	2		(1.9) **SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.	SS 3	2-3-9-9 (12)					
				SS 4	3-6-5-4 (11)					
421	3			SS 5	2-6-5-10 (11)					
420	4			SS 6	4-7-10-17 (17)					
419	5			SS 7	9-23-50 (73)					
418	6		(6.3) **SANDY SILT TILL** trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining.	SS 8	9-12-48-42 (60)					
417	7									
416	8			SS	19-29-32-31					

(Continued Next Page)

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BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

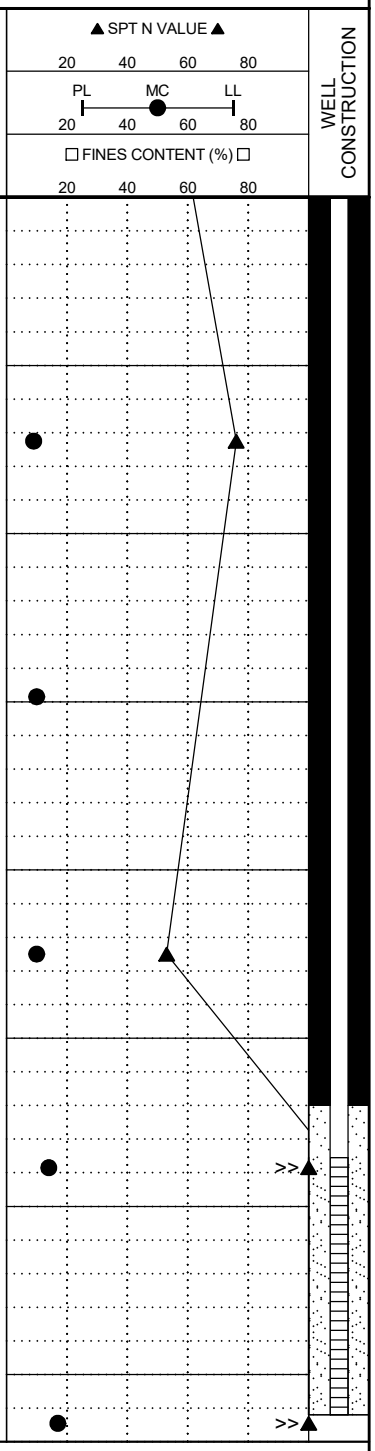
CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining. *(continued)*		9	(61)			
415	9				SS 10	23-32-44-50 (76)			
414	10								
413	11				SS 11	40-50			
412	12								
411	13				SS 12	24-33-20-47 (53)			
410	14				SS 13	50/0.10			
409	15			15.3	SS 14	50/0.10			



WELL CONSTRUCTION

End of Borehole at 15.34 mbgs.

BORING NUMBER BH1S

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.34 m / Elev 422.54 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining.	0.3							
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining.								
422	2			1.9							
			SILTY SAND fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.								
421	3										
420	4										
419	5										
				5.2							

End of Borehole at 5.18 mbgs.

JLP Services Inc., www.jlpservices.ca

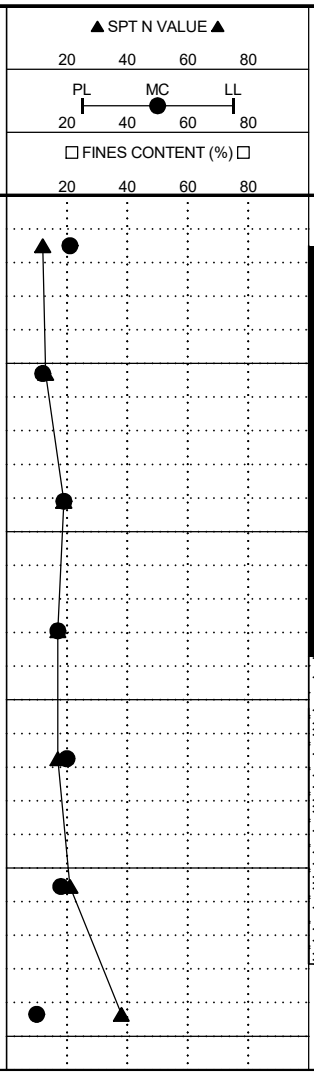
BORING NUMBER BH2

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.47 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.23 m / Elev 422.24 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
423			**TOPSOIL** sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining.	0.3	SS 1	2-4-8-8 (12)			
	1		**SANDY SILT TILL** trace to some gravel inclusions; dark brown to brown, moist, compact no odour, no staining.		SS 2	3-4-9-7 (13)			
422				1.7	SS 3	7-8-11-10 (19)			
	2		**SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact no odour, no staining.						
421					SS 4	6-7-10-11 (17)			
	3								
420					SS 5	5-7-10-11 (17)			
	4				SS 6	5-8-13-13 (21)			
419									
	5			5.0	SS 7	8-19-19-15 (38)			
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, dense no odour, no staining.	5.2					

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

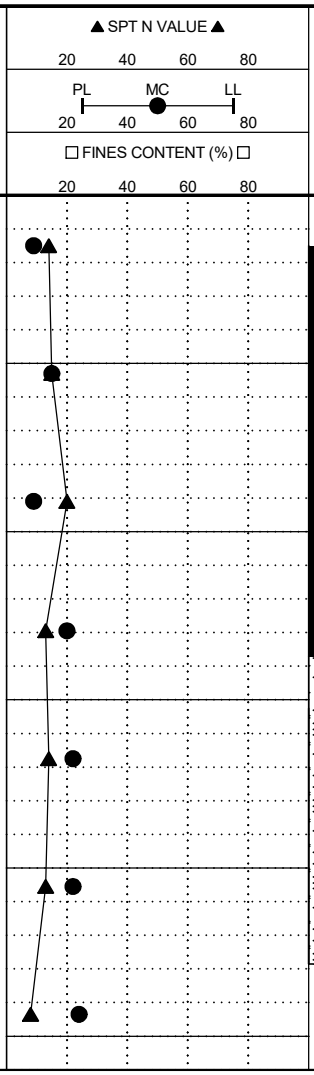
BORING NUMBER BH3

JLP Geotechnical & Environmental Consultants

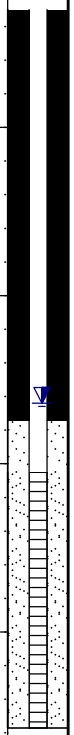
CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.06 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.64 m / Elev 422.42 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
425			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-5-9-12 (14)			
424	1		**SANDY SILT TILL** trace to some gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining.	1.6	SS 2	9-10-5-6 (15)			
423	2		**SILTY SAND** fine to medium grained; brown, moist to wet, compact to loose no odour, no staining.		SS 3	7-11-9-8 (20)			
					SS 4	4-5-8-5 (13)			
422	3				SS 5	5-6-8-4 (14)			
421	4				SS 6	6-6-7-6 (13)			
420	5		becoming grey at 5.0m	5.2	SS 7	4-3-5-5 (8)			

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION



JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH4

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.668 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.21 m / Elev 423.46 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining. (0.2)	SS 1	2-5-7-5 (12)					
425	1		**SANDY SILT TILL** trace gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining. (1.5)	SS 2	3-5-8-7 (13)					
424	2		**SILTY SAND** fine to medium grained; brown, wet to saturated, compact to loose no odour, no staining.	SS 3	4-5-5-5 (10)					
423	3			SS 4	4-5-5-7 (10)					
422	4			SS 5	2-2-7-4 (9)					
			becoming grey at about 4.1m (4.5)	SS 6	4-10-8-4 (18)					
421	5		**SANDY SILT TILL** trace to some clay,trace gravel inclusions, scattered sand seams; grey, wet, compact no odour, no staining. (5.2)	SS 7	3-6-4-5 (10)					

End of Borehole at 5.18 mbgs.

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH5

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.339 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.82 m / Elev 423.52 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-3-5-5 (8)					
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	3-2-2-1 (4)					
426											
	2				SS 3	3-4-5-6 (9)					
425					SS 4	4-6-7-8 (13)					
	3										
424					SS 5	7-12-11-12 (23)					
	4										
423				4.8							
	5		**SANDY SILT TILL** trace to some gravel inclusions; grey, moist, compact no odour, no staining.	5.2	SS 6	8-14-13-18 (27)					

End of Borehole at 5.18 mbgs.

JLP Services Inc., www.jlpservices.ca

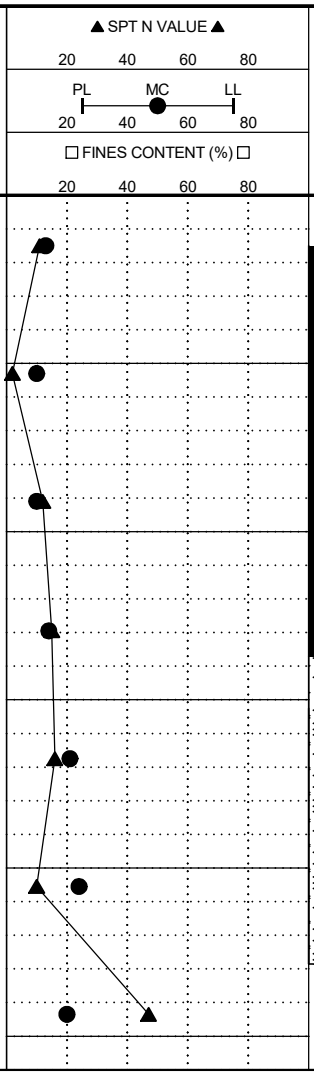
BORING NUMBER BH6

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.327 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.88 m / Elev 423.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.3	SS 1	1-5-6-4 (11)			
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	2-1-1-1 (2)			
426									
	2				SS 3	1-5-7-9 (12)			
425					SS 4	3-6-9-7 (15)			
	3								
424					SS 5	5-8-8-10 (16)			
	4				SS 6	4-4-6-7 (10)			
423				4.7					
	5		**SANDY SILT TILL** trace to some gravel inclusions; brown, moist, dense no odour, no staining.	5.2	SS 7	13-19-28-37 (47)			

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

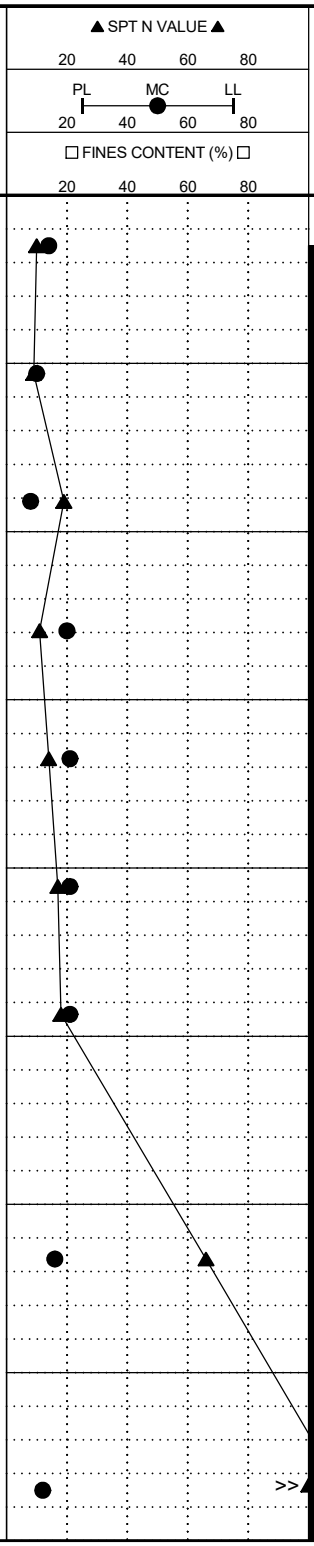
JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 24-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AK **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 11.78 m / Elev 413.57 m

ELEV. (m)	DEPTH (m)	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
425		**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining. (0.2)	SS 1	2-4-6-6 (10)			
	1	**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.	SS 2	5-4-5-6 (9)			
424			SS 3	7-9-10-10 (19)			
	2						
423			SS 4	3-5-6-6 (11)			
	3						
422			SS 5	5-6-8-7 (14)			
	4		SS 6	3-8-9-9 (17)			
421							
	5		SS 7	8-8-10-8 (18)			
420							
	6						
419		sand and gravel, some silt, coarse grained, clayey seams; wet	SS 8	18-16-50 (66)			
	7						
418		(7.3) **SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining.	SS 9	50/0.10			
	8						



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

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BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
417			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	9									
416				SS 10	50/0.13				>>	
	10									
415										
	11			SS 11	41-50					
414										
	12									
413				SS 12	50/0.10				>>	
	13									
412										
	14			SS 13	45-45-50 (95)					
411										
	15									
410				SS 14	16-16-50 (66)					
	16									
409										
	17			SS 15	50/0.13				>>	

(Continued Next Page)

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
408			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	18									
407				SS 16	50/0.13				>>	
	19									
406										
	20			SS 17	50/0.13				>>	
405										
	21									
404				SS 18	50/0.13				>>	
	22									
403										
	23			SS 19	50/0.13				>>	
402										
	24									
401				SS 20	50/0.13				>>	
	25									
			25.3	SS 21	40-50					

End of Borehole at 25.3 mbgs.

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BORING NUMBER BH7S

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.72 m / Elev 422.63 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
425			**TOPSOIL** 0.2 sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.							
	1		**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.							
424										
	2									
423										
	3									
422										
	4									
421										
	5		5.2							

End of Borehole at 5.18 mbgs.

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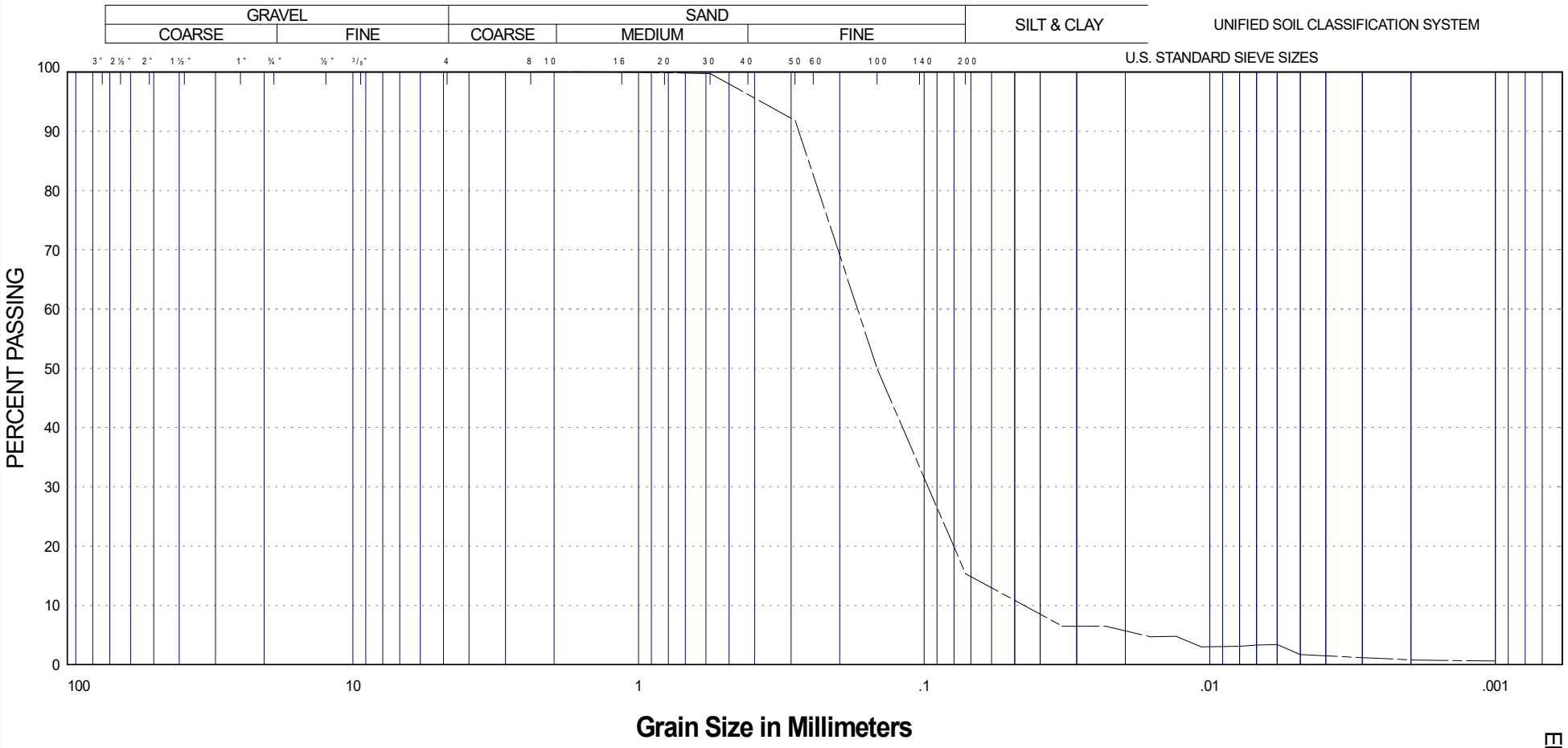
GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 1

SAMPLE N°: 6

DEPTH: 3.8 - 4.4 m±

ELEVATION: 420.1 - 419.5 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SAND, some silt

PLASTIC PROPERTIES

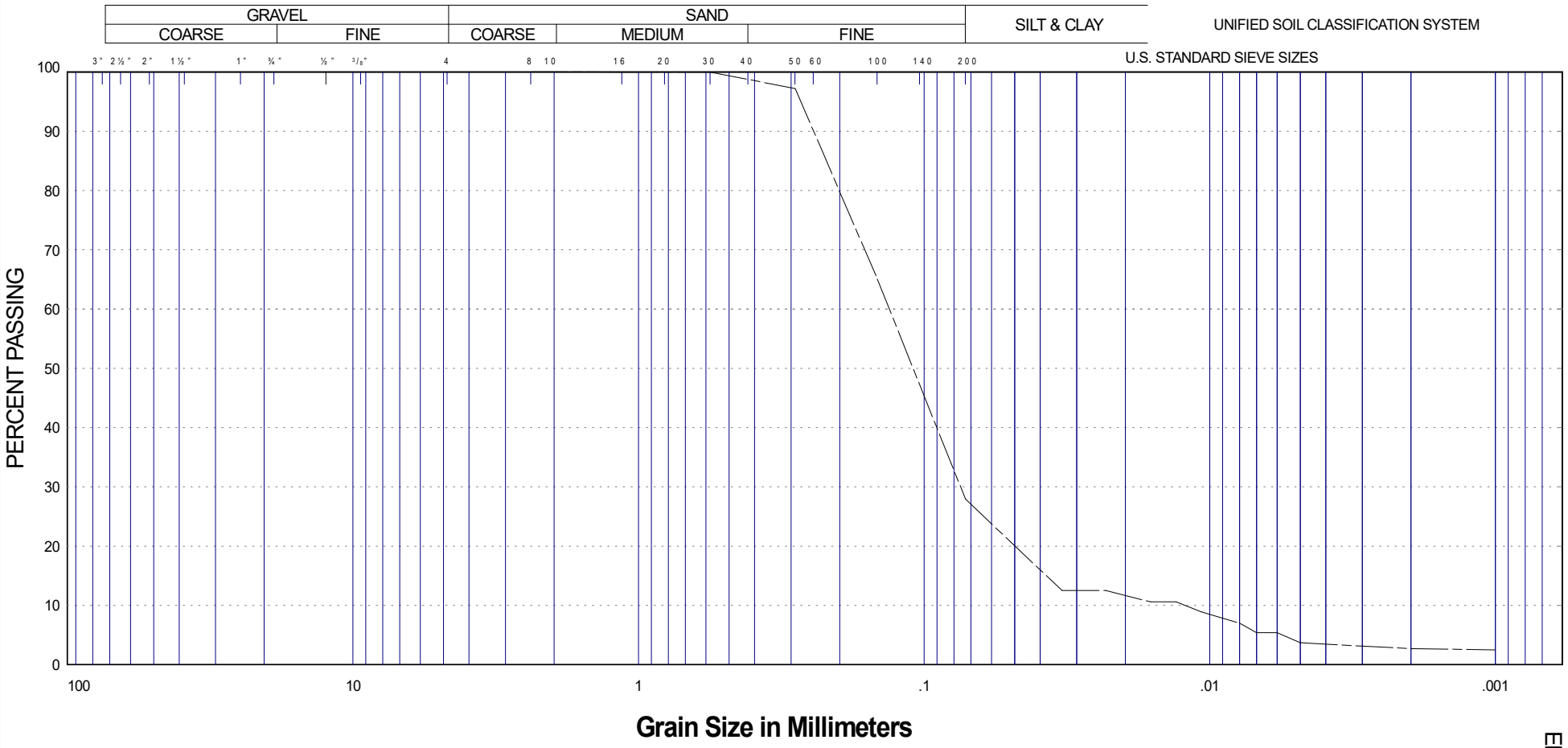
LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 18.6

ENCLOSURE N° 11

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 7

SAMPLE N°: 7

DEPTH: 4.6 - 5.2 m±

ELEVATION: 420.8 - 420.2 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILTY SAND, trace clay

PLASTIC PROPERTIES

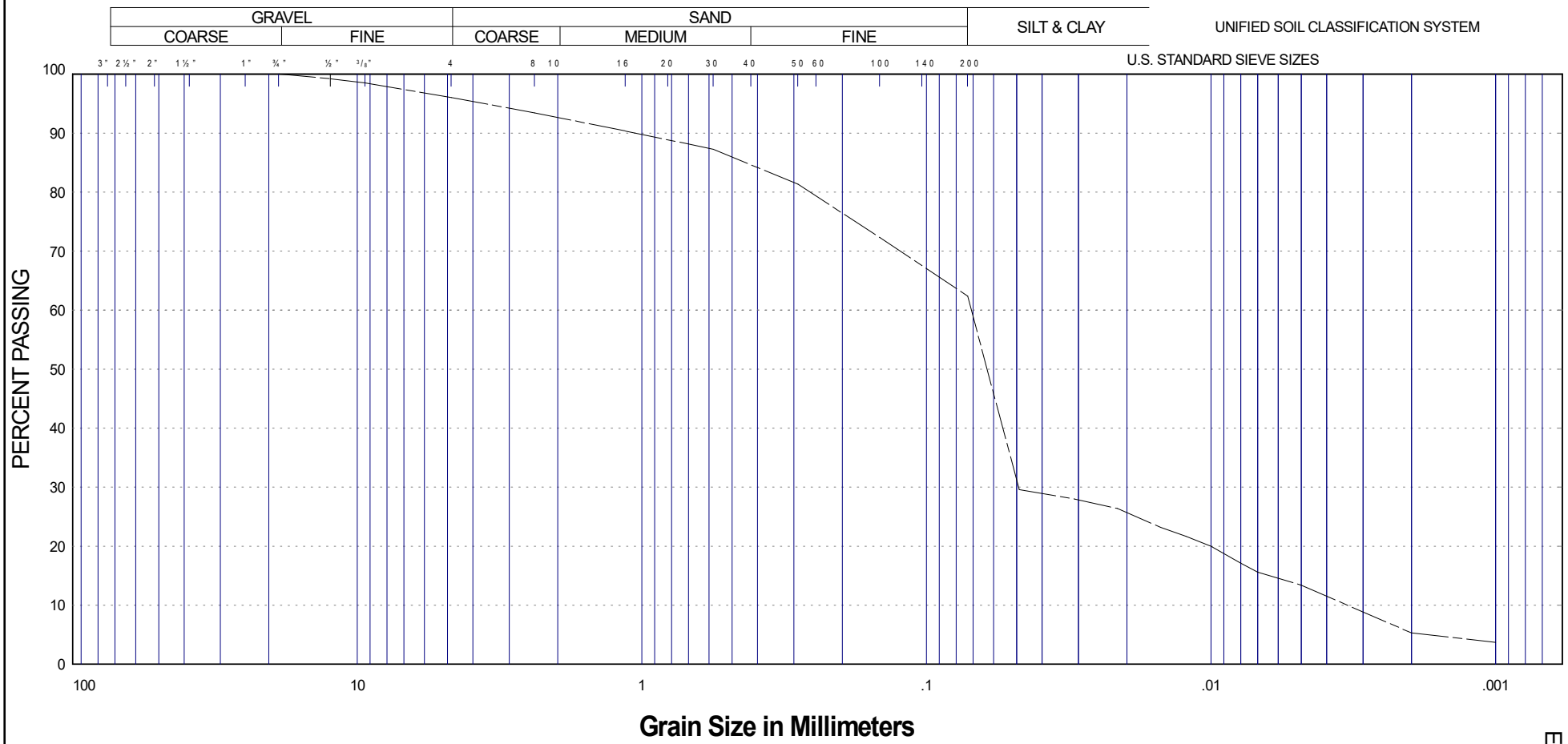
LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 20.0

ENCLOSURE N° 12

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 1

SAMPLE N°: 12

DEPTH: 12.2 - 12.8 m±

ELEVATION: 411.7 - 411.1 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SANDY SILT, trace clay, trace gravel (ML)

PLASTIC PROPERTIES

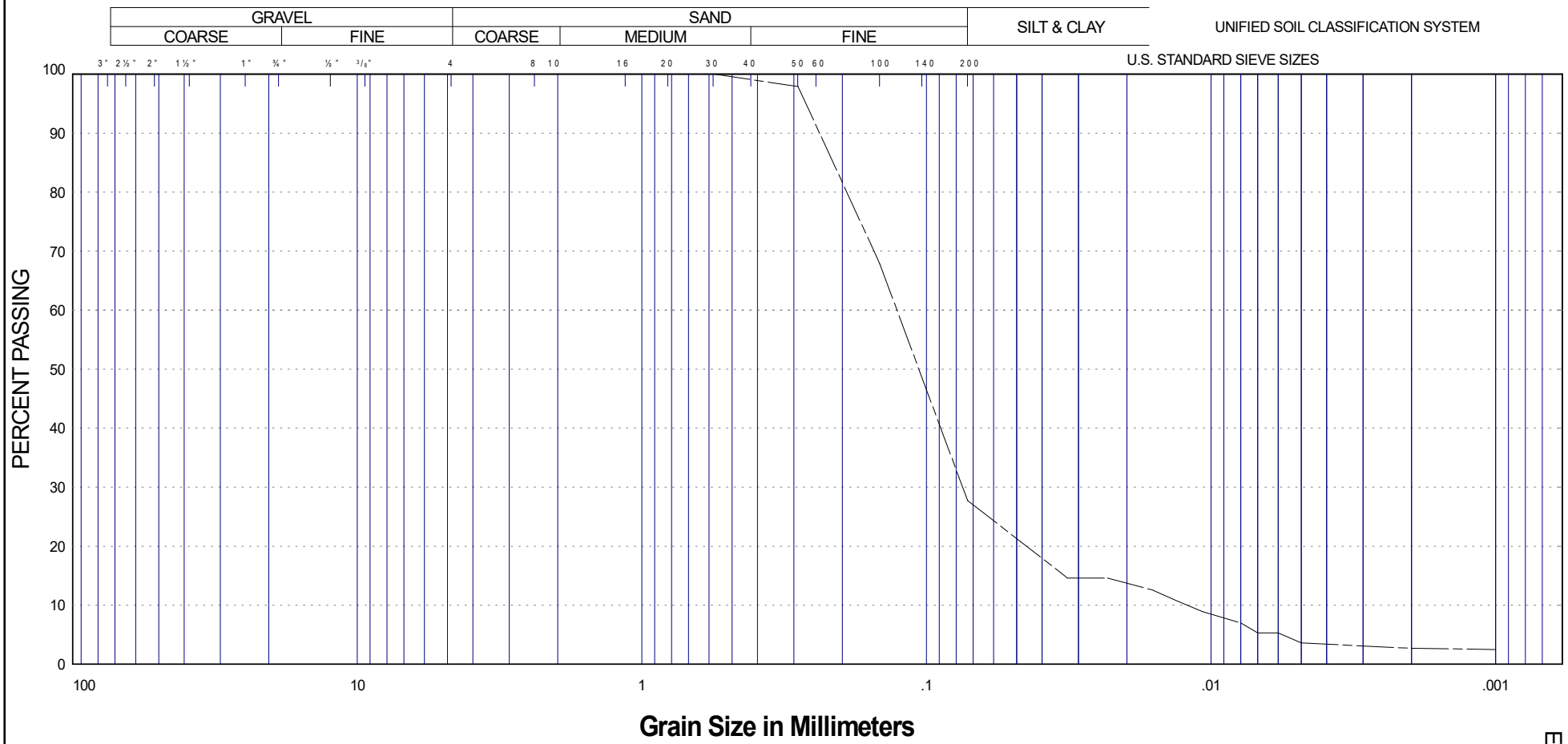
LIQUID LIMIT	% = 10.6
PLASTIC LIMIT	% = 9.2
PLASTICITY INDEX	% = 1.4
MOISTURE CONTENT	% = 10.0

ENCLOSURE N° 13

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 7

SAMPLE N°: 15

DEPTH: 16.8 - 17.4 m±

ELEVATION: 408.6 -408.0 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILTY SAND, trace clay (SM)

PLASTIC PROPERTIES

LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 21.5

ENCLOSURE N° 14

JLP SERVICES INC.

Appendix A – Limitations and Use of Report

REPORT TERMS AND CONDITIONS

NOTICE: THE FOLLOWING PROVISIONS SET FORTH IMPORTANT QUALIFICATIONS AND LIMITATIONS ON THE FINDINGS AND RECOMMENDATIONS IN THE REPORT AS WELL AS THE USE OF, AND RELIANCE ON, THE REPORT.

1. **DEFINITIONS**. The following capitalized terms have the following meanings:

(a) "**Additional Investigations**" means investigations that JLP has indicated to the Client should be undertaken to take into account any Out-of-Scope Requirements, but that are not otherwise specifically within the scope of investigations conducted for the purpose of the Report.

(b) "**Applicable Laws**" means and includes without limitation all applicable provincial laws, regulations, guidelines, policies, standards, protocols, and objectives administered by the Ministry of the Environment and Climate Change or any other duly-constituted governmental authority, all as in force as of the date of the Report.

(c) "**Client**" means the Client as referred to in the Report.

(d) "**Client Information**" means the information, representations, and instructions provided by the Client, the Client's representatives, and/or others and upon which the Report is based, in whole or in part.

(e) "**Findings**" means the evaluations and conclusions set forth in the Report.

(f) "**JLP**" means JLP Services Inc.

(g) "**Out-of-Scope Requirements**" means special concerns or requirements of the Client in respect of the subject matter of the Report.

(h) "**Recommendations**" mean the findings and recommendations referred to in the Report, taking into account any Out-of-Scope Requirements that were disclosed to JLP prior to the date of the Report.

(i) "**Report**" means the report to which these Terms and Conditions are attached and form part.

(j) "**Report Documents**" means the underlying documents, records, data, and files, in any medium whatsoever, generated in connection with the preparation of the Report, including without limitation, the instructions and objectives communicated to JLP by the Client, communications between JLP and the Client, and other reports, proposals, or documents prepared by JLP for the Client in connection with the Site.

(k) "**Site**" means the site in respect of which the Report was prepared.

(l) "**Site Conditions**" means Site conditions known as a result of, or reasonably imputed by, the investigations that were undertaken as of the date of the Report.

2. **BASIS OF REPORT**. The Report is based on the Site Conditions. Any changes to the Site Conditions after the date of the Report that could or will affect the Site Conditions may or will have a corresponding effect on the Recommendations. The Report does not take into account any (a) Additional Investigations that were not undertaken, or (b) Out-of-Scope Requirements that were not communicated prior to completion of the investigations that were been undertaken as of the date of the Report. Where recommended field services are referred to, they are the minimum services necessary to determine compliance of construction with Applicable Laws,

generally accepted industry-standard practices, and the Recommendations.

3. **RELIANCE & USE**. The Report has been prepared only for the Site and the related design, development, building, or building assessment objectives identified by the Client. The Findings and Recommendations are based on the Site Conditions and the Client Information. In preparing the Report, JLP has relied upon the Client Information and disclaims any responsibility for any inaccuracy, misstatement, omission, unintentional misrepresentation, or other deficiency contained in the Report as a result of such reliance. Unless specifically stated otherwise, the applicability and reliability of the Findings and the Recommendations expressed in the Report are only valid to the extent that (a) there has been no material change to or variation from any of the Client Information, (b) the Client Information contains no untrue statement of a material fact, or (c) the Client Information omits no statement of a material fact necessary in order to make the Client Information not misleading.

   The Report and the Findings and Recommendations are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the prior written consent of JLP, which may be arbitrarily withheld or conditioned.

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4. **STANDARD OF CARE**. The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances. No other warranty, expressed or implied, is made or intended in the Report. It is intended that the Findings and Recommendations are meant to assist in reducing the Client's risk associated with environmental impairment at the Site. The Report should not be considered risk mitigation.

5. **ENTIRE REPORT**. The Report also includes the Report Documents. In order to properly understand the Findings and Recommendations, reference must be made to the Report in its entirety. JLP is not responsible for use by any party of a part of the Report only.

6. **GOVERNING FORMAT**. Notwithstanding that JLP may have submitted an electronic version of the Report or any document forming part of the Report, only the signed and sealed physical copy of the Report shall be deemed to be the original and in the event of any dispute or discrepancy, the physical copy shall govern. JLP makes no representation about the compatibility of its electronic or digital file format with the Client's current or future software and/or hardware systems. The documents described herein are JLP's instruments of professional service and shall not be altered without the written consent of JLP.

7. **GENERAL LIMITATIONS**.

   (a) Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

   (b) The Report contains no opinion or determination as to any matters governed by laws other than the laws of the Province of Ontario and the federal laws of Canada applicable therein as of the date hereof.

   (c) During any future development of the Site, conditions not observed during JLP's investigations may become apparent. If this occurs, JLP should be contacted to assess the situation and whether there is a need for additional testing.

BURNSIDE

Centre Wellington Operations Centre Hydrogeological Assessment 965 Gartshore Street Fergus, Ontario

Township of Centre Wellington Fergus, Ontario

Centre Wellington Operations Centre
Hydrogeological Assessment
965 Gartshore Street
Fergus, Ontario

Township of Centre Wellington
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Record of Revisions

Revision	Date	Description
-	May 16, 2023	Initial Submission

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Township of Centre Wellington (Township) to complete a hydrogeological assessment for the proposed new Operations Centre to be located at 965 Gartshore Street in Fergus (herein referred to as the subject lands). The hydrogeological assessment is being completed as part of background studies to support the design and construction of the new facility. The subject lands are located west of Gartshore Street between the intersections with Sideroad 10 and Glengarry Crescent. The location of the subject lands is illustrated in Figure 1 and Figure 2.

1.1 Scope of Work

The scope of the hydrogeological assessment involved a review of available regional information as well as the completion of site-specific investigations as described below:

1. Review of published geological and hydrogeological information: A review of background material for the area, including topography, surficial geology and bedrock geology mapping and existing geotechnical and hydrogeological reports and source protection mapping was completed to assess the regional hydrogeological setting.

2. Review of the Ministry of the Environment, Conservation and Parks (MECP) water well records: The MECP maintains a database that provides geological records of water supply wells drilled in the province. A list of the available MECP water well records for local wells is provided in Appendix A and the well locations are plotted on Figure 11. It is noted that the well locations listed in the MECP records are approximations only and may not be representative of the precise well locations in the field. These well data were compiled and mapped to characterize the local groundwater resources and assess potential impacts to the local private wells from development of the subject lands.

3. Install groundwater monitoring network: Groundwater monitoring locations were established to characterize seasonal variations in the water table in both the shallow and deep aquifers. A total of nine boreholes were drilled at seven locations and all were completed as monitoring wells (5 cm diameter) to determine the local stratigraphy and site-specific soil and groundwater conditions of the subject lands. Two monitoring well nests (two wells of different depths at the same location) were installed to assess vertical gradients. The locations of the monitoring wells are shown on Figure 2 and monitoring well construction details are provided on the borehole logs in Appendix B.

4. Hydraulic conductivity testing: Burnside conducted single well response tests in order to determine hydraulic conductivity. Single well response tests were conducted at three groundwater monitoring wells (BH2, BH3, and BH7s). The hydraulic conductivity field testing results are provided in Appendix C.

5. Infiltration Testing: Sites for infiltration testing will be determined based on need and discussions with the stormwater management design engineering team. At the time of writing the testing has not been completed yet.

6. Monitoring of groundwater levels: Monitoring was completed in monitoring wells to measure the depth to the water table and assess the horizontal and vertical groundwater flow conditions. Groundwater level monitoring was completed monthly from December 2022 through May 2023. Automatic water level recorders (dataloggers) were installed in two monitoring wells and one nest (total of four wells) to document the range of groundwater fluctuations and the response of aquifers to precipitation events (BH1s/d, BH2, BH5). A barometric pressure logger was also installed on the subject lands to be used for the calibration of the datalogger results. The groundwater monitoring data and hydrographs are provided in Appendix D.

7. Water quality sampling: Water quality data was collected from two monitoring wells (BH2 and BH5) to typify the water quality in the vicinity of the subject lands. The water samples were submitted to a qualified laboratory for analyses of general water quality indicators (e.g., pH, hardness, and conductivity), basic ions (including chloride and nitrate) and selected metals to characterize the background water quality at the property. The laboratory water quality data are provided in Appendix E.

8. Water balance calculations: Pre and post-development water balance calculations have been completed to assess the groundwater infiltration volumes across the study area. The local climate data and detailed water balance calculations are provided in Appendix F.

9. Data compilation, assessment of site conditions and reporting.

2.0 Physical Setting

2.1 Topography and Drainage

The subject lands are located in the physiographic region known as the Guelph Drumlin Field which is characterized by drumlins or groups of drumlins, edged with gravel terraces and swampy valleys (Chapman & Putnam, 1984). The Ontario Geological Survey online database (OGS Earth) indicates that the site features a combination of drumlinized till plains and spillways. The topographic high on the subject lands is

approximately 430 metres above sea level (masl) which occurs on the east-southeast corner of the property (Figure 3). The land slopes gently to the northwest and southwest and the lowest elevations on the subject lands are found in the northwest corner at 423 masl. The available mapping does not show any wetlands or watercourses on the subject lands however there is a Provincially Significant Wetland (PSW) located approximately 40 m north of the subject lands.

The northern edge of the subject lands is located within the GRCA regulation limit due to the PSW in this area and the site is in the in the Irvine Creek subwatershed within the jurisdiction of the Grand River Conservation Authority (GRCA). Regionally, drainage is expected to be northward towards Irvine Creek which then flows southwest to join the Grand River in Elora.

2.2 Geology

Surficial geology mapping published by the Ontario Geological Survey (2010) shows that the subject lands are underlain by glaciofluvial (sandy) deposits at the north and south ends with a band of stone-poor, carbonate-derived silty to sandy till across the centre and northern portions (Figure 4). Organic deposits are mapped just north of the subject lands in the region of the PSW. The bedrock underlying the subject lands consists of dolostone from the Guelph Formation (Figure 5).

2.3 Stratigraphy

A total of nine boreholes were drilled at seven locations and completed as monitoring wells in October 2022 to determine the local stratigraphy and site-specific soil and groundwater conditions of the subject lands (logs provided in Appendix B and locations shown on Figure 5). The boreholes indicated that the overburden stratigraphy is generally composed of layers of silty sand with pockets of sandy silt till overlying a more homogenous sandy silt till. The borehole logs generally agree with the published mapping, with the near surface materials consisting sandy sediments as expected in the north and south and sandy silt till in the central portions.

To illustrate the shallow stratigraphy of the subject lands, schematic geologic cross-sections have been prepared (Figures 7 and 8) using the MECP well records (Appendix A) and the soils information collected during drilling of boreholes and monitoring wells (Appendix B). The locations of the cross-sections are illustrated on Figure 6 along with the locations of water wells and boreholes used in the construction of the cross-sections. The cross-sections illustrate that the subject lands are underlain by overburden that is 25 to 30 m thick overlying limestone bedrock (Figures 7 and 8). Bedrock is interpreted to be found at elevations of approximately 397 masl (Figures 7 and 8).

3.0 Hydrogeology

3.1 Hydraulic Conductivity

The ability of soil to transmit groundwater is measured as its hydraulic conductivity. Hydraulic conductivity is low in poorly transmissive sediments (aquitards) and higher in more transmissive sediments (aquifers). The determination of hydraulic conductivity rates assists with the determinations of groundwater flow directions and relationships between various layers in the subsurface. There are various methods that can be used to assess soil hydraulic conductivity depending on the available instrumentation. Grainsize data and soil characteristics collected during a geotechnical investigation can be used to provide a general estimate of hydraulic conductivity. In situ bail-down or slug-testing methods are used in groundwater monitoring wells to assess site-specific hydraulic conductivity. Both methods have been used to estimate the hydraulic conductivity of the soils encountered in the boreholes completed on the subject lands as discussed below.

3.1.1 Grainsize Analysis

Representative soil samples were collected by the geotechnical consultant during drilling of boreholes and four samples were submitted for grainsize analysis.

To estimate hydraulic conductivity based on grainsize analysis, an empirical formula method known as the Hazen estimation is used. This method approximates hydraulic conductivity based on grainsize curves for sandy soils. The approximation does not strictly apply to finer grained materials; however, it is still considered useful to provide a general indication of the range of the hydraulic conductivity values. Grainsize distribution data were available for seven samples obtained from on-site wells and these data were used to obtain hydraulic conductivity values empirically using the Hazen method. The grainsize distribution graphs are provided in Appendix C-1 and the estimated hydraulic conductivity values are provided in Table 1.

Table 1: Estimated Hydraulic Conductivity Based on Grainsize Analyses

Sample ID	Depth of Sample (mbgs*)	Soil Description	% Fines	Estimated Hydraulic Conductivity (cm/s)
BH1-SS6	3.3 – 4.4	Sand, some Silt	15	2.0×10^{-3}
BH1-SS12	12.2 – 12.8	Sandy Silt	62	1.2×10^{-5}
BH7-SS7	4.6 – 5.2	Silty Sand	28	2.3×10^{-4}
BH7-SS15	16.8 –17.4	Silty Sand	28	1.4×10^{-4}

*metres below ground surface

Grainsize analyses results indicate that the sediments within the overburden range in composition from sand with some silt (15% fines) to sandy silt (62% fines). A greater amount of fines within a deposit impacts the ability of the material to transmit water and generally lowers the overall hydraulic conductivity. Groundwater flow is generally limited by fine grained sediments with lower hydraulic conductivity. Grainsize analyses completed indicate that the sediments generally consist of varying amounts of sand, silt and gravel with trace clay. The hydraulic conductivities based on grainsize analyses for the sediments is estimated in the range of 10^{-3} to 10^{-5} cm/sec.

3.1.2 Single Well Response Tests

To assess the in situ hydraulic conductivity of the sediments, single well response tests (bail-down tests and slug tests) were conducted at three monitoring wells. The results from the tests were plotted (Appendix C-2) and analyzed to calculate hydraulic conductivity of the sediments screened. A summary of the calculated hydraulic conductivities is provided below in Table 2.

Table 2: Single Well Response Testing Results

Monitoring Well	Screen Interval (mbgs)*	Formation Screened	Hydraulic Conductivity (cm/sec)
BH2	3.1 – 4.6	Silty Sand	4.0×10^{-3}
BH3	3.2 – 4.7	Silty Sand	3.5×10^{-3}
BH5	3.2 – 4.7	Silty Sand	4.0×10^{-4}
BH7s	3.3 – 4.8	Silty Sand	4.0×10^{-3}

*metres below ground surface

Single well response tests in wells screened in the silty sand indicate moderate hydraulic conductivities in the order of 10^{-3} to 10^{-4} cm/sec.

3.2 Local Groundwater Use

The community of Fergus is supplied with municipal groundwater however there are still some private water supply wells that are used in unserviced areas. A review of the MECP well records for an area of approximately 500 m surrounding the subject lands identified 19 well records. Of the 19, 6 were for water supply (domestic commercial, stock and industrial) wells and 9 records were for monitoring wells. The records for 4 wells did not indicate the purpose or use of the well. All but one of the water supply wells are completed in the bedrock at depths ranging from 35 m to 70 m. Summaries of the MECP well records are provided in Appendix A and the plotted locations have been included on Figure 11.

A municipal supply well (Fergus supply well F6) is located immediately north of the subject lands, within 15 m from the property boundary. The well record reports the

estimated capacity as 1,363 L/min (300 gpm). The subject lands are located within the wellhead protection area for well F6 and are therefore subject to various source protection policies which are discussed in Sections 5.1 and 5.2.

3.3 Groundwater Level Monitoring Results

Water levels in nine monitoring wells were recorded monthly from December 2022 through May 2023 using a water level meter. Dataloggers (automatic water level recorders) were installed at BH1s/d, BH2 and BH5 to provide continuous data (hourly readings) of water levels during the monitoring period. A barometric pressure logger was also installed to measure changes in barometric pressure. These data are used to correct the water level data by accounting for changes in atmospheric pressure.

The groundwater monitoring data show the following (refer to Figure 6 for the monitoring locations and the data tables and hydrographs in Appendix D):

- Groundwater elevations across the subject lands ranged from 422.1 masl to 425.2 masl in the shallow overburden sediments over the monitoring period (December 2022 to May 2023). Groundwater elevations in the deep overburden were in the range of 413.5 to 421.8 masl. The depth to water table ranges from ground surface to 4 m below ground in the shallow overburden and was up to 12 m below ground in the deep overburden.

- Typically, shallow wells in southern Ontario show a seasonal pattern in groundwater levels with highest levels occurring in the spring, declining throughout the summer and early fall and then rising again in the late fall/early winter. Over the monitoring period (December 2022 to May 2023), groundwater levels fluctuated by up to about 2 m, with the highest groundwater levels observed during the spring freshet (March to April 2023), which is consistent with typical seasonal patterns in the area.

- Hourly automatic water level readings (datalogger readings) collected at monitoring wells BH1s/d, BH2 and BH5 are plotted against precipitation (data from Fergus Shand Dam climate station) to determine if there is a correlation between changes in water level and the occurrence of precipitation events (Appendix D). The groundwater level data show a response to individual precipitation events at BH1s/d and at BH2, with shallow groundwater levels increasing by up to 1 m following significant precipitation events in January and February 2023. The response at BH5 is considerably muted but a response to precipitation in January has been noted.

- Nested monitoring wells BH1s/d and BH7s/d were installed to determine vertical hydraulic gradients and evaluate the recharge or discharge conditions on the subject lands. There was clear downward (potential for recharge) gradient observed at monitoring well nest BH1s/d with water levels in the deep well staying consistently just over 1 m lower than the levels in the shallow well (Appendix D). Water levels at

BH7s/d also showed a consistent downward (recharge) gradient indicating groundwater movement from the overburden towards the bedrock.

- Monitoring well BH7d is completed close to the overburden/bedrock interface (bottom of well at 400.2 masl; bedrock interface interpreted at approximately 397 masl) and could potentially be impacted by water level changes in the bedrock if both systems are hydraulically connected. Drawdown in the deep overburden could potentially be increased if the municipal well F6 is pumping and causing a response in the overburden. BH1d is completed in the deep overburden (bottom of well 409.3 masl) and this well is fitted with a datalogger. The data reviewed over the monitoring period have not indicated a response in the deep overburden to the pumping of the municipal supply well.

- The water well record for F6 (the municipal well) indicates that water was found at around 39 m below ground and after completion of the well the static water level had risen to a potentiometric level of 17.5 m below ground surface. The static (potentiometric) levels indicated by the bedrock aquifer are not anticipated to be encountered if the productive zone in the bedrock (at 39 m) is not encountered. Additionally, the data gathered over the monitoring period have not indicated a connection between the bedrock and overburden aquifers.

3.4 Interpreted Groundwater Flow

Groundwater elevation data (May 2023) obtained from the monitoring wells are shown on Figure 9, along with the interpreted groundwater elevation contours for the area. The groundwater movement in the shallow overburden on the subject lands is interpreted to follow the elevation contours and flow in a generally north to northwest direction. Arrows perpendicular to the groundwater contours are used to illustrate the groundwater flow directions.

Groundwater flow in the deep overburden and in the bedrock have not been assessed as part of this study as the development is not expected to extend to these aquifers. The data evaluated so far have indicated that there is no response in the overburden to pumping at the municipal well F6.

3.5 Recharge and Discharge Conditions

Areas where water from precipitation infiltrates into the ground and moves downward (i.e., areas of downward hydraulic gradients) are known as recharge areas. These areas are generally in areas of relatively higher topographic elevation. Areas where groundwater moves upward (i.e., areas of upward hydraulic gradients) are discharge areas and these generally occur in areas of relatively lower topographic elevation, such as along watercourses. Recharge and discharge may occur in local, intermediate and

more regional flow systems. Infiltrating water at any given location may follow a shallow flow path and discharge a short distance away from the recharge area along the nearest slopes or in small watercourses, swales, agricultural ditches, wetlands, etc. This is referred to as a local groundwater flow system (i.e., flows that closely follow the existing topography with relatively short flow distances, e.g., up to a few hundred metres).

The soils on the subject lands (sandy silt till and silty sand) are expected to provide conditions conducive to groundwater recharge; however, high water table conditions in some areas due to the presence of fine-grained sediments may impede recharge from occurring. Finer grained sediments occurring in the area may restrict groundwater recharge or cause groundwater to perch above the regional aquifer systems and potentially provide support for wetlands in these areas.

Water level measurements obtained from monitoring wells on the subject lands indicate a downward gradient is present between the shallow and deep overburden. These data are interpreted to indicate that after infiltrating at surface groundwater percolates down through the shallow system to the lower overburden and bedrock aquifers (recharge).

4.0 Water Quality

To establish background water quality on the subject lands groundwater samples were collected on December 1, 2022. Water samples were collected from two groundwater wells (BH2 and BH5). The samples were sent to Bureau Veritas Laboratories for analysis of general water quality indicator parameters and basic ions (e.g., pH, alkalinity, hardness, conductivity, chloride, nitrate, etc.) and selected metals.

4.1 Groundwater Quality

The analytical results from the laboratory are provided in Appendix E and are discussed below. The data reviewed showed the following:

- Groundwater exceeded the Ontario Drinking Water Quality Standards (ODWQS) operational guideline for total hardness (80 to 100 mg/L) with values of 330 and 370 mg/L. Hardness in groundwater is caused by dissolved calcium and magnesium and is typically a result of the geologic material of the aquifer. Further analysis of the concentration of calcium and magnesium indicate that these parameters are elevated and indicate a carbonate environment within the groundwater.

- Groundwater exceeded the ODWQS aesthetic objective for manganese (0.05 mg/L) and the Canadian Drinking Water Quality Guideline maximum acceptable concentration (0.12 mg/L) with a concentration of 0.28 mg/L at BH5.

- Groundwater concentrations of 12 and 17 mg/L were reported for sodium and chloride was reported at 36 and 47 mg/L.

- Groundwater results for nitrate are interpreted to represent impacts from fertilizer application with concentrations of 4.8 and 1.1 mg/L at BH2 and BH5, respectively.

- The water on site displayed good water quality indicators with potential for impacts due to anthropogenic activities. It is noted that no domestic or potable use of the shallow groundwater is proposed and hence no potential quality impacts are predicted. It is noted that the site is in a source protection regulated area and hence water quality as related to drinking water threats will be regulated.

5.0 Source Water Protection

The subject lands are located within the Grand River Source Protection Area for which policies in the Grand River Source Protection Plan (SPP) apply. A review of the Source Protection Atlas indicates that the subject lands are located within the Wellhead Protection Area (WHPA) for Fergus municipal supply well F6. The subject lands are located within the 100 m separation zone (WHPA-A) and the 2-year time of travel (WHPA-B). The location of the subject lands in relation to the WHPAs is shown on Figure 10. The subject lands are also known to be located within a local area for water quantity protection WHPA-Q.

5.1 Aquifer Vulnerability

Aquifer vulnerability refers to the susceptibility of the aquifer to potential contamination. Some degree of protection for aquifers is offered by the nature of the soil above the water table. The degree of protection is dependent on the depth to water table or the depth to the aquifer and the type of soil above the water table or aquifer. Generally greater depths provide better protection and finer deposits (clays and silts) provide better protection than sands and gravels. Figure 10 indicates that the subject lands are mapped with an intrinsic vulnerability of 10 within WHPA-A and 8 within WHPA-B. There are no highly vulnerable aquifers (HVA) mapped in the area of the subject lands. Vulnerability scores of 10 and 8 are however the highest scores applicable to vulnerable areas and this rating suggest that the municipal aquifer in the area is vulnerable to contamination.

5.2 Threat Evaluation

Since the subject lands are located within the wellhead protection areas for the community of Fergus (Figure 10) the proposed development will be subject to policies under the Grand River Source Protection Policy if activities include any of the prescribed drinking water threats (Clean Water Act, 2006) that would be a significant drinking water threat. Potential drinking water threats that may occur on the subject lands include:

- The establishment, operation or maintenance of a system that collects, stores, transmits, treats or disposes of sewage;

- The establishment, operation, or maintenance of a waste disposal site within the meaning of Part V of the Environmental Protection Act;
- The application of road salt;
- The handling and storage of road salt;
- The storage of snow;
- The handling and storage of fuel;
- The handling and storage of a dense non-aqueous phase liquid;
- The handling and storage of an organic solvent;
- An activity that reduces the recharge of an aquifer;
- Establishment and operation of a liquid hydrocarbon pipeline.

Due to the potential for these threats to arise on the subject lands, a Threats Disclosure report may be required.

6.0 Water Balance

A water balance assessment is required in order to assess potential land development impacts on the local groundwater conditions. The water balance will be completed for this study to determine the pre-development recharge volumes (based on existing land use conditions) and the post-development recharge volumes that would be expected based on the proposed land use plan. The detailed water balance calculations will be provided in Appendix F.

6.1 Water Balance Components

A water balance is an accounting of the water resources within a given area. As a concept, the water balance is relatively simple and may be estimated from the following equation:

$$P = S + ET + R + I$$

Where:

P	=	precipitation
S	=	change in groundwater storage
ET	=	evapotranspiration/evaporation
R	=	surface water runoff
I	=	infiltration

The components of the water balance vary in space and time and depend on climatic conditions as well as the soil and land cover conditions (i.e., rainfall intensity, land slope, soil hydraulic conductivity and vegetation). Runoff, for example, occurs particularly during periods of snowmelt when the ground is frozen, or during intense rainfall events. Precise measurement of the water balance components is difficult and as such, approximations and simplifications are made to characterize the water balance of a property. Field observations of the drainage conditions, land cover and soil types,

groundwater levels and local climatic records are important input considerations for the water balance calculations.

The groundwater balance components for the subject lands are discussed below:

Precipitation (P)

The long-term average annual precipitation for the area of the subject lands is 946 mm based on data from the Environment Canada Fergus Shand Dam (Station 6142400, 43°44'05.088" N, 80°19'49.098" W, elevation 417.6 masl) for the period between 1981 and 2010. The climate station is located approximately 4 km east of the subject lands. Average monthly records of precipitation and temperature from this station have been used for the water balance calculations in this study (Appendix F).

Storage (S)

Although there are groundwater storage gains and losses on a short-term basis, the net change in groundwater storage on a long-term basis is assumed to be zero so this term is dropped from the equation and not considered for the calculations.

Evapotranspiration (ET)

Evapotranspiration and evaporation components vary based on the characteristics of the land surface cover (i.e., type of vegetation, soil moisture conditions, perviousness of surfaces, etc.). Potential evapotranspiration (PET) refers to the water loss from a vegetated surface to the atmosphere under conditions of an unlimited water supply. The actual rate of evapotranspiration (AET) is generally less than the PET under dry conditions (i.e., during the summer when there is a soil moisture deficit). In this report, the PET and AET have been calculated using a soil-moisture balance approach.

Water Surplus (R + I)

The difference between the mean annual P and the mean annual ET is referred to as the water surplus. Part of the water surplus travels across the surface of the soil as surface or overland runoff (R) and the remainder infiltrates the surficial soil (I). The infiltration is comprised of two end member components: one component that moves vertically downward to the groundwater table (referred to as recharge) and a second component that moves laterally through the topsoil profile or shallow soils as interflow that re-emerges locally to surface (i.e., as runoff) at some short time following cessation of precipitation. As opposed to the “direct” component of surface runoff that occurs during precipitation or snowmelt events, interflow becomes an “indirect” component of runoff. The interflow component of surface runoff is not accounted for in the water balance equation cited above since it is often difficult to distinguish between interflow and direct

(overland) runoff, however both interflow and direct runoff together form the total surface water runoff component.

6.2 Approach and Methodology

The analytical approach to calculate the water balance utilized for this assessment involves monthly soil-moisture balance calculations to determine the pre-development (based on existing land use) infiltration volumes. For the purposes of this study, the water balance calculations were undertaken using a spreadsheet model. The soil-moisture balance approach utilized assumes that soils do not release water as potential recharge while a soil moisture deficit exists. During wetter periods, any excess of precipitation over evapotranspiration first goes to restore soil moisture. Once the soil moisture deficit is overcome, any further excess water can then pass through the soil as infiltration and either become interflow (indirect runoff) or recharge (deep infiltration).

The soil moisture capacity for the soils on the subject lands were estimated based on guidance available in the MECP SWM Planning and Design Manual (2003). A soil moisture storage capacity of 200 mm was used for the areas where the land cover was predominantly short to moderate-rooted vegetation in the fields and agricultural areas (Table F-1, Appendix F). A soil moisture storage capacity of 125 mm was used for areas that will become lawn or manicured areas (Tables F-2 and F-3, Appendix F). Tables F-1 to F-3 in Appendix F detail the monthly potential evapotranspiration calculations accounting for latitude and climate, and then calculate the actual evapotranspiration and water surplus components of the water balance based on the monthly precipitation and soil moisture conditions.

The MECP SWM Planning and Design Manual (2003) methodology for calculating total infiltration based on topography, soil type and land cover was used and a corresponding runoff component was calculated for the soil moisture storage conditions (Tables F-1, F-2 and F-3, Appendix F). The calculated water balance components from this table are used to assess the pre-development and post-development volumes for runoff and infiltration as presented on Table F-4 in Appendix F.

6.3 Water Balance Component Values

The detailed monthly calculations of the water balance components are provided in Tables F-1 to F-3 in Appendix F. For these calculations, it has been assumed that silt loam soils are representative for the subject lands for estimating the soil infiltration factor. The calculations show that a water surplus is generally available from November to May (see Figure F-1). The monthly water balance calculations illustrate how infiltration occurs during periods when there is sufficient water available to overcome the soil moisture storage requirements. The monthly calculations are summed to provide estimates of the annual water balance component values (Tables F-1, F-2 and F-3, Appendix F). A summary of these values is provided in Table 3.

Table 3: Water Balance Component Values

Water Balance Component	Agricultural Lands	Urban Lawns	Grassed Berms
Average Precipitation	946 mm/year	946 mm/year	946 mm/year
Actual Evapotranspiration	579 mm/year	579 mm/year	579 mm/year
Water Surplus	367 mm/year	367 mm/year	367 mm/year
Infiltration	202 mm/year	220 mm/year	147 mm/year
Runoff	165 mm/year	147 mm/year	220 mm/year

6.4 Pre-Development Water Balance (Existing Conditions)

The pre-development water balance calculations for the subject lands are presented in Table F-4 in Appendix F. The total area of the subject lands is about 79,700 m^2. The pre-development land use was predominantly agricultural (moderately rooted crops). The total calculated pre-development infiltration volume is about 15,500 m^3/year (Table F-4, Appendix F). It is acknowledged that infiltration rates depend on the hydraulic conductivity of soils and that hydraulic conductivity may naturally vary over several orders of magnitude, so the margins of error on the calculations are high. As such the calculated volumes are considered as general estimates only.

6.5 Potential Urban Development Impacts to Water Balance

Urban development of an area affects the natural water balance. The most significant difference is the addition of impervious surfaces as a type of surface cover (i.e., roads, parking lots, driveways, and rooftops). Impervious surfaces prevent infiltration of water into the soils and the removal of the vegetation removes the evapotranspiration component of the natural water balance. The evaporation component from impervious surfaces is relatively minor (estimated to be 10% to 20% of precipitation) compared to the evapotranspiration component that occurs with vegetation in this area (about 58% of precipitation in the area of the subject lands). So, the net effect of the construction of impervious surfaces is that most of the precipitation that falls onto impervious surfaces becomes surplus water and direct runoff. The natural infiltration components (interflow and deep recharge) are reduced.

For the purposes of this study the evaporation will be estimated to be 15% of precipitation. The remaining 85% of the precipitation that falls on impervious surfaces will be assumed to become runoff. Therefore, assuming an evaporation/loss from impervious surfaces of 15% of the precipitation, there is a potential water surplus from impervious areas of 804 mm/year.

As noted previously, the subject lands are located in a WHPA-Q for water quantity protection and in these areas, loss/ reduction of recharge is not allowed. Specific action

through the implementation of LID measures will be required to maintain recharge to the greatest extent possible.

It is noted that the proposed development will be serviced by municipal water supply and wastewater services. Therefore, there will be no impact on the water balance and local groundwater or surface water quantity and quality conditions related to any on-site groundwater supply pumping or disposal of septic effluent.

6.6 Post-Development Water Balance with No Mitigation

To assess the potential development impact on infiltration, the post-development infiltration volume was calculated for the subject property based on the proposed development plan. These calculations assume no mitigation is in place (i.e., all runoff from impervious surfaces will be directed to the storm sewers), resulting in quantification of an infiltration target for the design of a Low Impact Development (LID) strategy for stormwater management.

The land areas for each proposed land use on the subject property were estimated based on the stormwater management report completed by Burnside in 2023. The infiltration and runoff components for the post-development land uses were calculated using the SWM Planning and Design Manual (2003) methodology based on topography, soil type and land cover as shown on Tables F-2 and F-3, Appendix F. The total calculated post-development infiltration and runoff volumes (without mitigation) are presented in Table F-4, Appendix F. The estimated annual infiltration volume is about 4,900 m^3/year.

Comparing the existing (pre-development) and post-development values in Table F-4, Appendix F, the water balance calculations show that development has the potential to reduce the natural infiltration across the subject property by about 68% (10,600 m^3/year).

LID measures for stormwater management are recommended to try to promote infiltration and make up the difference between these pre- and post-development infiltration conditions to the extent practical. As noted above, with the wide margins of error associated with this type of analysis, the infiltration deficit volume is considered as a reasonable estimate that is suitable as a target or guide for LID strategy design.

6.7 Post-Development with Mitigation (LID)

There are various LID techniques that may be used to increase the post-development infiltration in a newly urbanized area. The proposed LID measures for the subject property were developed in conjunction with Burnside SWM engineers and will include:

- Infiltration of the runoff from the 25 mm storm event from roof areas of Phase 1 and Phase 2 buildings in catchment area 201 via an infiltration trench.

Calculations have been completed to assess the effects of these LID measures as shown on Table F-5, Appendix F. Quantification of these LID techniques is challenging and there are no widely accepted quantification standards. To assess the potential effectiveness of these LID measures for the proposed development, water balance calculations have been completed.

To calculate the annual infiltration volume for roof runoff directed to infiltration trenches, the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006) were used to correlate the storm event size the swales are designed to infiltrate to a percentage of the average annual rainfall depth, which was then applied to the impervious area directed to these trenches to calculate an infiltration volume, as shown in Table F-5 (Appendix F). It is reported in these Guidelines, based on the review of rainfall data from 16 rainfall stations across Toronto, the 25 mm storm accounts for approximately 95% of the annual precipitation.

Recalculation of the water balance for the subject property with these LID measures in place demonstrates that 66% of the pre-development volumes can be maintained (Table F-5, Appendix F). This shows the significant benefit of the proposed LID strategy in increasing recharge volumes in the developed area.

7.0 Development Considerations

7.1 Construction Below the Water Table

Based on groundwater level data collected as part of this study the water table on the subject lands ranges from 1 to 4 m below surface across the subject lands. Should excavations during construction or servicing extend below the water table the local soils may need to be dewatered. Due to the potential for encountering the water table during construction, the dewatering of local aquifers may be required in order for services to be installed below the water table. The undertaking of dewatering according to industry standards and in accordance with a MECP processes will ensure that adequate attention is paid to potential adverse impacts to the environment. Currently the MECP allows for construction dewatering of less than 400,000 L/d to proceed under the Environmental Activity Sector Registry (EASR) process. If dewatering is to be above this threshold, then the standard Permit to Take Water (PTTW) process applies. In both cases, a scientific study is required in support of EASR registration or PTTW application. This scientific study must review the potential for environmental impacts and provide mitigation and monitoring measures to the satisfaction of the MECP or other review agency. The requirements for construction dewatering will be confirmed by geotechnical/hydrogeological investigations completed in support of detailed design.

The construction of buried services below the water table has the potential to capture and redirect groundwater flow through more permeable fill materials typically placed in the base of excavations. Groundwater may also infiltrate into joints in storm sewers and

maintenance holes (i.e., manholes). Over the long-term, these impacts can lower the groundwater table across the development area. To mitigate this effect, services to be installed below the water table should be constructed to prevent redirection of groundwater flow. This will involve the use of anti-seepage collars or clay plugs surrounding the pipes to provide barriers to flow and prevent groundwater flow along granular bedding material and erosion of the backfill materials.

7.2 Local Groundwater Supply Wells

The community of Fergus is supplied with municipal water and the subject lands will also be serviced by municipal water supply and wastewater. It is noted that some areas of Fergus are not serviced and that rural residences in the surrounding area may also not be serviced by municipal supply. To identify potentially vulnerable wells in the vicinity of the subject lands the serviced area mapping for Fergus along with water well records from the MECP were reviewed and shown in Figure 11. Our review of the MECP water well records within 500 m of the subject lands indicates that all water supply wells are located in the bedrock (Appendix A). Dewatering, if required, is expected to be limited to the shallow overburden and bedrock wells are not expected to be impacted. It is however recommended that the scientific study required for PTTW or EASR should include an assessment of the potential zone of influence for dewatering and within that zone, identify any wells that require monitoring during the dewatering process. A well interference response protocol should also be developed and implemented during dewatering.

7.3 Well Decommissioning

Prior to or during construction, it is necessary to ensure that all inactive wells within the development footprint have been located and properly decommissioned by a licensed water well contractor according to Ontario Regulation 903. This regulation applies to private domestic wells and to the groundwater observation wells installed for this study unless they are maintained throughout the construction for monitoring purposes.

8.0 References

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R.J. Burnside & Associates Limited. 2023. Functional Servicing and Stormwater Management Report Centre Wellington Operations Centre. Burnside Project 300055234.0000 dated April 24, 2023.

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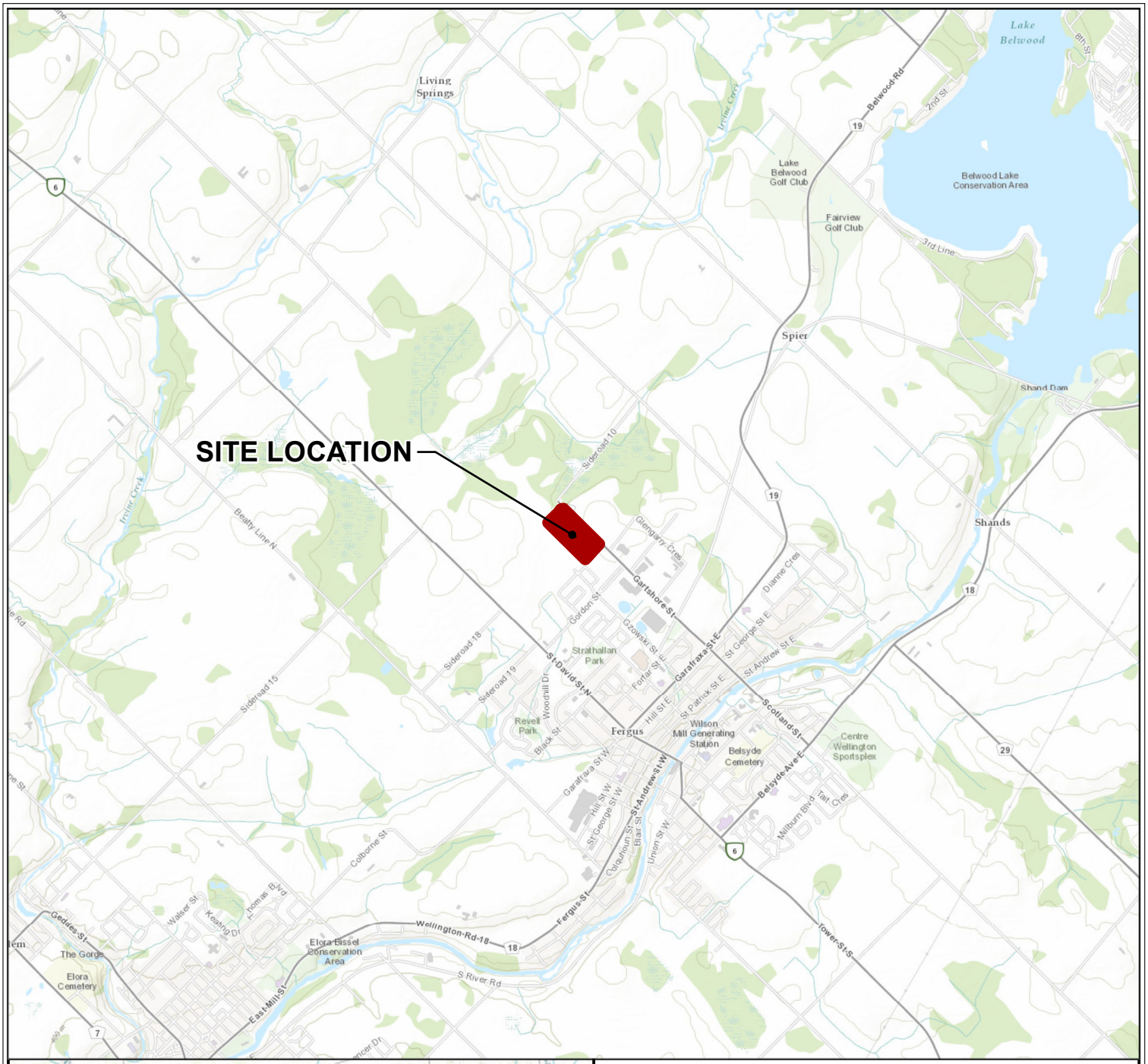
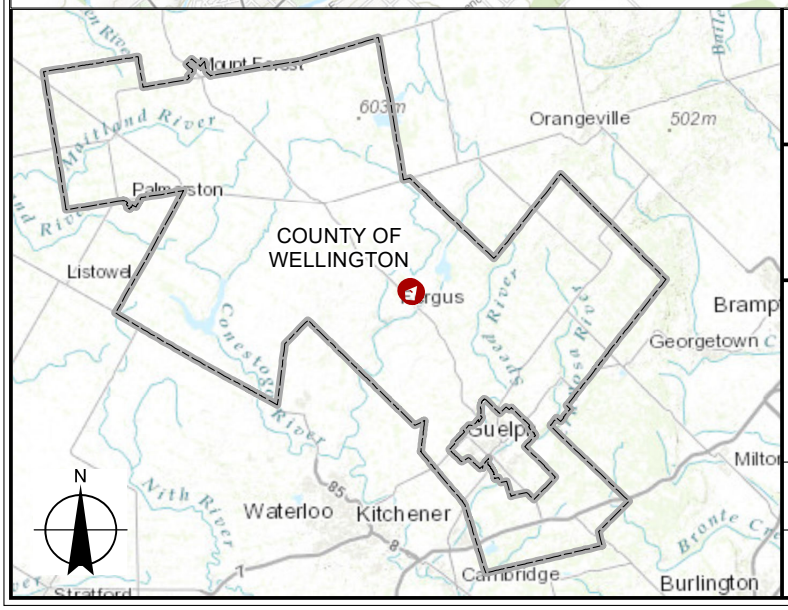
[THE DIFFERENCE IS OUR PEOPLE]

Figures





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TOWNSHIP OF CENTRE WELLINGTON

Map Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

SITE LOCATION PLAN

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CD	AM	May 2023	1
Scale		Project No.	
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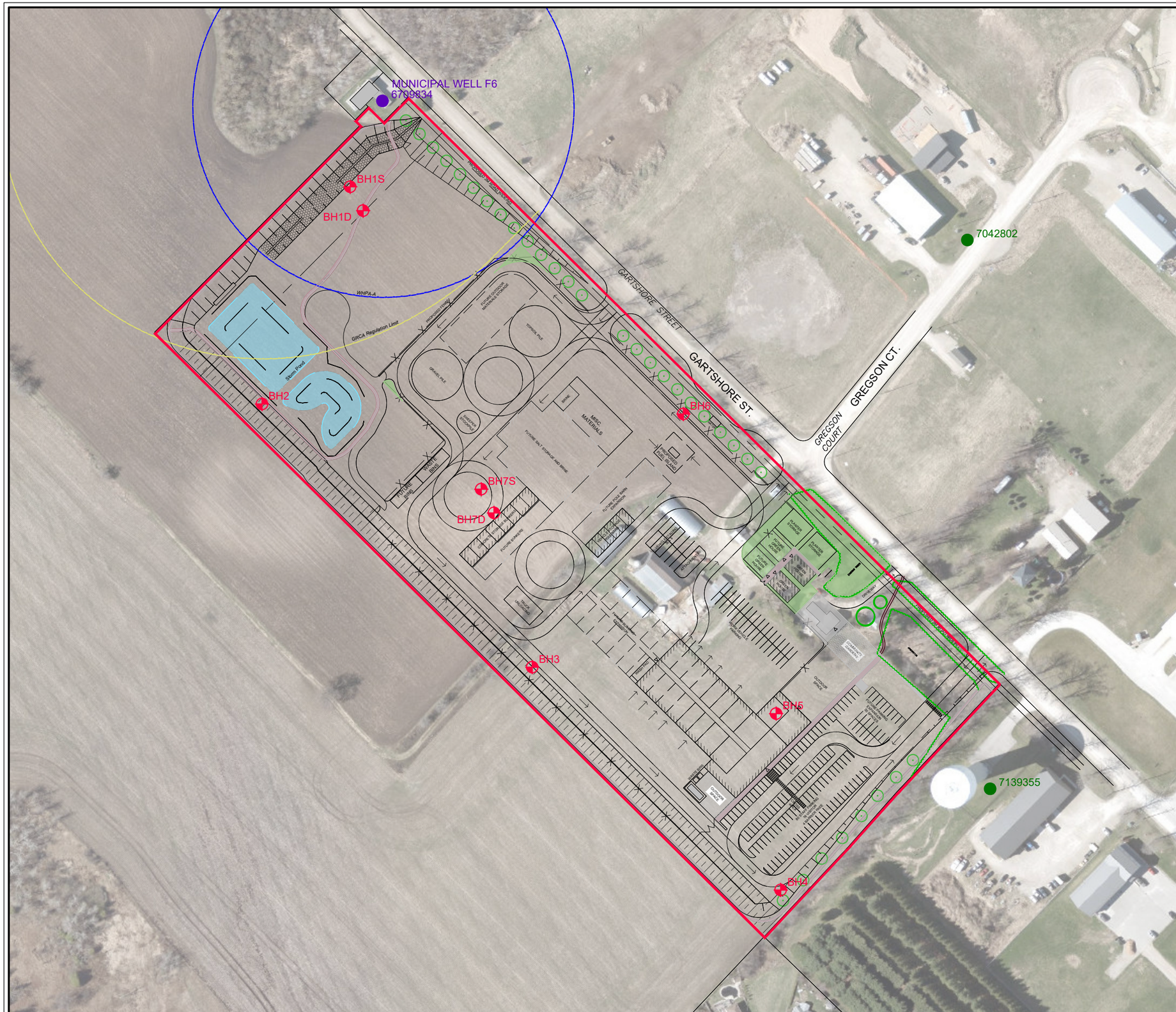

LEGEND

SUBJECT LANDS

MONITORING WELL LOCATION
(By JLP, 2022)

MECP OVERBURDEN WELL LOCATION

MECP BEDROCK WELL LOCATION

Air Photo Source:
Background 2020 Air Photo obtained from Township of Centre Wellington Online GIS
Server: https://gis.centrewellington.ca/server/rest/services Layer: Airphoto202016cm

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Metres

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

SITE PLAN AND PROPOSED DEVELOPMENT

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LEGEND

SUBJECT LANDS

GROUND ELEVATION (masl)

WETLAND (MNR)

Air Photo Source:
Background 2020 Air Photo obtained from Township of Centre Wellington Online GIS Server: https://gis.centrewellington.ca/server/rest/services Layer: Airphoto202016cm

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

TOPOGRAPHY AND DRAINAGE

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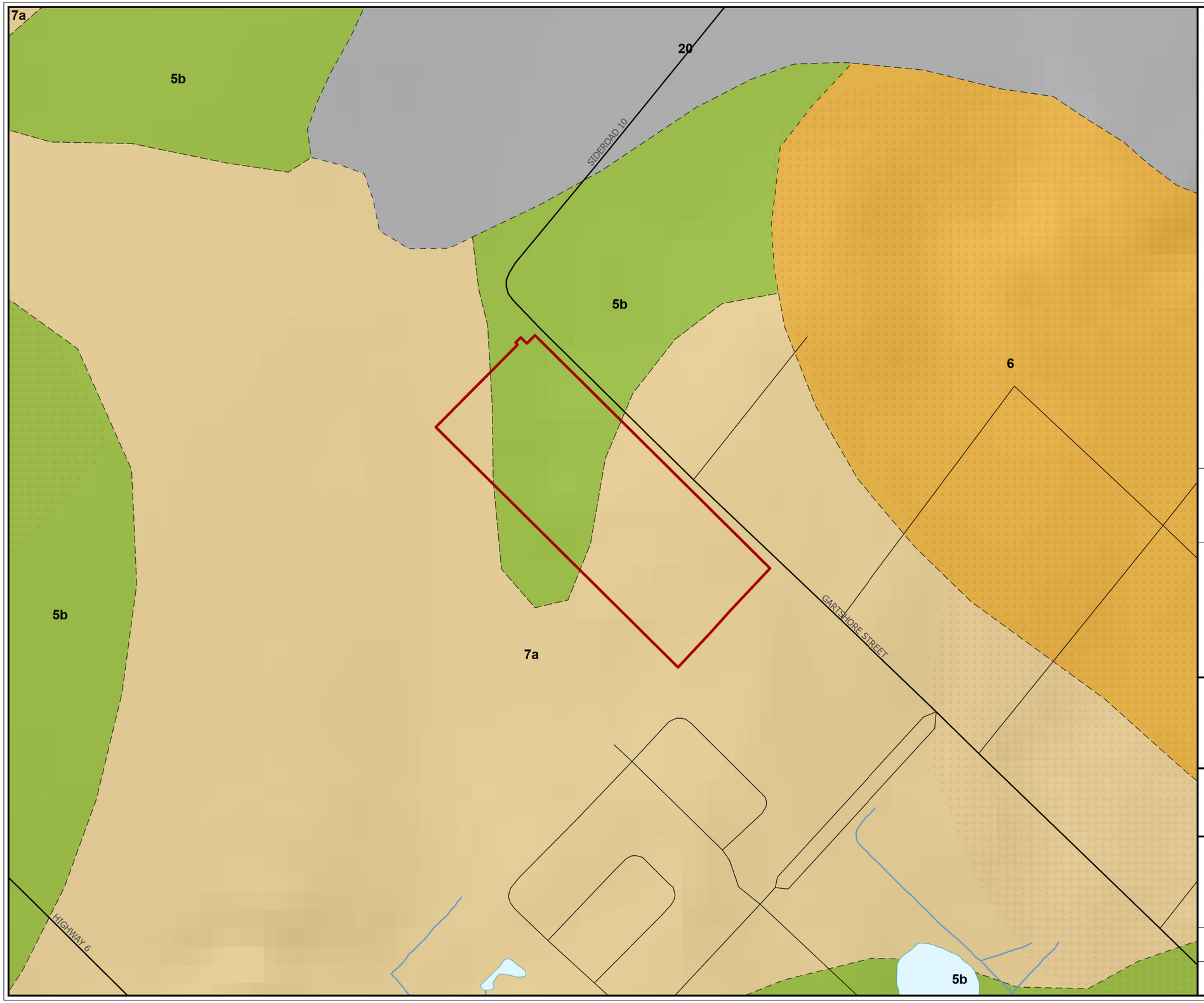

Legend

- Subject Lands
- Local Roads
- Roads
- Waterbody
- Watercourse

Surficial Geology

- 5b: Till: Stone-poor, carbonate-derived silty to sandy till
- 6: Ice-contact stratified deposits
- 7a: Glaciofluvial deposits: Sandy deposits
- 20: Organic deposits
- Hummocky Topography
- Unit Contact Boundary

Sources:

1. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release–Data 126 - Revision 1.
2. Ministry of Natural Resources, © King's Printer for Ontario
3. Natural Resources Canada © His Majesty the King in Right of Canada

Datum: North American 1983 CSRS

Coord. System: NAD 1983 CSRS UTM Zone 17N

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

SURFICIAL GEOLOGY

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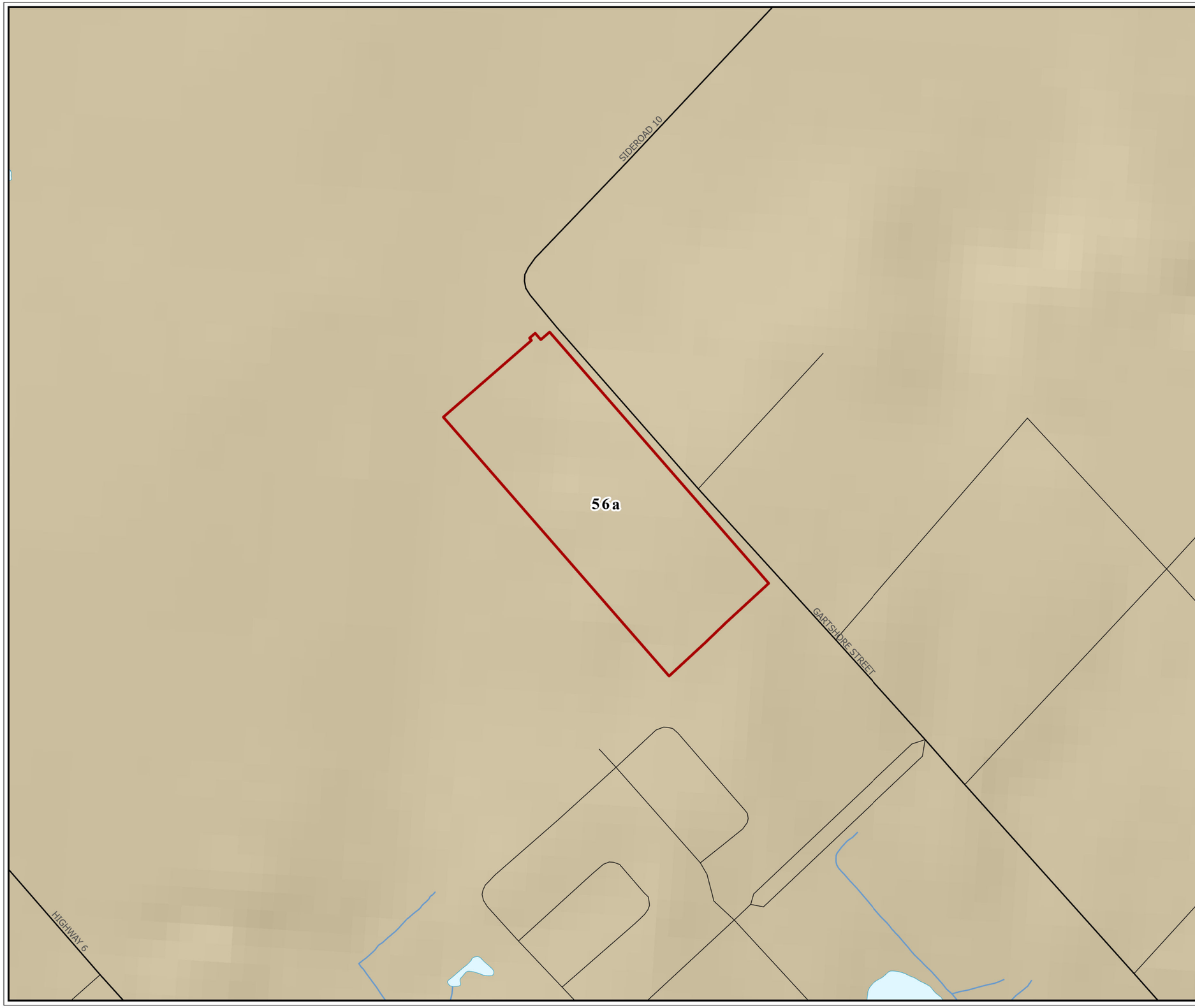

Legend

- Subject Lands
- Local Roads
- Roads
- Watercourse
- Waterbody

LOWER SILURIAN - 56 Sandstone, shale, dolostone, siltstone

- 56a Guelph Fm.

Sources:

1. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release–Data 126 - Revision 1.
2. Ministry of Natural Resources, © King's Printer for Ontario
3. Natural Resources Canada © His Majesty the King in Right of Canada

Datum: North American 1983 CSRS

Coord. System: NAD 1983 CSRS UTM Zone 18N

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

BEDROCK GEOLOGY

Drawn	Checked	Date	Figure No.
CD	DS	May 2023	5
Scale		Project No.	
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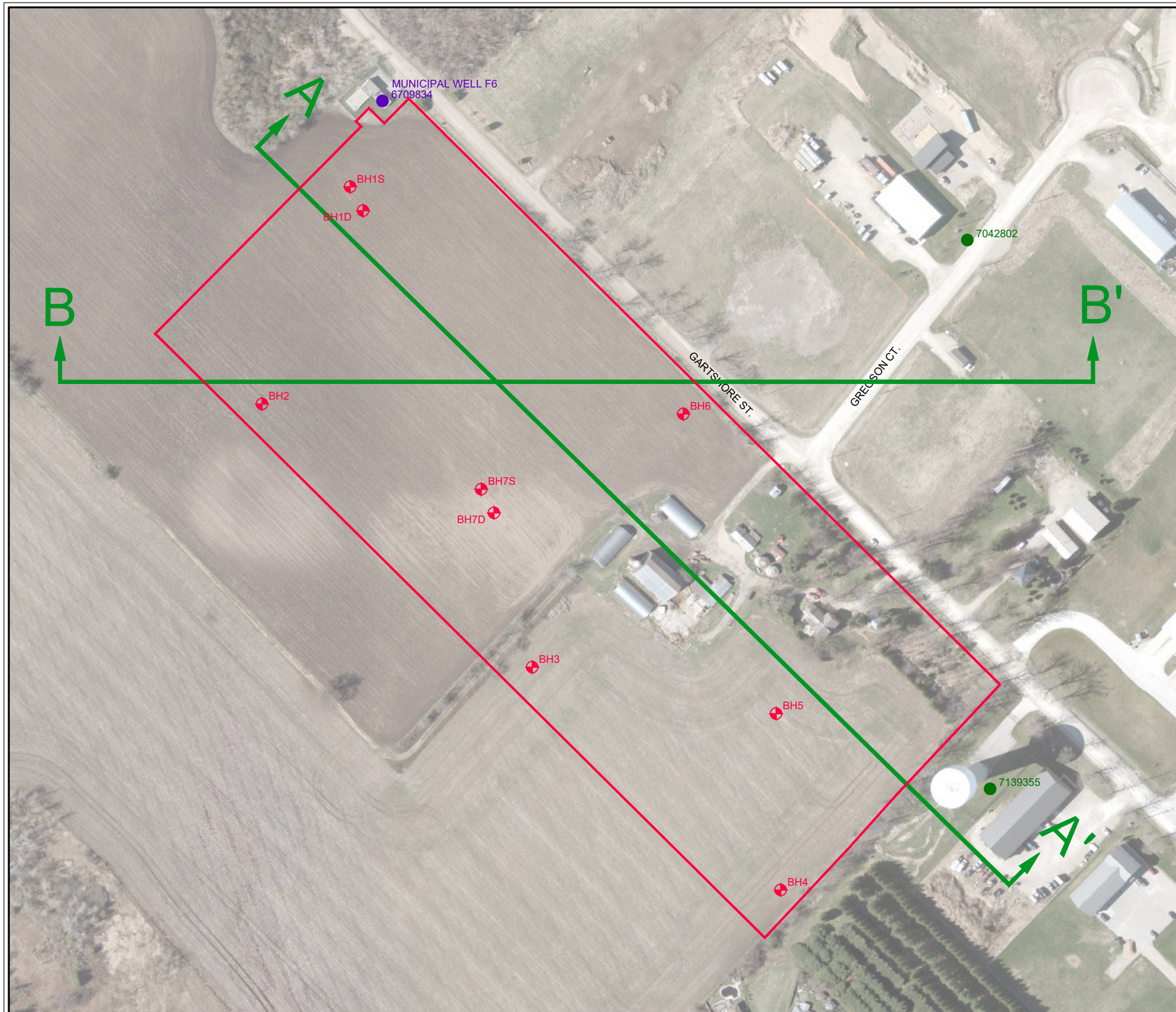
File Path: \\elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\08_GIS\02 Hydrogeology\055234 CW Operations HG.aprx Print Date: 2023/05/12 Time: 01:40 PM



LEGEND

SUBJECT LANDS

MONITORING WELL LOCATION
(By JLP, 2022)

MECP OVERBURDEN WELL LOCATION

MECP BEDROCK WELL LOCATION

Air Photo Source:
Background 2020 Air Photo obtained from Township of Centre Wellington Online GIS Server: https://gis.centrewellington.ca/server/rest/services Layer: Airphoto202016cm

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Metres

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Client

TOWNSHIP OF CENTRE WELLINGTON

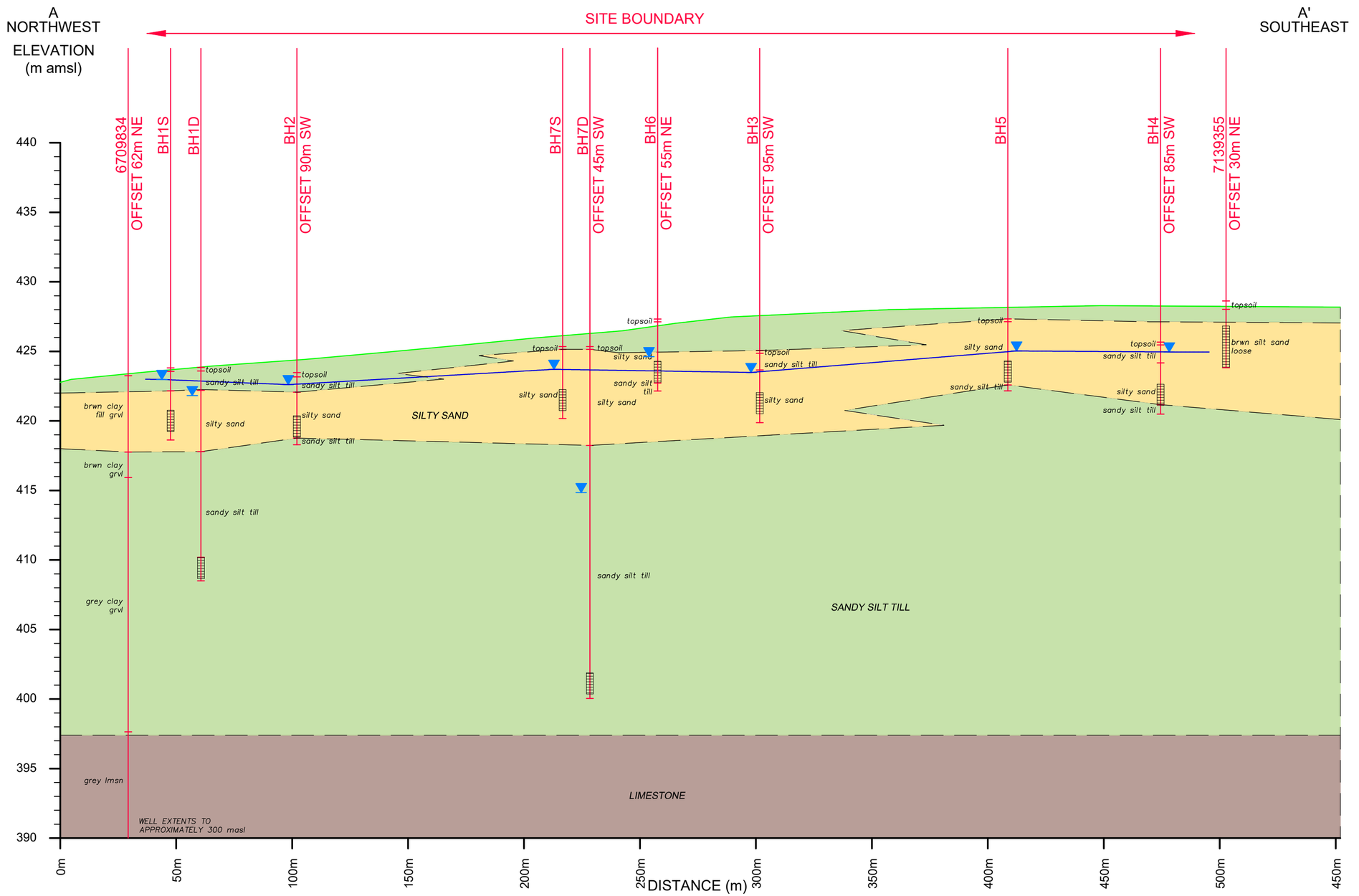
Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

BOREHOLE, MONITORING WELL AND CROSS SECTION PLAN

Drawn	Checked	Date	Figure No.
CD	AM	May 2023	6
Scale		Project No.	
1:2,000		300055234	

File: \\elmo\shared work areas\055234 centre wellington operations centre\03_production\02 hydrogeology\055234 HG Report Figures.dwg Date Plotted: May 12, 2023 - 1:49 PM



LEGEND

- 5893 — WELL LOCATION & NUMBER
- EXISTING GROUND PROFILE
- silty sand — GEOLOGICAL STRATIGRAPHY
- STATIC WATER LEVEL (May 9, 2023)
- WELL SCREEN

Horizontal Scale: 1:1,500
Vertical Scale: 1:250
Vertical Exaggeration: 6X

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

INTERPRETED CROSS SECTION A-A'

Drawn	Checked	Date	Figure No.
CD	AM	May 2023	7
Scale		Project No.	
1:1,500		300055234	

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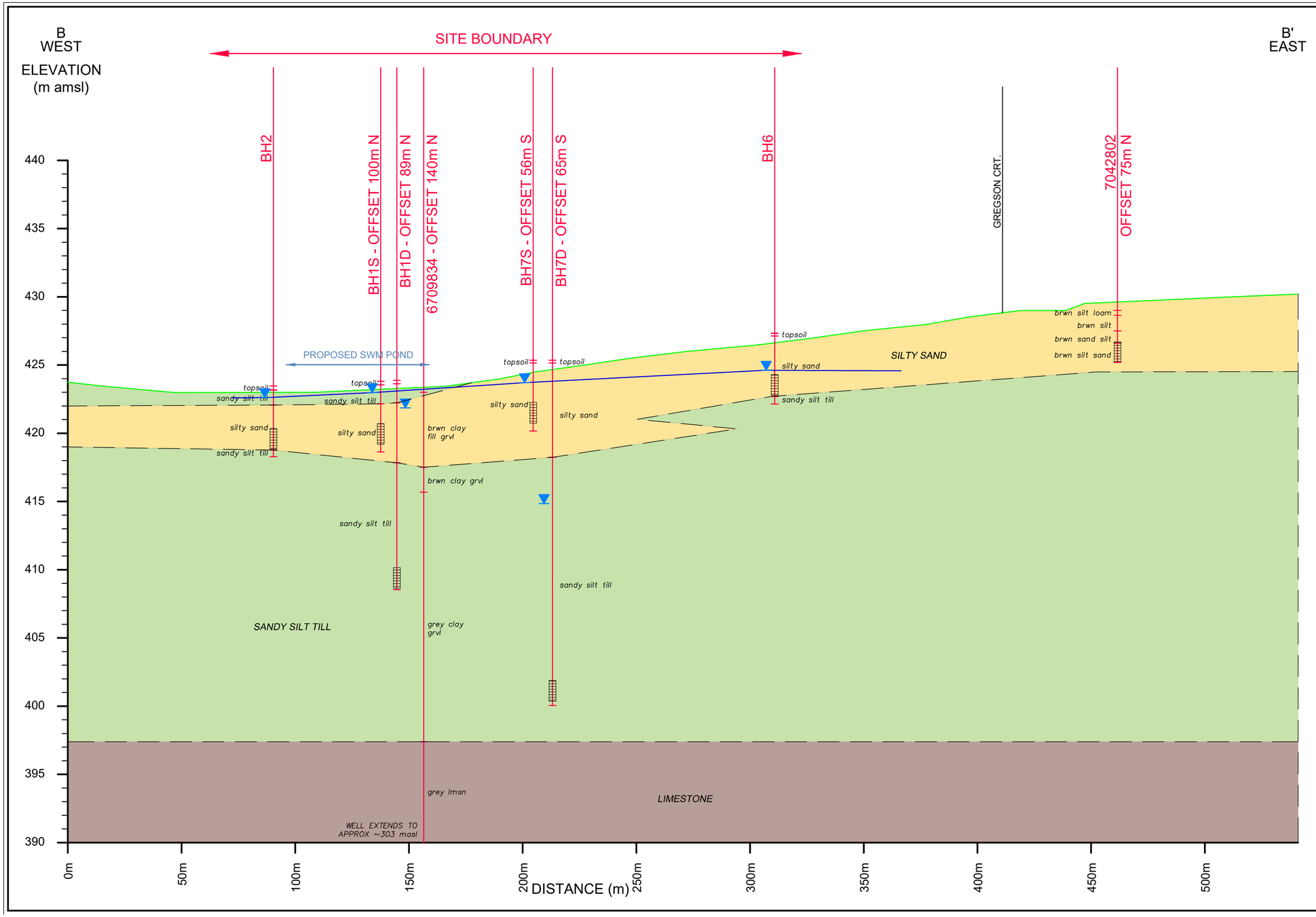

LEGEND

- 5893 — WELL LOCATION & NUMBER
- EXISTING GROUND PROFILE
- silty sand — GEOLOGICAL STRATIGRAPHY
- STATIC WATER LEVEL (May 9, 2023)
- WELL SCREEN

Horizontal Scale: 1:1,500
Vertical Scale: 1:250
Vertical Exaggeration: 6X

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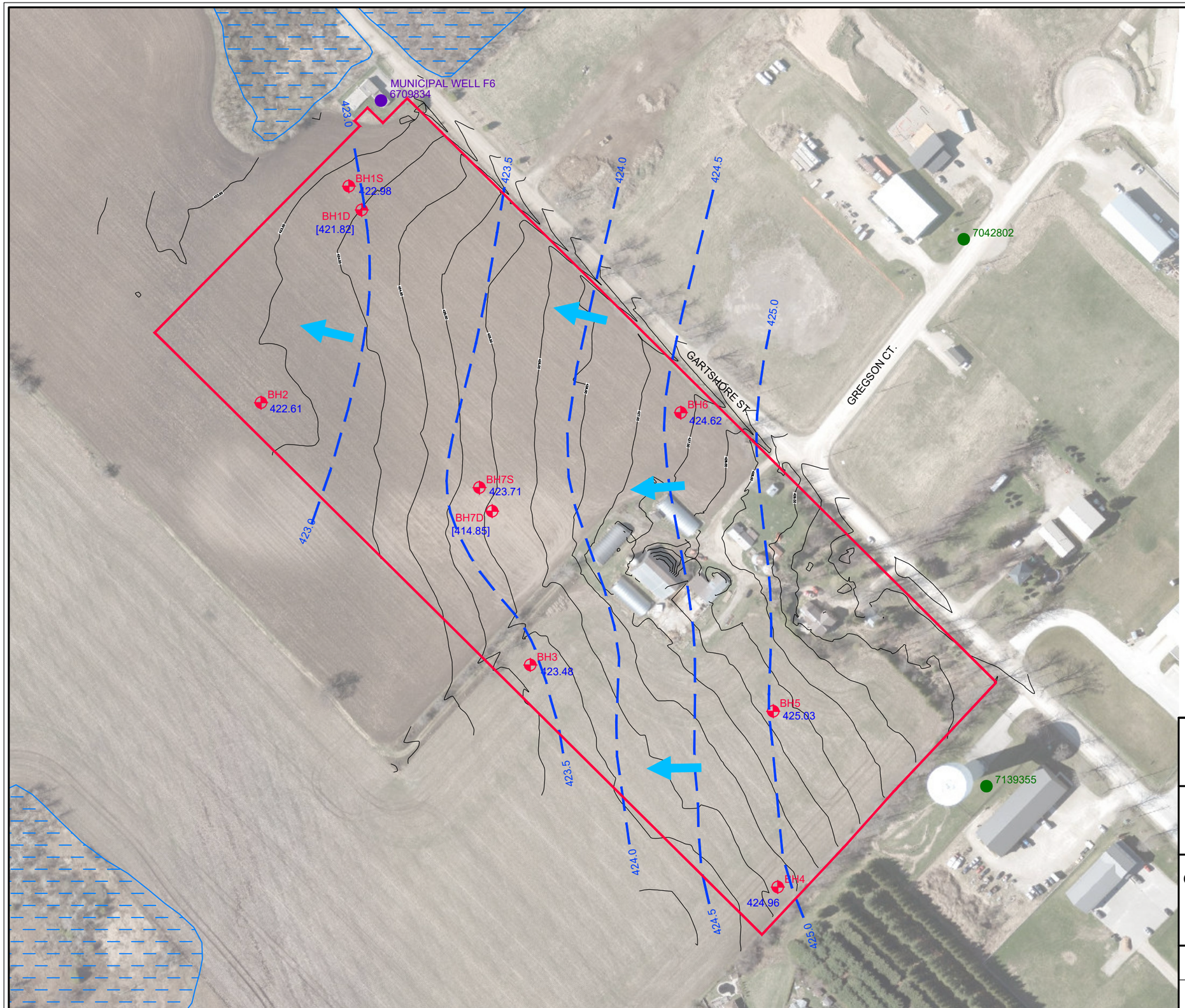
Client
TOWNSHIP OF CENTRE WELLINGTON

Figure Title
CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT
INTERPRETED CROSS SECTION B-B'

Drawn	Checked	Date	Figure No.
CD	AM	May 2023	8
Scale 1:1,500		Project No. 300055234	

File: \\elmo\shared work areas\055234 centre wellington operations centre\03_production\02 hydrogeology\055234 HG Report Figures.dwg Date Plotted: May 12, 2023 - 1:50 PM



LEGEND

- SUBJECT LANDS
- MONITORING WELL LOCATION *(By JLP, 2022)*
- 422.45 — SHALLOW GROUNDWATER ELEVATION *(May 9, 2023)* - masl
- [413.50] — DEEP GROUNDWATER ELEVATION *(May 9, 2023)* - masl
- GROUNDWATER CONTOUR - masl
- INTERPRETED GROUNDWATER FLOW DIRECTION
- WETLAND (MNR)

Air Photo Source:
Background 2020 Air Photo obtained from Township of Centre Wellington Online GIS Server: https://gis.centrewellington.ca/server/rest/services Layer: Airphoto202016cm

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Metres

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TOWNSHIP OF CENTRE WELLINGTON

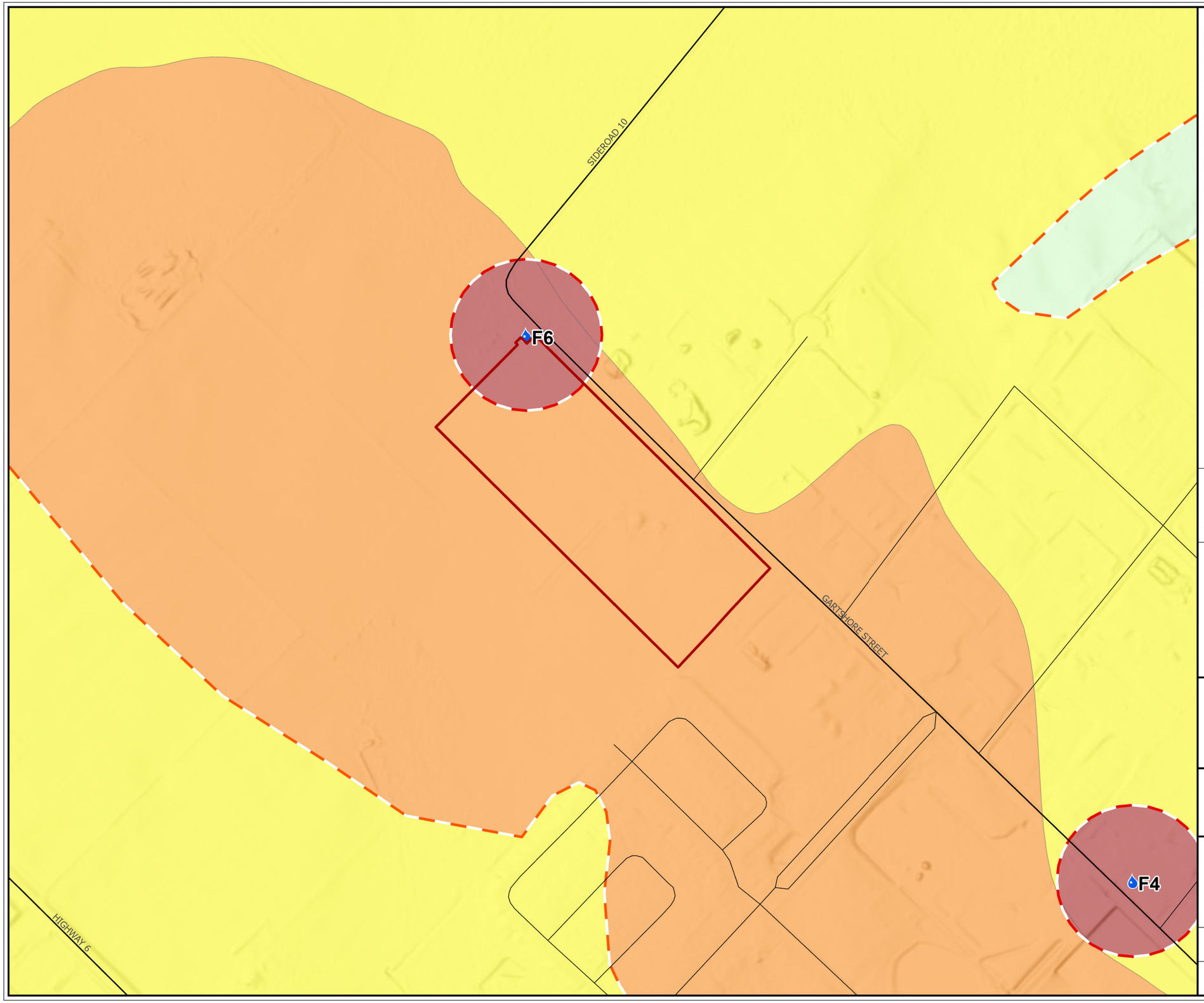
Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

SHALLOW GROUNDWATER FLOW - MAY, 2023

Drawn	Checked	Date	Figure No.
CD	AM	May 2023	9
Scale		Project No.	
1:2,000		300055234	

File: \\elmo\shared work areas\055234 centre wellington operations centre\03_production\02 hydrogeology\055234 HG Report Figures.dwg Date Plotted: May 15, 2023 - 3:48 PM



Legend

- Subject Lands
- Local Roads
- Roads

SWP WHPA-Wellhead Protection Area (GRCA)

- WHPA-A
- WHPA-B
- WHPA-C
- WHPA-D

SWP WHPA Vulnerability (GRCA)

- 10
- 8
- 6
- 4
- 2
- Well

Sources:

1. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release–Data 126 - Revision 1.
2. Ministry of Natural Resources, © King's Printer for Ontario
3. Natural Resources Canada © His Majesty the King in Right of Canada

Datum: North American 1983 CSRS

Coord. System: NAD 1983 CSRS UTM Zone 17N

N

0 50 100 200 200 300 300 400

Metres

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TOWNSHIP OF CENTRE WELLINGTON

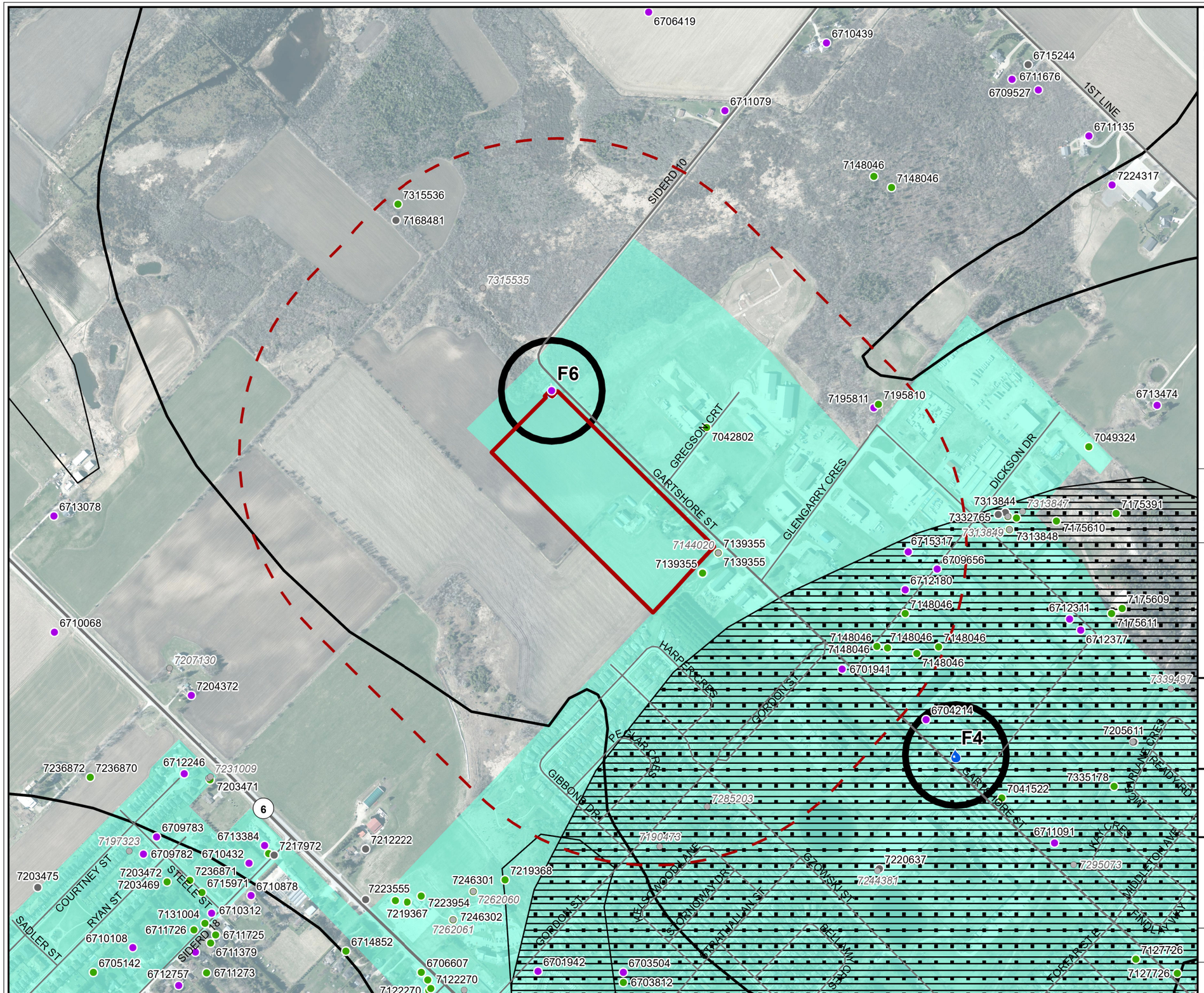
Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

SOURCE WATER PROTECTION

Drawn	Checked	Date	Figure No.
CD	DS	May 2023	10
Scale		Project No.	
1:5,000		300055234	

File Path: \\elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\08. GIS\02 Hydrogeology\055234 CW Operations HG.aprx Print Date: 2023/05/12 Time: 01:55 PM



Legend

- Subject Lands
- Subject Lands 500m Buffer
- MECP Bedrock Well Location
- MECP Overburden Well Location
- MECP Well - Unknown Status/Formation
- MECP Abandoned Well Location
- Municipally Serviced Area (Approximate)
- Expressway / Highway
- Arterial / Collector Road
- Local Road

Issue Contributing Area

- Chloride
- TCE & Chloride
- TCE
- TCE

Wellhead Protection Area

- WHPA A
- WHPA B
- WHPA C
- WHPA D
- Well

Sources:

1. Ontario Geological Survey 2011. 1:250 000 scale bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release–Data 126 - Revision 1.
2. Ministry of Natural Resources, © King's Printer for Ontario
3. Natural Resources Canada © His Majesty the King in Right of Canada

Datum: North American 1983 CSRS

Coord. System: NAD 1983 CSRS UTM Zone 17N

N

0 100 200 300 400 500

Metres

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TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE HYDROGEOLOGICAL ASSESSMENT

GROUNDWATER IMPACT EVALUATION

Drawn	Checked	Date	Figure No.
CD	DS	May 2023	11
Scale		Project No.	
1:7,500		300055234	

File Path: \\elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\08_GIS\02 Hydrogeology\055234 CW Operations HG.aprx Print Date: 2023/05/12 Time: 02:04 PM

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Appendix A

MECP Water Well Records

Water Well Records

Monday, January 30, 2023

2:12:12 PM

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
FERGUS TOWN	17 549552 4841203 W	2010/03 7366	0 1			MT	0005 100006 10	7144020 (Z105901) A083485 A	
FERGUS TOWN	17 549964 4840873 W	1972/03 2801	12 12 10	FR 0265 FR 0290 FR 0295 FR 0380 FR 0385	63/169/300/24:0	MN		6704214 ()	LOAM 0001 BRWN CLAY SAND GRVL 0044 GREY CLAY SAND GRVL 0160 BRWN SILT SAND 0190 BRWN SAND 0220 BRWN CLAY SAND GRVL 0259 BRWN SNDS 0264 WHIT LMSN 0425
FERGUS TOWN	17 549797 4840973 W	1951/10 2411	4 4	FR 0200	40/40/10/:	ST DO		6701941 ()	MSND GRVL 0110 LMSN 0200
FERGUS TOWN	17 549552 4841203 W	2010/01 7366	1			MO		7139355 (M04742) A083485	BRWN LOAM SILT LOOS 0002 BRWN SILT SAND LOOS 0016
FERGUS TOWN	17 548917 4841893 W	2018/06 7238	2	UT 0030		MO	0054 10	7315536 (Z293105) A237330	BRWN SILT SAND 0003 BLUE SILT STNS BLDR 0025 GREY SILT STNS SAND 0064
FERGUS TOWN	17 549870 4841497 W	2012/09 7221	1.34			MO		7195810 (Z143777) A118997	BRWN CLAY SNDY 0014 GREY CLAY STNY STNS 0072 GREY SAND SLTY STNS 0076
FERGUS TOWN	17 549086 4841727 W	2018/06 7238				MO		7315535 (Z293106) A130084 A	
FERGUS TOWN 01 010	17 549529 4841451 W	2007/02 6607	2.00	0005			0008 5	7042802 (Z70431) A053557	BRWN SILT LOAM 0001 BRWN SILT 0005 BRWN SAND SILT 0008 BRWN SILT SAND 0012
FERGUS TOWN 16 020	17 549929 4841205 W	2005/02 1737	6	FR 0225	140/142//1:	IN		6715317 (Z24376) A011658	BRWN SAND SILT CLAY 0038 GREY CLAY STNS 0100 BRWN LMSN 0230
NICHOL TOWNSHIP	17 549436 4840622 W	2012/10 7221	36 30	UT 0016				7190473 (Z159341) A	
NICHOL TOWNSHIP	17 548913 4841861 W	2011/08 7238						7168481 (Z135834) A114027	SAND GRVL 0030 GREY TILL CLAY STNS 0070 GREY LMSN 0480 GREY SHLE 0490
NICHOL TOWNSHIP	17 549530 4840701 W	2017/04 7221	35.8			DO		7285203 (Z256286) A	
NICHOL TOWNSHIP CON 15 018	17 548653 4840624 W	2000/06 6865	6 6	UK 0170 UK 0185 UK 0195	89/140/6/1:	DO		6713384 (211320)	BRWN SAND 0029 GREY CLAY SAND 0052 GREY CLAY STNS 0084 LMSN 0095 GREY LMSN 0129 BRWN LMSN 0164 BRWN LMSN 0190 GREY LMSN 0196

TOWNSHIP CON LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION
NICHOL TOWNSHIP CON 16 017	17 549222 4841524 W	1989/05 2801	12 11	FR 0128	58/153/350/24:0	MN		6709834 (31325)	BRWN CLAY FILL GRVL 0018 BRWN CLAY GRVL 0024 GREY CLAY GRVL 0084 GREY LMSN 0165 BRWN LMSN 0213 GREY LMSN 0225 BRWN LMSN 0232 GREY LMSN 0315 BRWN LMSN 0378 GREY LMSN 0400 WHIT LMSN 0402
NICHOL TOWNSHIP CON 16 018	17 548853 4840617 W	2013/05 6607						7212222 (C20908) A141577 P	
NICHOL TOWNSHIP CON 16 019	17 549923 4841130 W	1995/09 3518	6 6	FR 0114	57/87/10/2:0	CO		6712180 (165520)	BRWN CLAY SAND HARD 0020 GREY CLAY STNS HARD 0080 BRWN SNDS BLDR HARD 0097 BRWN ROCK HARD 0114
WEST GARAFRAXA TOWNS	17 549861 4841490 W	2012/08 7221	6.26 6.13			MO		7195811 (Z143799) A078888	BRWN SAND CLAY 0018 GREY CLAY STNS 0087 BRWN LMSN 0116 GREY LMSN 0145 BRWN LMSN 0330 BRWN LMSN 0394 GREY LMSN 0470 GREY LMSN 0485 BLUE SHLE 0495
WEST GARAFRAXA TOWNS CON 01 009	17 549986 4841171 W	1988/06 3518	6	FR 0124	40/90/12/2:0	DO		6709656 (26873)	BLCK LOAM SOFT 0002 BRWN SAND SILT CLAY 0020 GREY CLAY STNS 0075 GREY SILT CLAY LOOS 0100 BRWN ROCK 0124
WEST GARAFRAXA TOWNS CON 01 009	17 549867 4841018 W	2010/06 7147	1.97	FR 0003		MO		7148046 (M08690) A092945	BLCK LOAM 0001 BRWN SAND STNS FGRD 0014

TOWNSHIP	CON	LOT	UTM	DATE CNTR	CASING DIA	WATER	PUMP TEST	WELL USE	SCREEN	WELL	FORMATION

Notes:
UTM: UTM in Zone, Easting, Northing and Datum is NAD83; L: UTM estimated from Centroid of Lot; W: UTM not from Lot Centroid
DATE CNTR: Date Work Completedand Well Contractor Licence Number
CASING DIA: .Casing diameter in inches
WATER: Unit of Depth in Fee. See Table 4 for Meaning of Code

PUMP TEST: Static Water Level in Feet / Water Level After Pumping in Feet / Pump Test Rate in GPM / Pump Test Duration in Hour : Minutes
WELL USE: See Table 3 for Meaning of Code
SCREEN: Screen Depth and Length in feet
WELL: WEL (AUDIT #) Well Tag . A: Abandonment; P: Partial Data Entry Only
FORMATION: See Table 1 and 2 for Meaning of Code

1. Core Material and Descriptive terms

Code	Description	Code	Description	Code	Description	Code	Description	Code	Description
BLDR	BOULDERS	FCRD	FRACTURED	IRFM	IRON FORMATION	PORS	POROUS	SOFT	SOFT
BSLT	BASALT	FGRD	FINE-GRAINED	LIMY	LIMY	PRDG	PREVIOUSLY DUG	SPST	SOAPSTONE
CGRD	COARSE-GRAINED	FGVL	FINE GRAVEL	LMSN	LIMESTONE	PRDR	PREV. DRILLED	STKY	STICKY
CGVL	COARSE GRAVEL	FILL	FILL	LOAM	TOPSOIL	QRTZ	QUARTZITE	STNS	STONES
CHRT	CHERT	FLDS	FELDSPAR	LOOS	LOOSE	QSND	QUICKSAND	STNY	STONEY
CLAY	CLAY	FLNT	FLINT	LTCL	LIGHT-COLOURED	QTZ	QUARTZ	THIK	THICK
CLN	CLEAN	FOSS	FOSILIFEROUS	LYRD	LAYERED	ROCK	ROCK	THIN	THIN
CLYY	CLAYEY	FSND	FINE SAND	MARL	MARL	SAND	SAND	TILL	TILL
CMTD	CEMENTED	GNIS	GNEISS	MGRD	MEDIUM-GRAINED	SHLE	SHALE	UNKN	UNKNOWN TYPE
CONG	CONGLOMERATE	GRNT	GRANITE	MGVL	MEDIUM GRAVEL	SHLY	SHALY	VERY	VERY
CRYS	CRYSTALLINE	GRSN	GREENSTONE	MRBL	MARBLE	SHRP	SHARP	WBRG	WATER-BEARING
CSND	COARSE SAND	GRVL	GRAVEL	MSND	MEDIUM SAND	SHST	SCHIST	WDFR	WOOD FRAGMENTS
DKCL	DARK-COLOURED	GRWK	GREYWACKE	MUCK	MUCK	SILT	SILT	WTHD	WEATHERED
DLMT	DOLOMITE	GVLY	GRAVELLY	OBDN	OVERBURDEN	SLTE	SLATE		
DNSE	DENSE	GYPS	GYPSUM	PCKD	PACKED	SLTY	SILTY		
DRTY	DIRTY	HARD	HARD	PEAT	PEAT	SNDS	SANDSTONE		
DRY	DRY	HPAN	HARDPAN	PGVL	PEA GRAVEL	SNDY	SANDYOAPSTONE		

2. Core Color

Code	Description
WHIT	WHITE
GREY	GREY
BLUE	BLUE
GREN	GREEN
YLLW	YELLOW
BRWN	BROWN
RED	RED
BLCK	BLACK
BLGY	BLUE-GREY

3. Well Use

Code	Description	Code	Description
DO	Domestic	OT	Other
ST	Livestock	TH	Test Hole
IR	Irrigation	DE	Dewatering
IN	Industrial	MO	Monitoring
CO	Commercial	MT	Monitoring TestHole
MN	Municipal		
PS	Public		
AC	Cooling And A/C		
NU	Not Used		

4. Water Detail

Code	Description	Code	Description
FR	Fresh	GS	Gas
SA	Salty	IR	Iron
SU	Sulphur		
MN	Mineral		
UK	Unknown		

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Appendix B

Borehole Logs

BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 26-10-22 **COMPLETED** 26-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.43 m / Elev 421.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining. (0.3)	SS 1	1-3-4-6 (7)					
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining.	SS 2	3-2-3-4 (5)					
422	2		(1.9) **SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.	SS 3	2-3-9-9 (12)					
				SS 4	3-6-5-4 (11)					
421	3			SS 5	2-6-5-10 (11)					
420	4			SS 6	4-7-10-17 (17)					
419	5			SS 7	9-23-50 (73)					
418	6		(6.3) **SANDY SILT TILL** trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining.	SS 8	9-12-48-42 (60)					
417	7									
416	8			SS	19-29-32-31					

(Continued Next Page)

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / FINES CONTENT (%)	WELL CONSTRUCTION
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining. *(continued)*	9	(61)					
415	9			SS 10	23-32-44-50 (76)					
414	10									
413	11			SS 11	40-50					
412	12									
411	13			SS 12	24-33-20-47 (53)					
410	14			SS 13	50/0.10				>>	
409	15									
			15.3	SS 14	50/0.10				>>	

End of Borehole at 15.34 mbgs.

SPT N VALUE: 20 40 60 80

PL MC LL: 20 40 60 80

FINES CONTENT (%): 20 40 60 80

BORING NUMBER BH1S

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.34 m / Elev 422.54 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining. (0.3)							
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining.							
422	2		(1.9) **SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.							
421	3									
420	4									
419	5		(5.2) **End of Borehole at 5.18 mbgs.**							

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH2

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.47 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.23 m / Elev 422.24 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining. (0.3)	SS 1	2-4-8-8 (12)					
423	1		**SANDY SILT TILL** trace to some gravel inclusions; dark brown to brown, moist, compact no odour, no staining.	SS 2	3-4-9-7 (13)					
422			(1.7)	SS 3	7-8-11-10 (19)					
	2		**SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact no odour, no staining.							
421				SS 4	6-7-10-11 (17)					
	3									
420				SS 5	5-7-10-11 (17)					
	4			SS 6	5-8-13-13 (21)					
419										
	5		(5.0)	SS 7	8-19-19-15 (38)					
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, dense no odour, no staining. (5.2)							

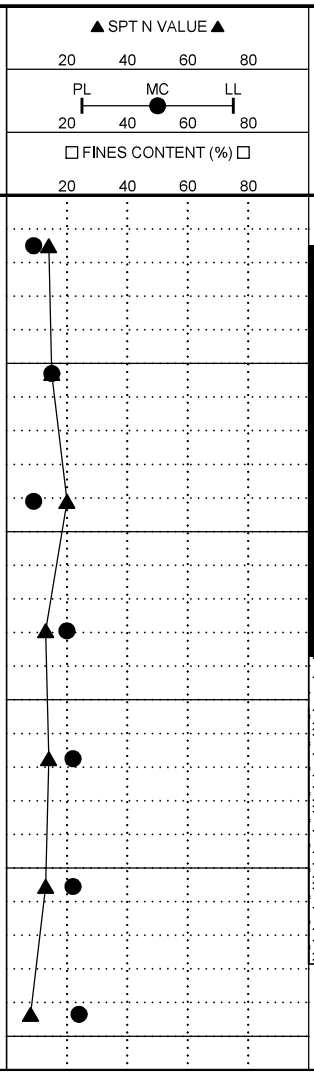
End of Borehole at 5.18 mbgs.

BORING NUMBER BH3

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.06 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.64 m / Elev 422.42 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
425			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-5-9-12 (14)			
424	1		**SANDY SILT TILL** trace to some gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining.	1.6	SS 2	9-10-5-6 (15)			
423	2		**SILTY SAND** fine to medium grained; brown, moist to wet, compact to loose no odour, no staining.		SS 3	7-11-9-8 (20)			
422	3				SS 4	4-5-8-5 (13)			
421	4				SS 5	5-6-8-4 (14)			
420	5		becoming grey at 5.0m	5.2	SS 6	6-6-7-6 (13)			
					SS 7	4-3-5-5 (8)			



End of Borehole at 5.18 mbgs.

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH4

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.668 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.21 m / Elev 423.46 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining. (0.2)	SS 1	2-5-7-5 (12)					
425	1		**SANDY SILT TILL** trace gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining. (1.5)	SS 2	3-5-8-7 (13)					
424	2		**SILTY SAND** fine to medium grained; brown, wet to saturated, compact to loose no odour, no staining.	SS 3	4-5-5-5 (10)					
423	3			SS 4	4-5-5-7 (10)					
422	4			SS 5	2-2-7-4 (9)					
			becoming grey at about 4.1m (4.5)	SS 6	4-10-8-4 (18)					
421	5		**SANDY SILT TILL** trace to some clay,trace gravel inclusions, scattered sand seams; grey, wet, compact no odour, no staining. (5.2)	SS 7	3-6-4-5 (10)					

End of Borehole at 5.18 mbgs.

BORING NUMBER BH5

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.339 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.82 m / Elev 423.52 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-3-5-5 (8)					
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	3-2-2-1 (4)					
426											
	2				SS 3	3-4-5-6 (9)					
425					SS 4	4-6-7-8 (13)					
	3										
424					SS 5	7-12-11-12 (23)					
	4										
423				4.8							
	5		**SANDY SILT TILL** trace to some gravel inclusions; grey, moist, compact no odour, no staining.	5.2	SS 6	8-14-13-18 (27)					

End of Borehole at 5.18 mbgs.

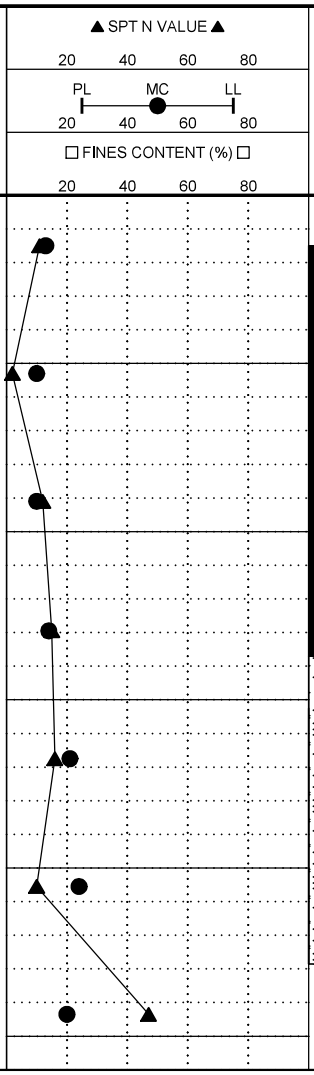
BORING NUMBER BH6

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.327 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.88 m / Elev 423.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.3	SS 1	1-5-6-4 (11)			
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	2-1-1-1 (2)			
426									
	2				SS 3	1-5-7-9 (12)			
425					SS 4	3-6-9-7 (15)			
	3								
424					SS 5	5-8-8-10 (16)			
	4				SS 6	4-4-6-7 (10)			
423				4.7					
	5		**SANDY SILT TILL** trace to some gravel inclusions; brown, moist, dense no odour, no staining.	5.2	SS 7	13-19-28-37 (47)			

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 24-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AK **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 11.78 m / Elev 413.57 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
425			**TOPSOIL** 0.2 sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	SS 1	2-4-6-6 (10)					
	1		**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.	SS 2	5-4-5-6 (9)					
424										
	2			SS 3	7-9-10-10 (19)					
423				SS 4	3-5-6-6 (11)					
	3									
422				SS 5	5-6-8-7 (14)					
	4			SS 6	3-8-9-9 (17)					
421										
	5			SS 7	8-8-10-8 (18)					
420										
	6									
419			sand and gravel, some silt, coarse grained, clayey seams; wet	SS 8	18-16-50 (66)					
	7									
418			7.3 **SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining.	SS 9	50/0.10					
	8									

(Continued Next Page)

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BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
417			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	9									
416				SS 10	50/0.13				>>	
	10									
415										
	11			SS 11	41-50					
414										
	12									
413				SS 12	50/0.10				>>	
	13									
412										
	14			SS 13	45-45-50 (95)					
411										
	15									
410				SS 14	16-16-50 (66)					
	16									
409										
	17			SS 15	50/0.13				>>	

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BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
408			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	18									
407				SS 16	50/0.13				>>	
	19									
406										
	20			SS 17	50/0.13				>>	
405										
	21									
404				SS 18	50/0.13				>>	
	22									
403										
	23			SS 19	50/0.13				>>	
402										
	24									
401				SS 20	50/0.13				>>	
	25									
			25.3	SS 21	40-50					

End of Borehole at 25.3 mbgs.

BORING NUMBER BH7S

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.72 m / Elev 422.63 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
425			**TOPSOIL** 0.2 sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.							
	1		**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.							
424										
	2									
423										
	3									
422										
	4									
421										
	5		5.2							

End of Borehole at 5.18 mbgs.

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BURNSIDE

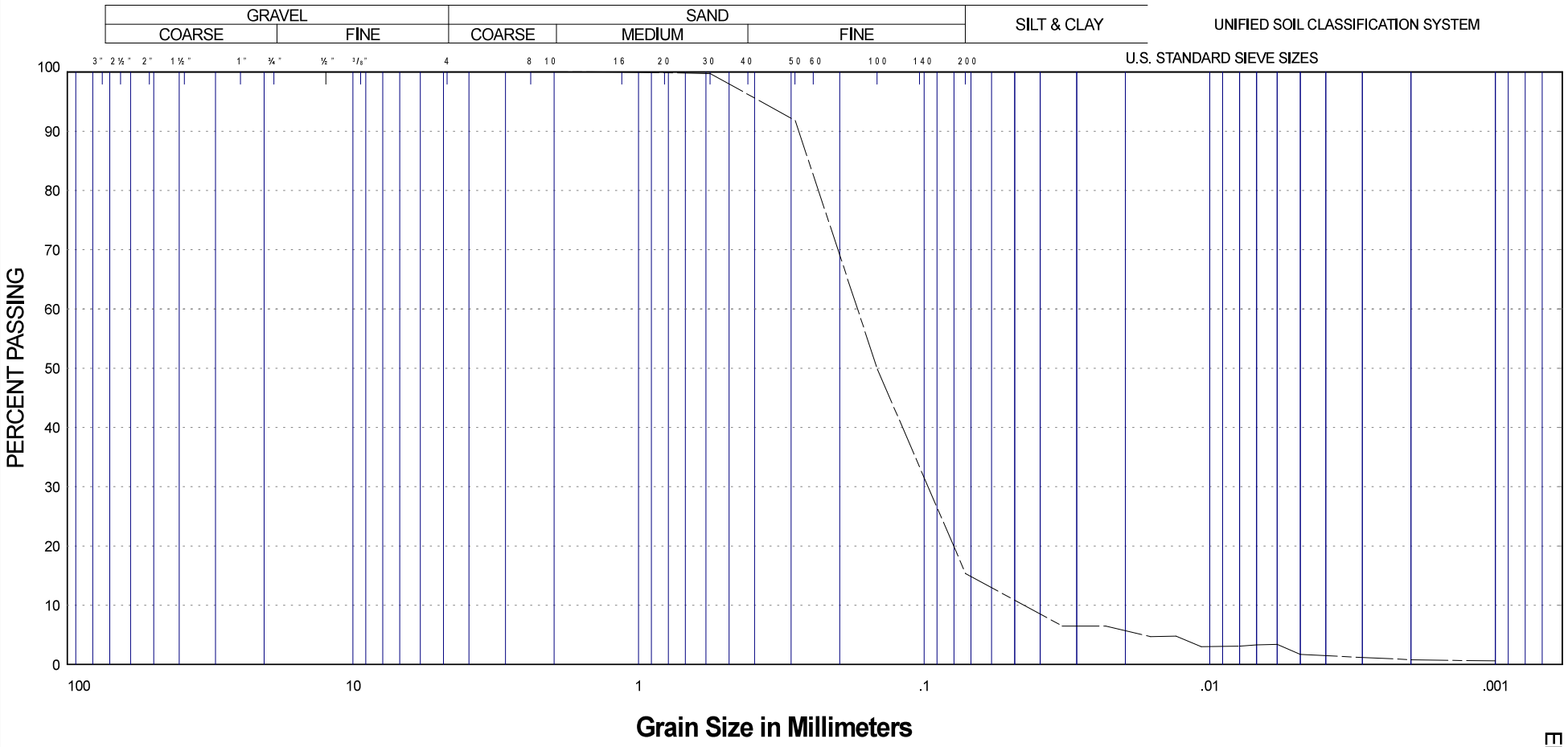
[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Hydraulic Conductivity

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 1

SAMPLE N°: 6

DEPTH: 3.8 - 4.4 m±

ELEVATION: 420.1 - 419.5 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SAND, some silt

PLASTIC PROPERTIES

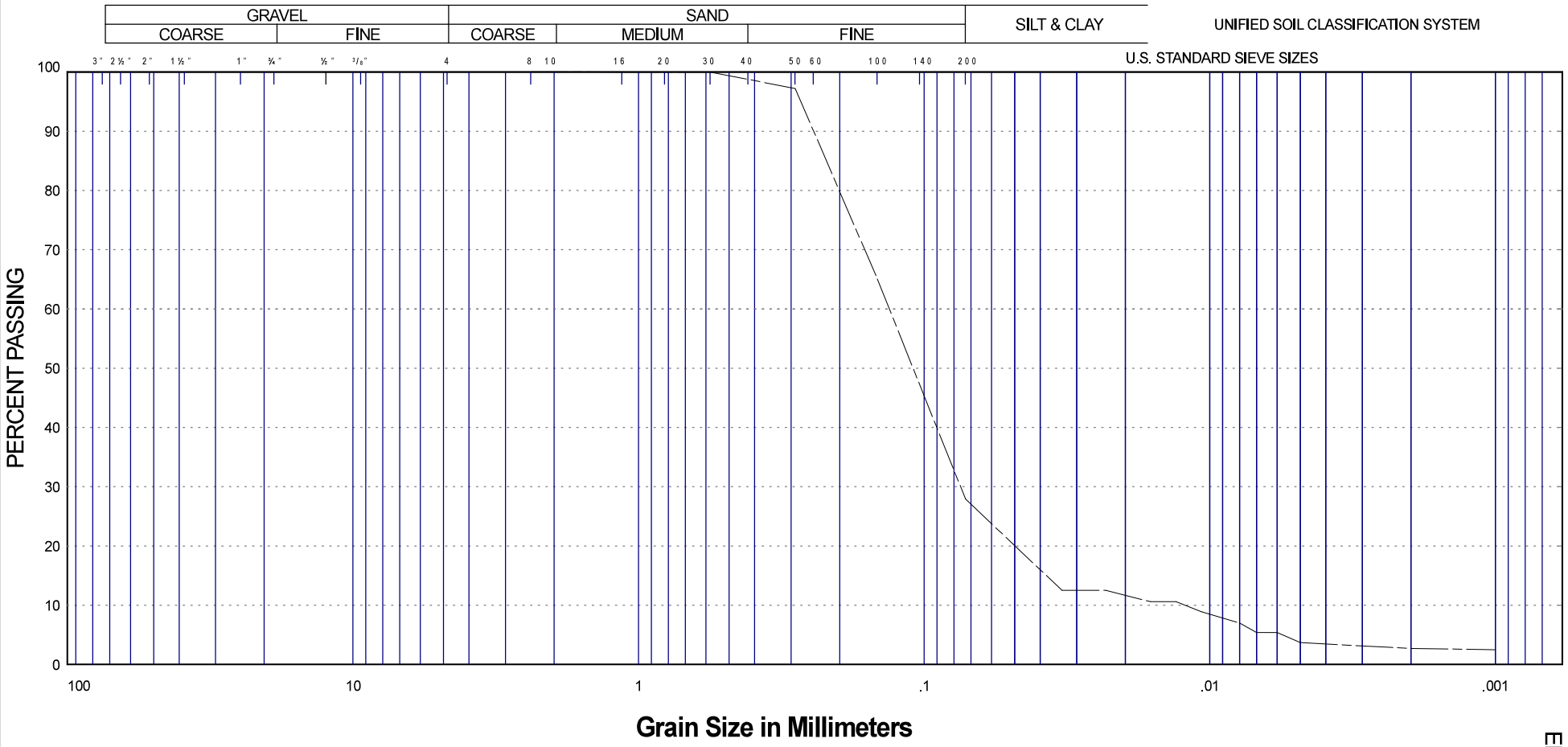
LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 18.6

ENCLOSURE N° 11

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 7

SAMPLE N°: 7

DEPTH: 4.6 - 5.2 m±

ELEVATION: 420.8 - 420.2 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SILTY SAND, trace clay

PLASTIC PROPERTIES

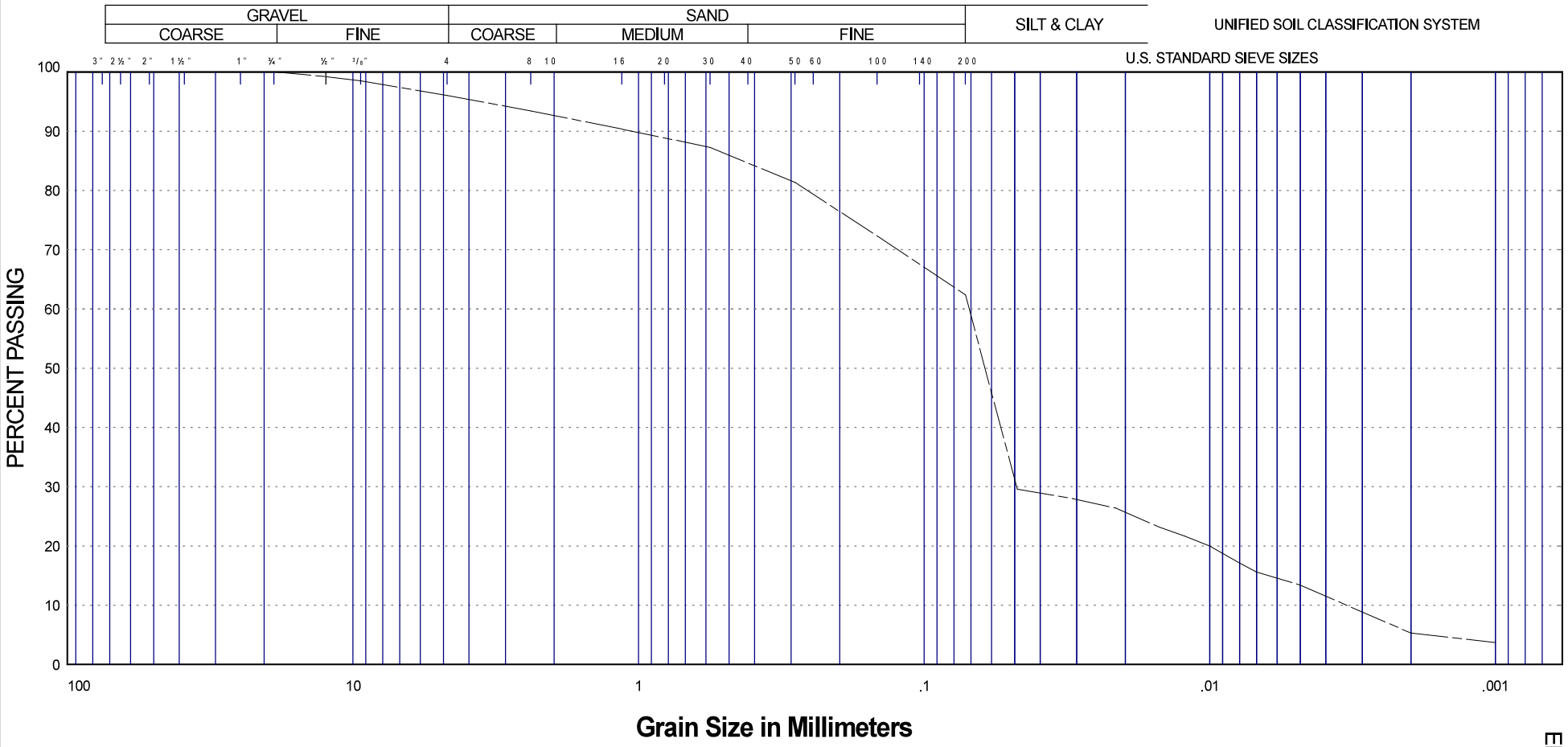
LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 20.0

ENCLOSURE N° 12

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 1

SAMPLE N°: 12

DEPTH: 12.2 - 12.8 m±

ELEVATION: 411.7 - 411.1 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

SANDY SILT, trace clay, trace gravel (ML)

PLASTIC PROPERTIES

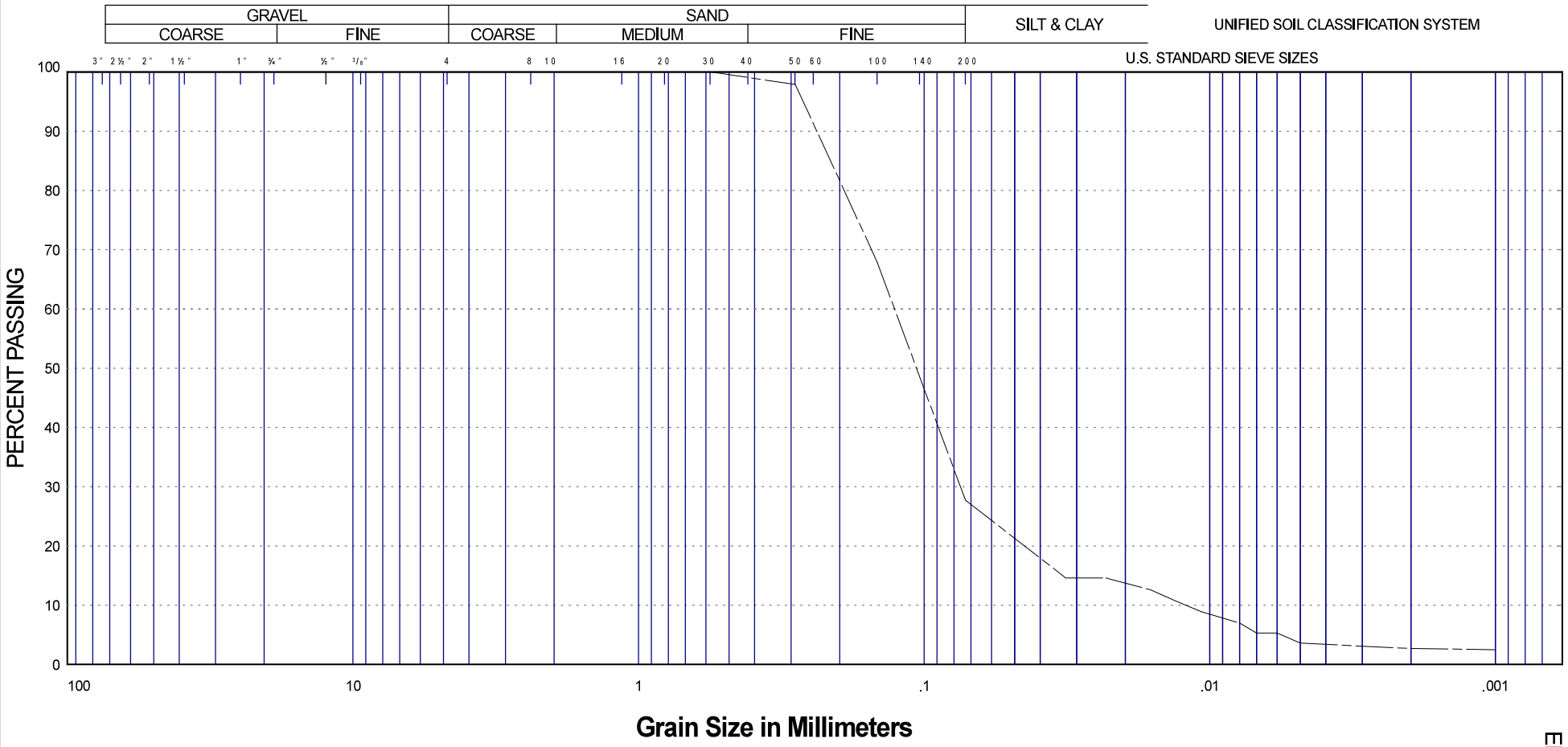
LIQUID LIMIT	% = 10.6
PLASTIC LIMIT	% = 9.2
PLASTICITY INDEX	% = 1.4
MOISTURE CONTENT	% = 10.0

ENCLOSURE N° 13

JLP SERVICES INC.

GRAIN SIZE DISTRIBUTION

OUR REFERENCE N° G4599-22-6



PROJECT: Operations Centre

LOCATION: 965 Gartshore Street, Fergus, ON

BOREHOLE N°: 7

SAMPLE N°: 15

DEPTH: 16.8 - 17.4 m±

ELEVATION: 408.6 -408.0 m±

COEFFICIENT OF UNIFORMITY:

COEFFICIENT OF CURVATURE:

Classification of Sample and Group Symbol:

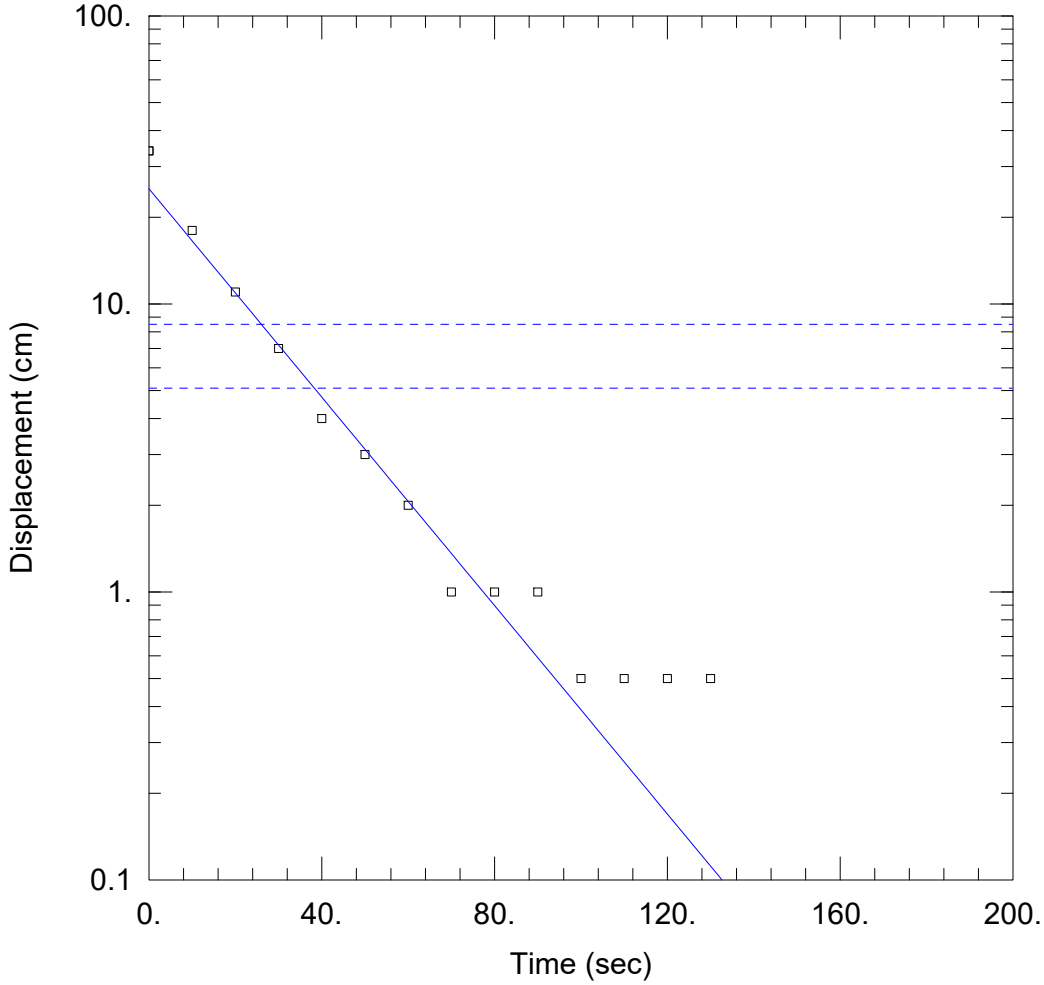
SILTY SAND, trace clay (SM)

PLASTIC PROPERTIES

LIQUID LIMIT	% = -
PLASTIC LIMIT	% = -
PLASTICITY INDEX	% = -
MOISTURE CONTENT	% = 21.5

ENCLOSURE N° 14

JLP SERVICES INC.



HYDRAULIC CONDUCTIVITY TEST - BH2 - RISING HEAD SLUG - SCREENED IN SILTY SAND

PROJECT INFORMATION

Company: R.J. Burnside
Client: Centre Wellington
Project: 300055234
Location: Fergus, ON
Test Well: BH2
Test Date: Dec 1 2022

AQUIFER DATA

Saturated Thickness: 334. cm

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH2)

Initial Displacement: 34. cm
Total Well Penetration Depth: 573. cm
Casing Radius: 2.54 cm

Static Water Column Height: 334. cm
Screen Length: 152. cm
Well Radius: 10. cm

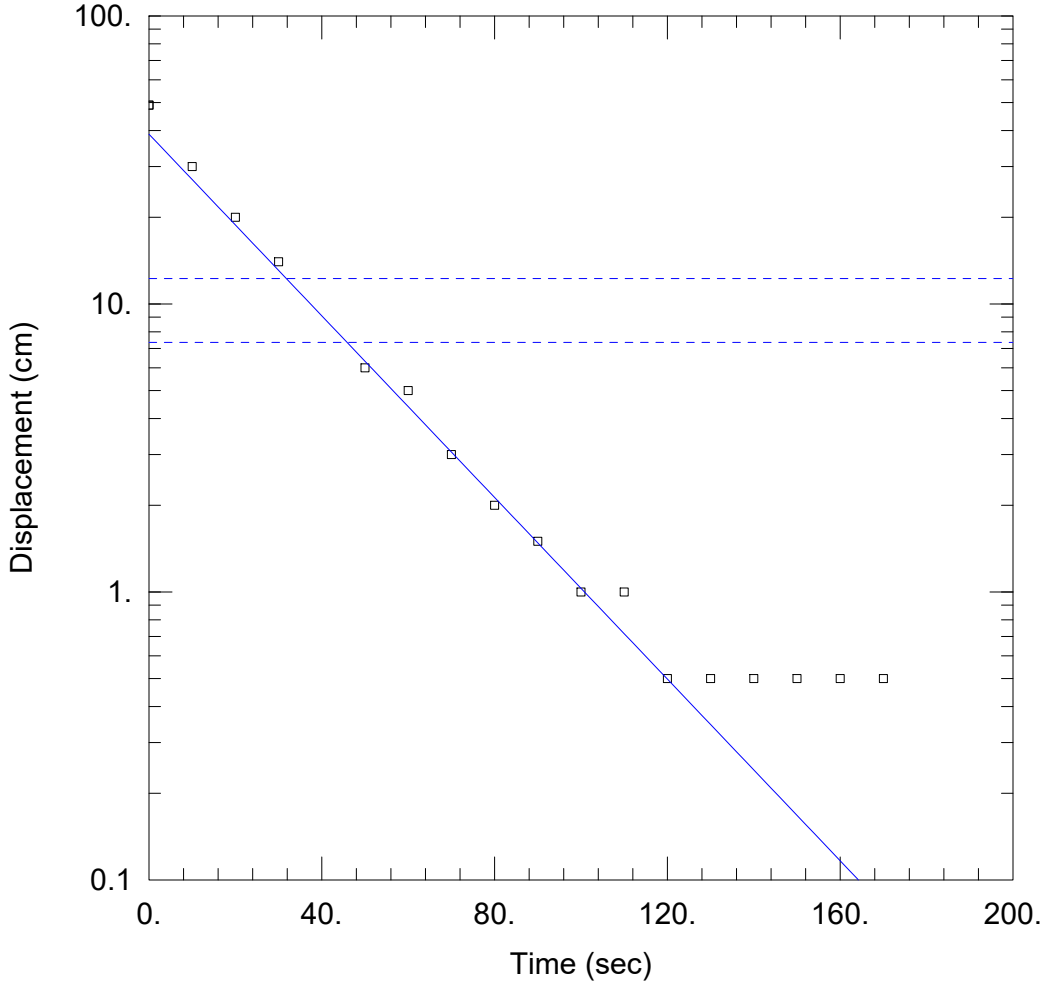
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.004037 cm/sec

y0 = 25.11 cm



HYDRAULIC CONDUCTIVITY TEST - BH3 - RISING HEAD SLUG - SCREENED IN SILTY SAND

PROJECT INFORMATION

Company: R.J. Burnside
Client: Centre Wellington
Project: 300055234
Location: Fergus, ON
Test Well: BH3
Test Date: Dec 1 2022

AQUIFER DATA

Saturated Thickness: 202. cm

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH3)

Initial Displacement: 49. cm
Total Well Penetration Depth: 575. cm
Casing Radius: 2.54 cm

Static Water Column Height: 202. cm
Screen Length: 152. cm
Well Radius: 10. cm

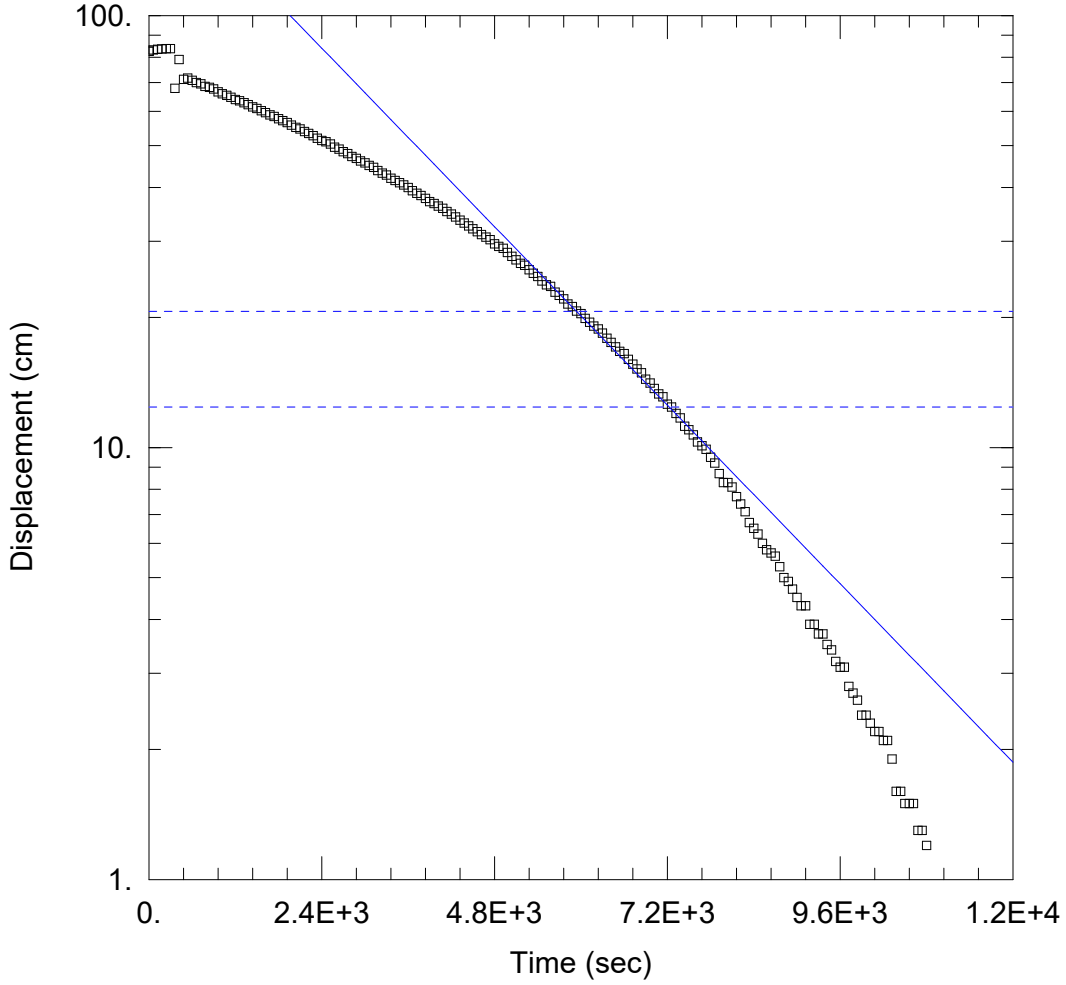
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.003518 cm/sec

y0 = 38.85 cm



HYDRAULIC CONDUCTIVITY TEST - BH5 - RISING HEAD SLUG - SCREENED IN SILTY SAND

PROJECT INFORMATION

Company: R.J. Burnside
Client: Centre Wellington
Project: 300055234
Location: Fergus, ON
Test Well: BH3
Test Date: Dec 1 2022

AQUIFER DATA

Saturated Thickness: 90. cm

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH5)

Initial Displacement: 82.7 cm
Total Well Penetration Depth: 152. cm
Casing Radius: 2.54 cm

Static Water Column Height: 90. cm
Screen Length: 152. cm
Well Radius: 10. cm
Gravel Pack Porosity: 0.3

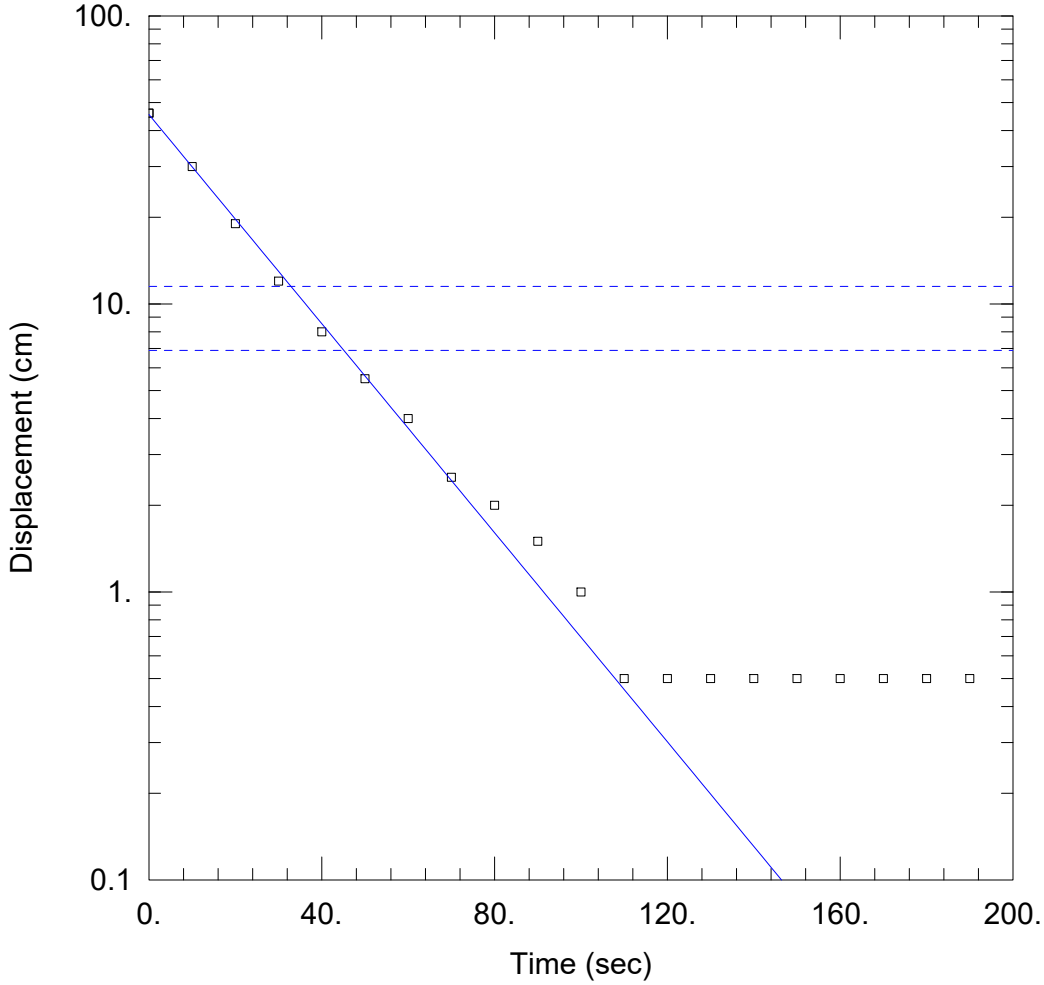
SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.0004029 cm/sec

y0 = 217.6 cm



HYDRAULIC CONDUCTIVITY TEST - BH7S - RISING HEAD SLUG - SCREENED IN SILTY SAND

PROJECT INFORMATION

Company: R.J. Burnside
Client: Centre Wellington
Project: 300055234
Location: Fergus, ON
Test Well: BH7S
Test Date: Dec 1 2022

AQUIFER DATA

Saturated Thickness: 200. cm

Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (BH7S)

Initial Displacement: 46. cm
Total Well Penetration Depth: 575. cm
Casing Radius: 2.54 cm

Static Water Column Height: 200. cm
Screen Length: 152. cm
Well Radius: 10. cm

SOLUTION

Aquifer Model: Unconfined

Solution Method: Hvorslev

K = 0.004049 cm/sec

y0 = 45.42 cm

BURNSIDE

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Appendix D

Groundwater Levels

BURNSIDE

Centre Wellington Operations Centre

Table D-1 - Groundwater Elevations

Monitoring Well	Stick-up (magl)	Well Depth (mbgl)	Ground Elevation* (masl)	Measuring Point Elevation (masl)	01-Dec-22		05-Dec-22		16-Jan-23		08-Feb-23	
					Water Level (mbgl)	Water Elevation (masl)	Water Level (mbgl)	Water Elevation (masl)	Water Level (mbgl)	Water Elevation (masl)	Water Level (mbgl)	Water Elevation (masl)
BH1s	1.02	**4.36**	**423.81**	424.83	1.34	422.47	1.34	422.47	1.27	422.54	1.34	422.47
BH1d	1.14	**14.54**	**423.88**	425.02	2.47	421.41	2.43	421.45	2.46	421.42	2.57	421.31
BH2	1.16	**4.57**	**423.47**	424.63	1.23	422.24	1.23	422.24	1.22	422.25	1.31	422.16
BH3	1.05	**4.70**	**425.06**	426.11	2.68	422.38	2.64	422.42	2.46	422.60	2.57	422.49
BH4	1.17	**4.24**	**425.67**	426.84	2.25	423.42	2.21	423.46	1.92	423.75	2.05	423.62
BH5	1.12	**4.71**	**427.34**	428.46	3.81	423.53	3.82	423.52	3.70	423.64	3.62	423.72
BH6	1.02	**4.66**	**427.33**	428.35	3.88	423.45	3.88	423.45	3.70	423.63	3.75	423.58
BH7s	0.98	**4.77**	**425.35**	426.33	2.77	422.58	2.72	422.63	2.51	422.84	2.64	422.71
BH7d	1.12	**25.16**	**425.35**	426.47	11.83	413.52	11.78	413.57	11.75	413.60	11.76	413.59

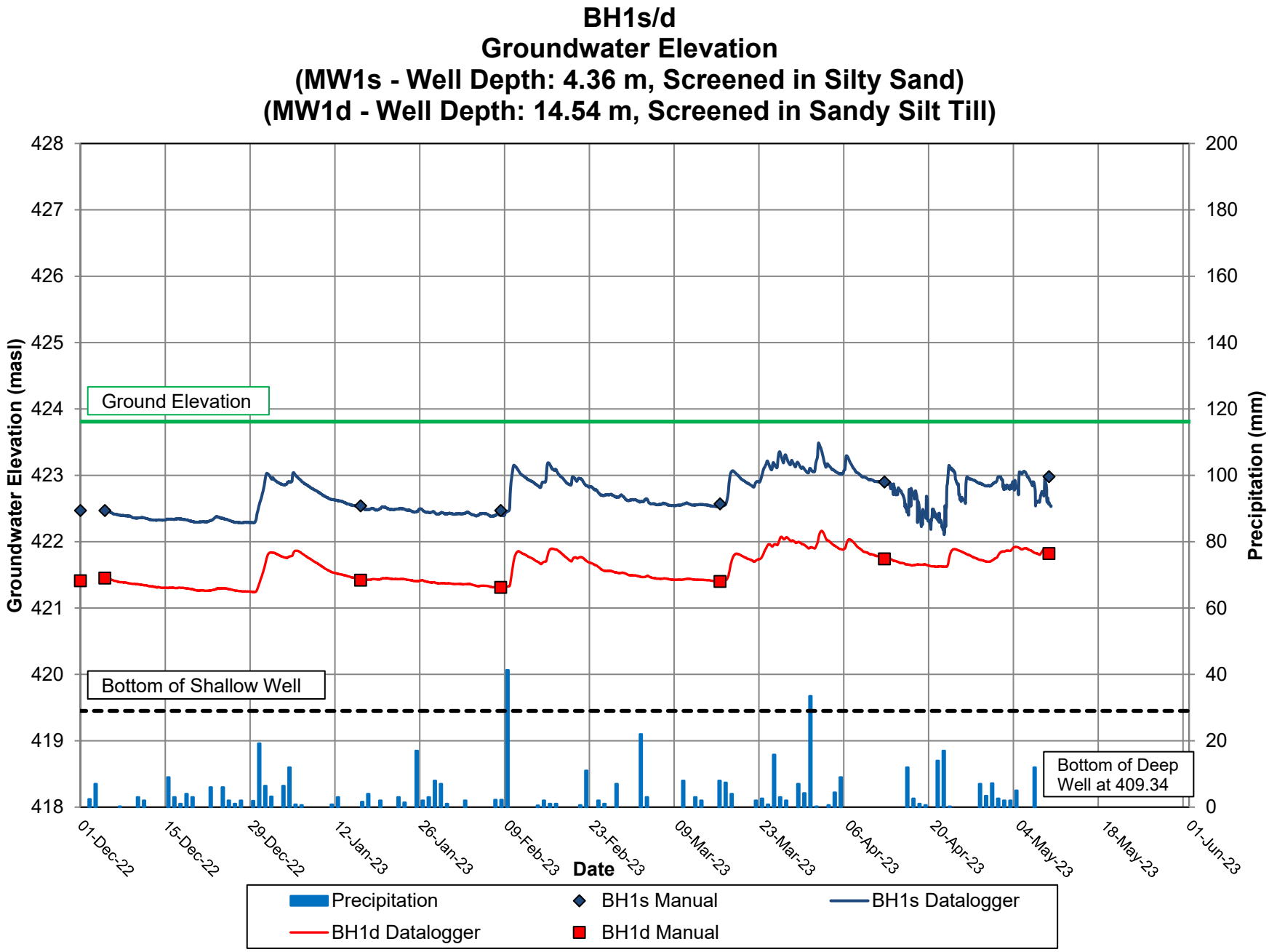
magl - metres above ground level
mbgl - metres below ground level
masl - metres above sea level
* surveyed ground elevations (JLP, 2022)

Centre Wellington Operations Centre

Table D-1 - Groundwater Elevations

Monitoring Well	Stick-up (magl)	Well Depth (mbgl)	Ground Elevation* (masl)	Measuring Point Elevation (masl)	16-Mar-23		12-Apr-23		09-May-23	
					Water Level (mbgl)	Water Elevation (masl)	Water Level (mbgl)	Water Elevation (masl)	Water Level (mbgl)	Water Elevation (masl)
BH1s	1.02	**4.36**	**423.81**	424.83	1.24	422.57	0.91	422.90	0.83	422.98
BH1d	1.14	**14.54**	**423.88**	425.02	2.48	421.40	2.14	421.74	2.06	421.82
BH2	1.16	**4.57**	**423.47**	424.63	1.23	422.24	0.94	422.53	0.86	422.61
BH3	1.05	**4.70**	**425.06**	426.11	2.36	422.70	1.65	423.41	1.58	423.48
BH4	1.17	**4.24**	**425.67**	426.84	1.83	423.84	0.50	425.17	0.71	424.96
BH5	1.12	**4.71**	**427.34**	428.46	3.30	424.04	2.41	424.93	2.31	425.03
BH6	1.02	**4.66**	**427.33**	428.35	3.47	423.86	2.85	424.48	2.71	424.62
BH7s	0.98	**4.77**	**425.35**	426.33	2.43	422.92	1.74	423.61	1.64	423.71
BH7d	1.12	**25.16**	**425.35**	426.47	11.38	413.97	10.72	414.63	10.50	414.85

magl - metres above ground level
mbgl - metres below ground level
masl - metres above sea level
* surveyed ground elevations (JLP, 2022)



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300055234

Figure D-1

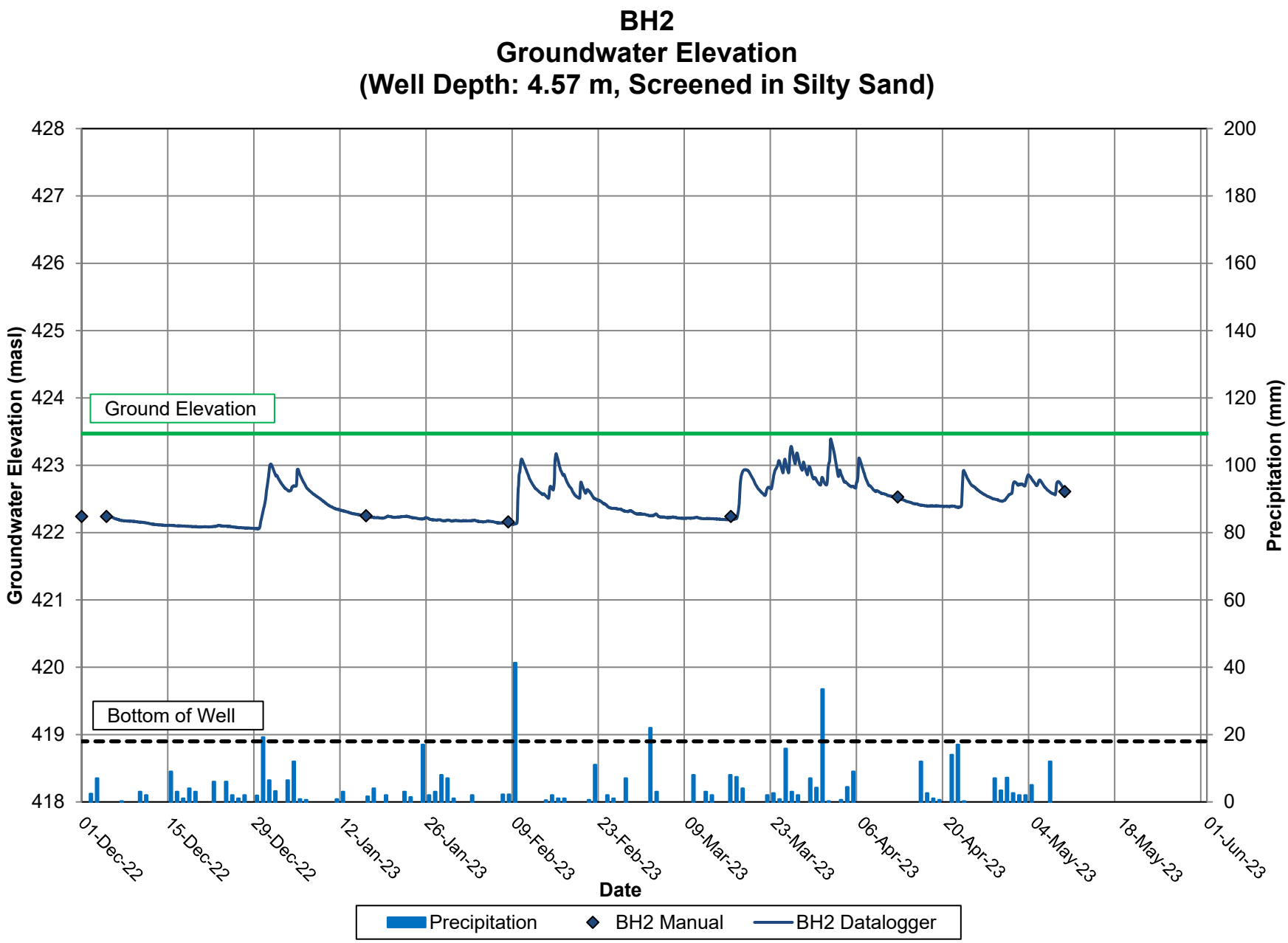

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Figure D-2

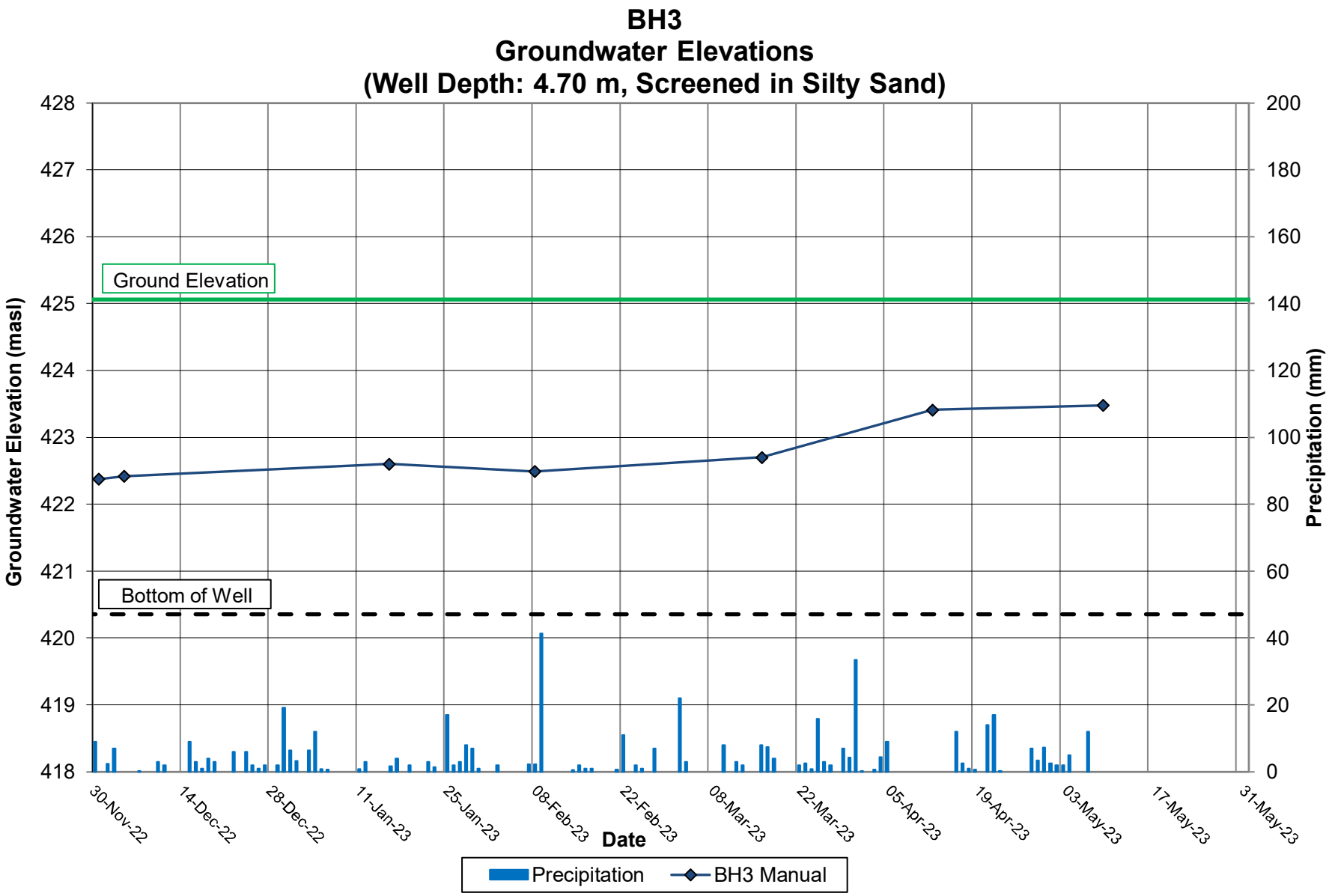

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Figure D-3

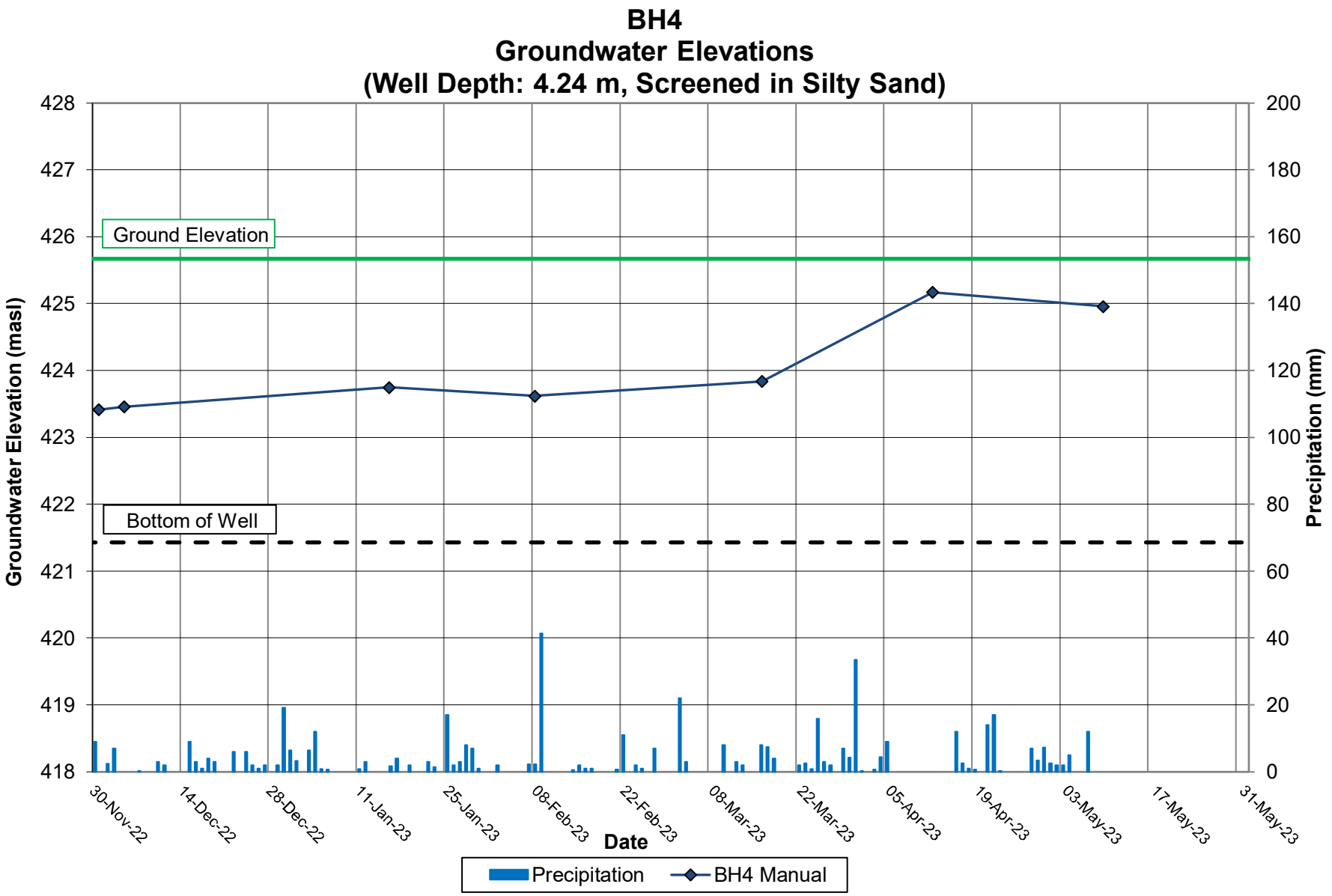

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Figure D-4

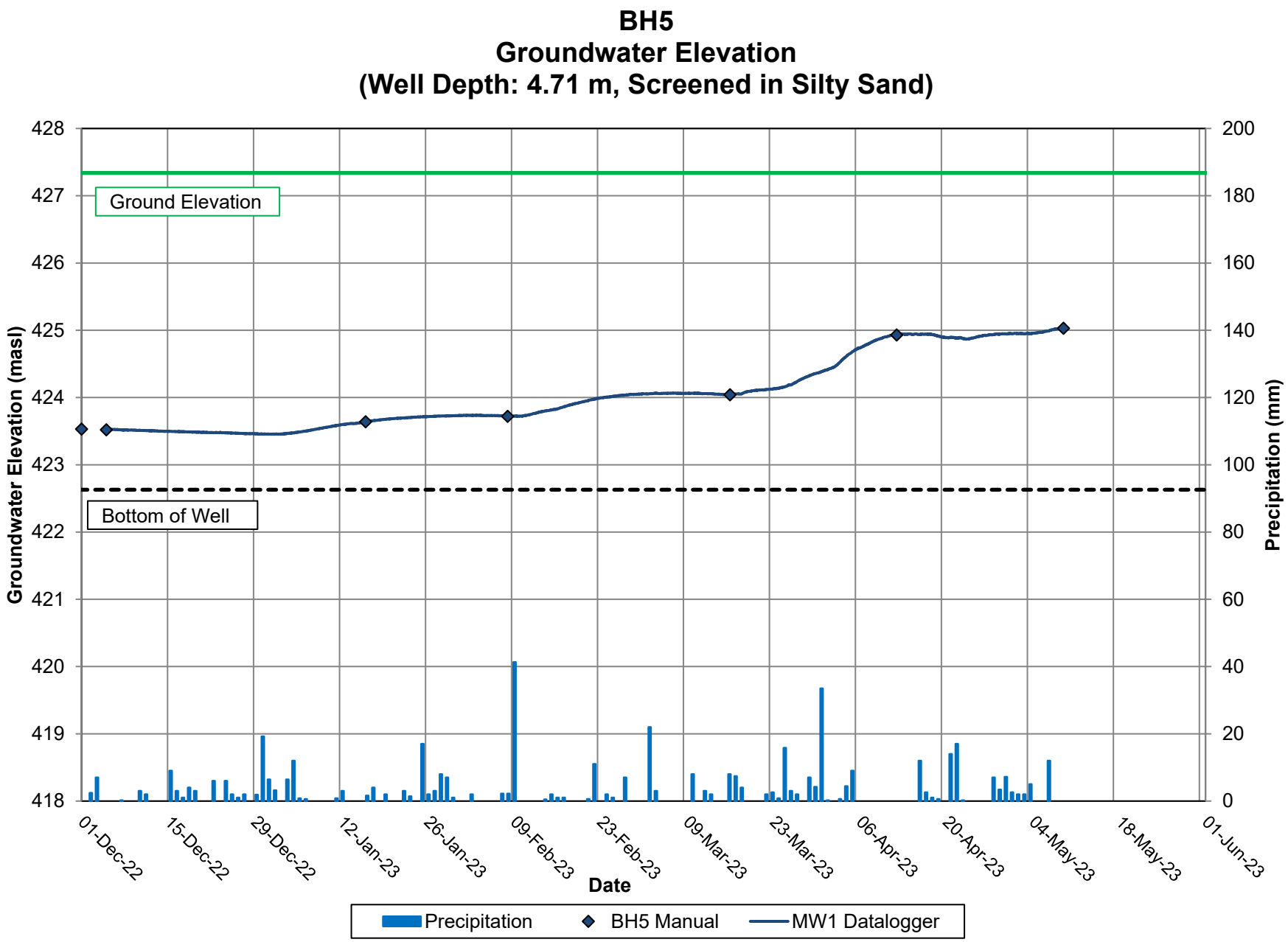

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Figure D-5

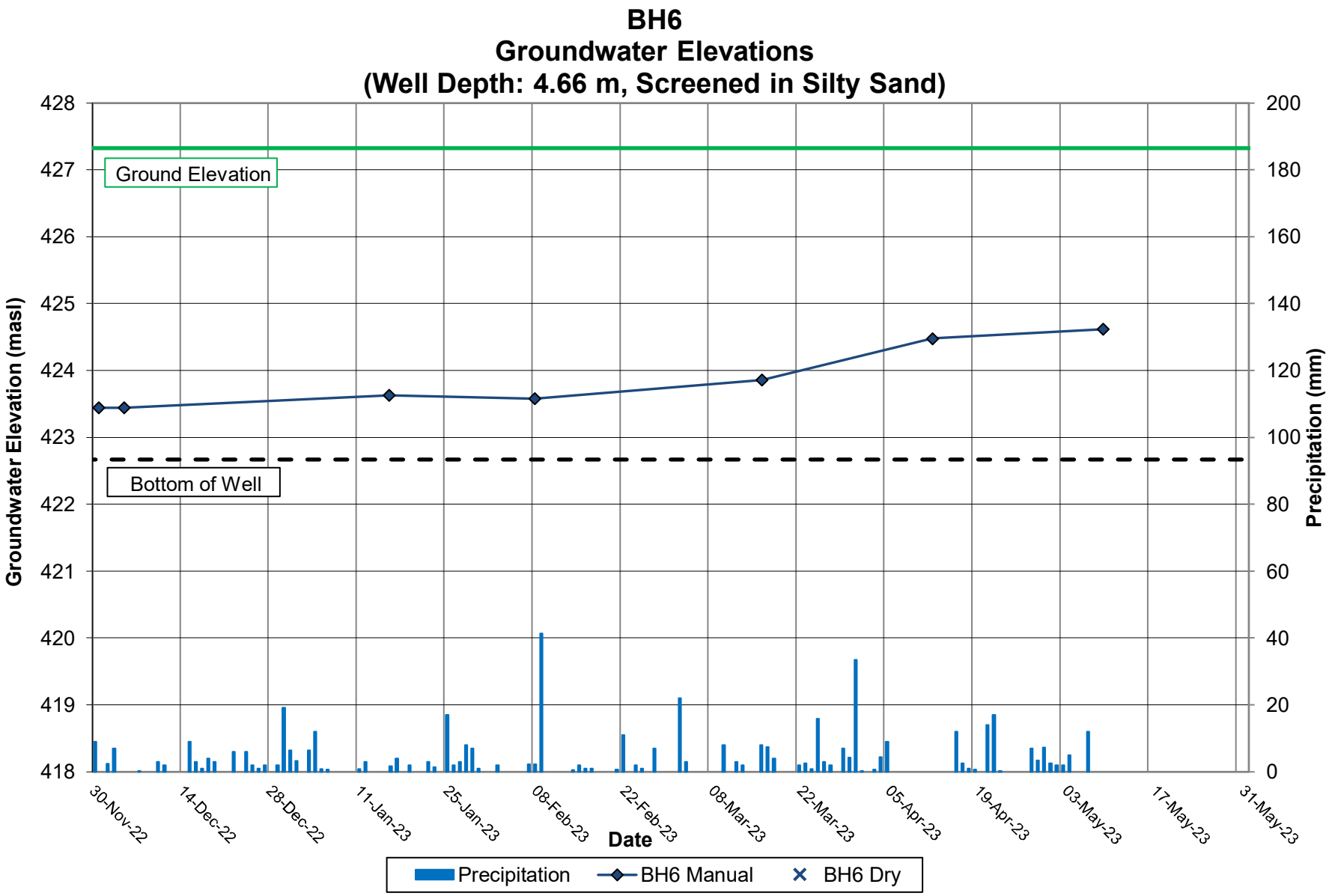

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Figure D-6

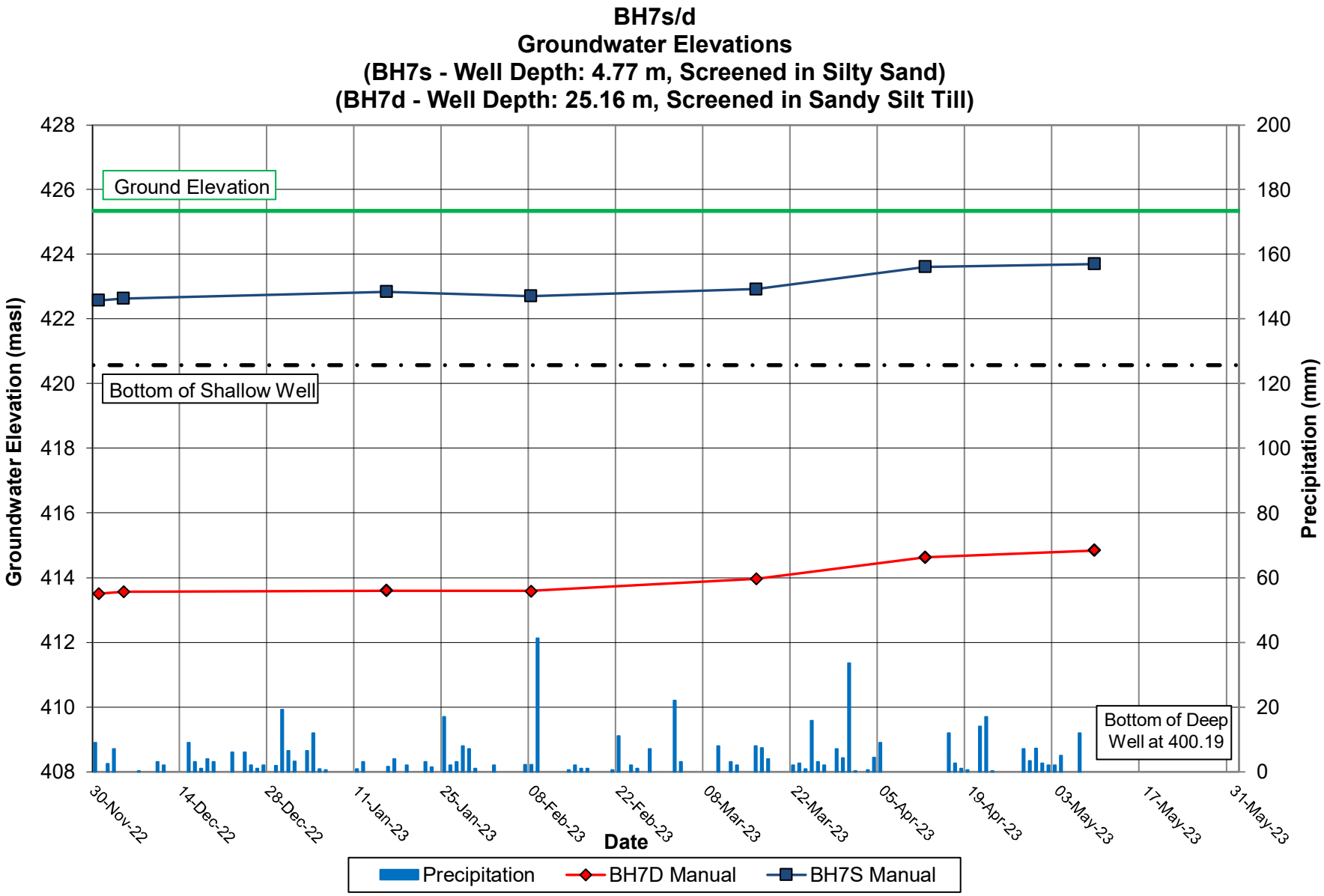

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Figure D-7

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

Groundwater Quality

Centre Wellington Operations Centre

Table E-1

Groundwater Analysis Results

			Location	**BH2**	**BH5**
			Matrix	Groundwater	Groundwater
			Sampling Date	**12/1/2022**	**12/1/2022**
Parameter	***ODWS***	***RDL***	***UNITS***	***Result***	***Result***
Anion Sum	-	N/A	me/L	6.64	7.34
Bicarb. Alkalinity (calc. as CaCO3)	$30\text{-}500_{OG}$	1.0	mg/L	240	250
Calculated TDS	500_{AO}	1.0	mg/L	370	410
Carb. Alkalinity (calc. as CaCO3)	-	1.0	mg/L	2	3
Cation Sum	-	N/A	me/L	7.54	8.02
Hardness (CaCO3)	$80\text{-}100_{OG}$	1.0	mg/L	**330**	**370**
Ion Balance (% Difference)	-	N/A	%	6.35	4.44
Langelier Index (@ 20C)	-	N/A	N/A	1	1
Langelier Index (@ 4C)	-	N/A	N/A	0.693	0.768
Saturation pH (@ 20C)	-	N/A	N/A	7	7
Saturation pH (@ 4C)	-	N/A	N/A	7.31	7.28
Total Ammonia-N	-	0.1	mg/L	ND	0
Conductivity	-	1.0	umho/cm	680	710
Dissolved Organic Carbon	5_{AO}	0.5	mg/L	1	1
Orthophosphate (P)	-	0.010	mg/L	ND	ND
pH	$6.5\text{-}8.5_{OG}$	N/A	pH	8	8
Dissolved Sulphate (SO4)	500_{AO}	1.0	mg/L	4.6	53.0
Alkalinity (Total as CaCO3)	-	1.0	mg/L	240	260
Dissolved Chloride (Cl-)	250_{AO}	1.0	mg/L	47	36
Nitrite (N)	1_{MAC}	0.0	mg/L	ND	0
Nitrate (N)	10_{MAC}	0.10	mg/L	4.80	1.06
Nitrate + Nitrite (N)	10_{MAC}	0.1	mg/L	5	1
Dissolved Aluminum (Al)	0.1_{OG}	0.0050	mg/L	ND	0.0085
Dissolved Antimony (Sb)	0.006_{IMAC}	0.0	mg/L	ND	ND
Dissolved Arsenic (As)	0.01_{IMAC}	0.0010	mg/L	ND	ND
Dissolved Barium (Ba)	1_{MAC}	0.0	mg/L	0.04	0.02
Dissolved Beryllium (Be)	-	0.00050	mg/L	ND	ND
Dissolved Boron (B)	5_{IMAC}	0.0	mg/L	0.015	0.018
Dissolved Cadmium (Cd)	0.005_{MAC}	0.00010	mg/L	ND	ND
Dissolved Calcium (Ca)	-	0.2	mg/L	97	100
Dissolved Chromium (Cr)	0.05_{MAC}	0.0050	mg/L	ND	ND
Dissolved Cobalt (Co)	-	0.0	mg/L	ND	ND
Dissolved Copper (Cu)	1_{AO}	0.0010	mg/L	0.0018	0.0017
Dissolved Iron (Fe)	0.3_{AO}	0.1	mg/L	ND	ND
Dissolved Lead (Pb)	0.01_{MAC}	0.00050	mg/L	ND	ND
Dissolved Magnesium (Mg)	-	0.1	mg/L	21	29
Dissolved Manganese (Mn)	0.05_{AO}	0.0020	mg/L	ND	**0.28**
Dissolved Molybdenum (Mo)	-	0.0	mg/L	ND	0
Dissolved Nickel (Ni)	-	0.0010	mg/L	ND	0.0012
Dissolved Phosphorus (P)	-	0.1	mg/L	ND	ND
Dissolved Potassium (K)	-	0.20	mg/L	10.0	1.7
Dissolved Selenium (Se)	0.01_{MAC}	0.0	mg/L	ND	ND
Dissolved Silicon (Si)	-	0.050	mg/L	4.7	6.2
Dissolved Silver (Ag)	-	0.0	mg/L	ND	ND
Dissolved Sodium (Na)	20_{OG}; 200_{MOH}	0.10	mg/L	17	12
Dissolved Strontium (Sr)	-	0.0	mg/L	0	0
Dissolved Thallium (Tl)	-	0.000050	mg/L	ND	0.0001
Dissolved Titanium (Ti)	-	0.0	mg/L	ND	ND
Dissolved Uranium (U)	0.02_{MAC}	0.00010	mg/L	0.0002	0.0008
Dissolved Vanadium (V)	-	0.0	mg/L	ND	ND
Dissolved Zinc (Zn)	5_{AO}	0.0050	mg/L	ND	0.0058

LEGEND	
Bold & Red	Exceedes criteria
N/A	Not applicable
RDL	Reportable Detection limit
ODWS	Ontario Drinking Water Standards, Objectives and Guidelines (revised June 2006)
MAC	ODWS Maximum Acceptable Concentration
IMAC	ODWS Interim Maximum Acceptable Concentration
AO	ODWS Aesthetic Objective
OG	ODWS Operational Guideline
MOH	Medical Officer of Health reporting limit

Your Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Your C.O.C. #: 907634-01-01

Attention: Patty Workman

RJ Burnside Associates Ltd
292 Speedvale Ave W
Unit 20
Guelph, ON
CANADA N1H 1C4

Report Date: 2022/12/08
Report #: R7422272
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2Z5173
Received: 2022/12/02, 14:18

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	2	N/A	2022/12/05	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	2	N/A	2022/12/06	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	2	N/A	2022/12/08	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	2	N/A	2022/12/05	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	2	N/A	2022/12/05	CAM SOP-00446	SM 23 5310 B m
Hardness (calculated as CaCO3)	2	N/A	2022/12/05	CAM SOP 00102/00408/00447	SM 2340 B
Dissolved Metals by ICPMS	2	N/A	2022/12/05	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	2	N/A	2022/12/08		
Anion and Cation Sum	2	N/A	2022/12/06		
Total Ammonia-N	2	N/A	2022/12/06	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (2)	2	N/A	2022/12/06	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	1	2022/12/03	2022/12/05	CAM SOP-00413	SM 4500H+ B m
pH	1	2022/12/05	2022/12/05	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	2	N/A	2022/12/07	CAM SOP-00461	SM 23 4500-P E m
Sat. pH and Langelier Index (@ 20C)	2	N/A	2022/12/08		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2022/12/08		Auto Calc
Sulphate by Automated Colourimetry	2	N/A	2022/12/08	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	2	N/A	2022/12/08		Auto Calc

Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Your Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Your C.O.C. #: 907634-01-01

Attention: Patty Workman

RJ Burnside Associates Ltd
292 Speedvale Ave W
Unit 20
Guelph, ON
CANADA N1H 1C4

Report Date: 2022/12/08
Report #: R7422272
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2Z5173
Received: 2022/12/02, 14:18

implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to:
Ashton Gibson, Project Manager
Email: Ashton.Gibson@bureauveritas.com
Phone# (905)817-5765
==========
This report has been generated and distributed using a secure automated process.
Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation, please refer to the Validation Signatures page if included, otherwise available by request. For Department specific Analyst/Supervisor validation names, please refer to the Test Summary section if included, otherwise available by request. This report is authorized by Rodney Major, General Manager responsible for Ontario Environmental laboratory operations.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		UMD884			UMD884			UMD885		
Sampling Date		2022/12/01 10:45			2022/12/01 10:45			2022/12/01 15:00		
COC Number		907634-01-01			907634-01-01			907634-01-01		
	UNITS	**BH2**	**RDL**	**QC Batch**	**BH2 Lab-Dup**	**RDL**	**QC Batch**	**BH5**	**RDL**	**QC Batch**
Calculated Parameters										
Anion Sum	me/L	6.64	N/A	8381453				7.34	N/A	8381453
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	240	1.0	8381454				250	1.0	8381454
Calculated TDS	mg/L	370	1.0	8381457				410	1.0	8381457
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.3	1.0	8381454				2.7	1.0	8381454
Cation Sum	me/L	7.54	N/A	8381453				8.02	N/A	8381453
Hardness (CaCO3)	mg/L	330	1.0	8380977				370	1.0	8380977
Ion Balance (% Difference)	%	6.35	N/A	8381452				4.44	N/A	8381452
Langelier Index (@ 20C)	N/A	0.942		8381455				1.02		8381455
Langelier Index (@ 4C)	N/A	0.693		8381456				0.768		8381456
Saturation pH (@ 20C)	N/A	7.07		8381455				7.03		8381455
Saturation pH (@ 4C)	N/A	7.31		8381456				7.28		8381456
Inorganics										
Total Ammonia-N	mg/L	ND	0.050	8385020				0.28	0.050	8385020
Conductivity	umho/cm	680	1.0	8384233	710	1.0	8384233	710	1.0	8383125
Dissolved Organic Carbon	mg/L	1.0	0.40	8384878				1.0	0.40	8384878
Orthophosphate (P)	mg/L	ND	0.010	8383152				ND	0.010	8383152
pH	pH	8.01		8384227	8.02		8384227	8.05		8383126
Dissolved Sulphate (SO4)	mg/L	4.6	1.0	8383151				53	1.0	8383151
Alkalinity (Total as CaCO3)	mg/L	240	1.0	8384225	260	1.0	8384225	260	1.0	8383123
Dissolved Chloride (Cl-)	mg/L	47	1.0	8383149				36	1.0	8383149
Nitrite (N)	mg/L	ND	0.010	8383127				0.015	0.010	8383127
Nitrate (N)	mg/L	4.80	0.10	8383127				1.06	0.10	8383127
Nitrate + Nitrite (N)	mg/L	4.80	0.10	8383127				1.08	0.10	8383127

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		UMD885		
Sampling Date		2022/12/01 15:00		
COC Number		907634-01-01		
	UNITS	**BH5 Lab-Dup**	**RDL**	**QC Batch**
Inorganics				
Orthophosphate (P)	mg/L	ND	0.010	8383152
Dissolved Sulphate (SO4)	mg/L	53	1.0	8383151
Dissolved Chloride (Cl-)	mg/L	36	1.0	8383149

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Bureau Veritas ID		UMD884	UMD885		
Sampling Date		2022/12/01 10:45	2022/12/01 15:00		
COC Number		907634-01-01	907634-01-01		
	UNITS	**BH2**	**BH5**	**RDL**	**QC Batch**
Metals					
Dissolved Aluminum (Al)	ug/L	ND	8.5	4.9	8383402
Dissolved Antimony (Sb)	ug/L	ND	ND	0.50	8383402
Dissolved Arsenic (As)	ug/L	ND	ND	1.0	8383402
Dissolved Barium (Ba)	ug/L	40	20	2.0	8383402
Dissolved Beryllium (Be)	ug/L	ND	ND	0.40	8383402
Dissolved Boron (B)	ug/L	15	18	10	8383402
Dissolved Cadmium (Cd)	ug/L	ND	ND	0.090	8383402
Dissolved Calcium (Ca)	ug/L	97000	100000	200	8383402
Dissolved Chromium (Cr)	ug/L	ND	ND	5.0	8383402
Dissolved Cobalt (Co)	ug/L	ND	ND	0.50	8383402
Dissolved Copper (Cu)	ug/L	1.8	1.7	0.90	8383402
Dissolved Iron (Fe)	ug/L	ND	ND	100	8383402
Dissolved Lead (Pb)	ug/L	ND	ND	0.50	8383402
Dissolved Magnesium (Mg)	ug/L	21000	29000	50	8383402
Dissolved Manganese (Mn)	ug/L	ND	280	2.0	8383402
Dissolved Molybdenum (Mo)	ug/L	ND	1.6	0.50	8383402
Dissolved Nickel (Ni)	ug/L	ND	1.2	1.0	8383402
Dissolved Phosphorus (P)	ug/L	ND	ND	100	8383402
Dissolved Potassium (K)	ug/L	10000	1700	200	8383402
Dissolved Selenium (Se)	ug/L	ND	ND	2.0	8383402
Dissolved Silicon (Si)	ug/L	4700	6200	50	8383402
Dissolved Silver (Ag)	ug/L	ND	ND	0.090	8383402
Dissolved Sodium (Na)	ug/L	17000	12000	100	8383402
Dissolved Strontium (Sr)	ug/L	130	210	1.0	8383402
Dissolved Thallium (Tl)	ug/L	ND	0.056	0.050	8383402
Dissolved Titanium (Ti)	ug/L	ND	ND	5.0	8383402
Dissolved Uranium (U)	ug/L	0.20	0.76	0.10	8383402
Dissolved Vanadium (V)	ug/L	ND	ND	0.50	8383402
Dissolved Zinc (Zn)	ug/L	ND	5.8	5.0	8383402

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvna.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

TEST SUMMARY

Bureau Veritas ID: UMD884
Sample ID: BH2
Matrix: Water

Collected: 2022/12/01
Shipped:
Received: 2022/12/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8384225	N/A	2022/12/05	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8381454	N/A	2022/12/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	8383149	N/A	2022/12/08	Alina Dobreanu
Conductivity	AT	8384233	N/A	2022/12/05	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8384878	N/A	2022/12/05	Gyulshen Idriz
Hardness (calculated as CaCO3)		8380977	N/A	2022/12/05	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8383402	N/A	2022/12/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	8381452	N/A	2022/12/08	Automated Statchk
Anion and Cation Sum	CALC	8381453	N/A	2022/12/06	Automated Statchk
Total Ammonia-N	LACH/NH4	8385020	N/A	2022/12/06	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	8383127	N/A	2022/12/06	Chandra Nandlal
pH	AT	8384227	2022/12/05	2022/12/05	Kien Tran
Orthophosphate	KONE	8383152	N/A	2022/12/07	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	8381455	N/A	2022/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8381456	N/A	2022/12/08	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8383151	N/A	2022/12/08	Samuel Law
Total Dissolved Solids (TDS calc)	CALC	8381457	N/A	2022/12/08	Automated Statchk

Bureau Veritas ID: UMD884 Dup
Sample ID: BH2
Matrix: Water

Collected: 2022/12/01
Shipped:
Received: 2022/12/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8384225	N/A	2022/12/05	Kien Tran
Conductivity	AT	8384233	N/A	2022/12/05	Kien Tran
pH	AT	8384227	2022/12/05	2022/12/05	Kien Tran

Bureau Veritas ID: UMD885
Sample ID: BH5
Matrix: Water

Collected: 2022/12/01
Shipped:
Received: 2022/12/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8383123	N/A	2022/12/05	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8381454	N/A	2022/12/06	Automated Statchk
Chloride by Automated Colourimetry	KONE	8383149	N/A	2022/12/08	Alina Dobreanu
Conductivity	AT	8383125	N/A	2022/12/05	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8384878	N/A	2022/12/05	Gyulshen Idriz
Hardness (calculated as CaCO3)		8380977	N/A	2022/12/05	Automated Statchk
Dissolved Metals by ICPMS	ICP/MS	8383402	N/A	2022/12/05	Prempal Bhatti
Ion Balance (% Difference)	CALC	8381452	N/A	2022/12/08	Automated Statchk
Anion and Cation Sum	CALC	8381453	N/A	2022/12/06	Automated Statchk
Total Ammonia-N	LACH/NH4	8385020	N/A	2022/12/06	Shivani Shivani
Nitrate & Nitrite as Nitrogen in Water	LACH	8383127	N/A	2022/12/06	Chandra Nandlal
pH	AT	8383126	2022/12/03	2022/12/05	Kien Tran

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Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

TEST SUMMARY

Bureau Veritas ID: UMD885
Sample ID: BH5
Matrix: Water

Collected: 2022/12/01
Shipped:
Received: 2022/12/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate	KONE	8383152	N/A	2022/12/07	Alina Dobreanu
Sat. pH and Langelier Index (@ 20C)	CALC	8381455	N/A	2022/12/08	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8381456	N/A	2022/12/08	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8383151	N/A	2022/12/08	Samuel Law
Total Dissolved Solids (TDS calc)	CALC	8381457	N/A	2022/12/08	Automated Statchk

Bureau Veritas ID: UMD885 Dup
Sample ID: BH5
Matrix: Water

Collected: 2022/12/01
Shipped:
Received: 2022/12/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	8383149	N/A	2022/12/08	Alina Dobreanu
Orthophosphate	KONE	8383152	N/A	2022/12/07	Alina Dobreanu
Sulphate by Automated Colourimetry	KONE	8383151	N/A	2022/12/08	Samuel Law

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GENERAL COMMENTS

Results relate only to the items tested.

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Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8383123	KIT	Spiked Blank	Alkalinity (Total as CaCO3)	2022/12/05		96	%	85 - 115
8383123	KIT	Method Blank	Alkalinity (Total as CaCO3)	2022/12/05	ND, RDL=1.0		mg/L	
8383123	KIT	RPD	Alkalinity (Total as CaCO3)	2022/12/05	2.1		%	20
8383125	KIT	Spiked Blank	Conductivity	2022/12/05		100	%	85 - 115
8383125	KIT	Method Blank	Conductivity	2022/12/05	ND, RDL=1.0		umho/cm	
8383125	KIT	RPD	Conductivity	2022/12/05	0.18		%	25
8383126	KIT	Spiked Blank	pH	2022/12/05		102	%	98 - 103
8383126	KIT	RPD	pH	2022/12/05	0.46		%	N/A
8383127	C_N	Matrix Spike	Nitrite (N)	2022/12/06		103	%	80 - 120
			Nitrate (N)	2022/12/06		92	%	80 - 120
8383127	C_N	Spiked Blank	Nitrite (N)	2022/12/06		103	%	80 - 120
			Nitrate (N)	2022/12/06		105	%	80 - 120
8383127	C_N	Method Blank	Nitrite (N)	2022/12/06	ND, RDL=0.010		mg/L	
			Nitrate (N)	2022/12/06	ND, RDL=0.10		mg/L	
8383127	C_N	RPD	Nitrite (N)	2022/12/06	NC		%	20
			Nitrate (N)	2022/12/06	NC		%	20
8383149	ADB	Matrix Spike [UMD885-01]	Dissolved Chloride (Cl-)	2022/12/08		NC	%	80 - 120
8383149	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2022/12/08		100	%	80 - 120
8383149	ADB	Method Blank	Dissolved Chloride (Cl-)	2022/12/08	ND, RDL=1.0		mg/L	
8383149	ADB	RPD [UMD885-01]	Dissolved Chloride (Cl-)	2022/12/08	1.2		%	20
8383151	S1L	Matrix Spike [UMD885-01]	Dissolved Sulphate (SO4)	2022/12/08		NC	%	75 - 125
8383151	S1L	Spiked Blank	Dissolved Sulphate (SO4)	2022/12/08		100	%	80 - 120
8383151	S1L	Method Blank	Dissolved Sulphate (SO4)	2022/12/08	ND, RDL=1.0		mg/L	
8383151	S1L	RPD [UMD885-01]	Dissolved Sulphate (SO4)	2022/12/08	0.10		%	20
8383152	ADB	Matrix Spike [UMD885-01]	Orthophosphate (P)	2022/12/07		101	%	75 - 125
8383152	ADB	Spiked Blank	Orthophosphate (P)	2022/12/07		101	%	80 - 120
8383152	ADB	Method Blank	Orthophosphate (P)	2022/12/07	ND, RDL=0.010		mg/L	
8383152	ADB	RPD [UMD885-01]	Orthophosphate (P)	2022/12/07	NC		%	20
8383402	PBA	Matrix Spike	Dissolved Aluminum (Al)	2022/12/05		102	%	80 - 120
			Dissolved Antimony (Sb)	2022/12/05		104	%	80 - 120
			Dissolved Arsenic (As)	2022/12/05		104	%	80 - 120
			Dissolved Barium (Ba)	2022/12/05		101	%	80 - 120
			Dissolved Beryllium (Be)	2022/12/05		103	%	80 - 120
			Dissolved Boron (B)	2022/12/05		101	%	80 - 120
			Dissolved Cadmium (Cd)	2022/12/05		102	%	80 - 120
			Dissolved Calcium (Ca)	2022/12/05		NC	%	80 - 120
			Dissolved Chromium (Cr)	2022/12/05		102	%	80 - 120
			Dissolved Cobalt (Co)	2022/12/05		102	%	80 - 120
			Dissolved Copper (Cu)	2022/12/05		104	%	80 - 120
			Dissolved Iron (Fe)	2022/12/05		105	%	80 - 120
			Dissolved Lead (Pb)	2022/12/05		98	%	80 - 120
			Dissolved Magnesium (Mg)	2022/12/05		NC	%	80 - 120

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Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Manganese (Mn)	2022/12/05		103	%	80 - 120
			Dissolved Molybdenum (Mo)	2022/12/05		105	%	80 - 120
			Dissolved Nickel (Ni)	2022/12/05		101	%	80 - 120
			Dissolved Phosphorus (P)	2022/12/05		104	%	80 - 120
			Dissolved Potassium (K)	2022/12/05		108	%	80 - 120
			Dissolved Selenium (Se)	2022/12/05		102	%	80 - 120
			Dissolved Silicon (Si)	2022/12/05		104	%	80 - 120
			Dissolved Silver (Ag)	2022/12/05		88	%	80 - 120
			Dissolved Sodium (Na)	2022/12/05		105	%	80 - 120
			Dissolved Strontium (Sr)	2022/12/05		101	%	80 - 120
			Dissolved Thallium (Tl)	2022/12/05		101	%	80 - 120
			Dissolved Titanium (Ti)	2022/12/05		100	%	80 - 120
			Dissolved Uranium (U)	2022/12/05		99	%	80 - 120
			Dissolved Vanadium (V)	2022/12/05		105	%	80 - 120
			Dissolved Zinc (Zn)	2022/12/05		104	%	80 - 120
8383402	PBA	Spiked Blank	Dissolved Aluminum (Al)	2022/12/05		102	%	80 - 120
			Dissolved Antimony (Sb)	2022/12/05		101	%	80 - 120
			Dissolved Arsenic (As)	2022/12/05		101	%	80 - 120
			Dissolved Barium (Ba)	2022/12/05		100	%	80 - 120
			Dissolved Beryllium (Be)	2022/12/05		97	%	80 - 120
			Dissolved Boron (B)	2022/12/05		96	%	80 - 120
			Dissolved Cadmium (Cd)	2022/12/05		101	%	80 - 120
			Dissolved Calcium (Ca)	2022/12/05		104	%	80 - 120
			Dissolved Chromium (Cr)	2022/12/05		99	%	80 - 120
			Dissolved Cobalt (Co)	2022/12/05		101	%	80 - 120
			Dissolved Copper (Cu)	2022/12/05		104	%	80 - 120
			Dissolved Iron (Fe)	2022/12/05		103	%	80 - 120
			Dissolved Lead (Pb)	2022/12/05		99	%	80 - 120
			Dissolved Magnesium (Mg)	2022/12/05		103	%	80 - 120
			Dissolved Manganese (Mn)	2022/12/05		100	%	80 - 120
			Dissolved Molybdenum (Mo)	2022/12/05		102	%	80 - 120
			Dissolved Nickel (Ni)	2022/12/05		100	%	80 - 120
			Dissolved Phosphorus (P)	2022/12/05		108	%	80 - 120
			Dissolved Potassium (K)	2022/12/05		106	%	80 - 120
			Dissolved Selenium (Se)	2022/12/05		99	%	80 - 120
			Dissolved Silicon (Si)	2022/12/05		104	%	80 - 120
			Dissolved Silver (Ag)	2022/12/05		101	%	80 - 120
			Dissolved Sodium (Na)	2022/12/05		103	%	80 - 120
			Dissolved Strontium (Sr)	2022/12/05		99	%	80 - 120
			Dissolved Thallium (Tl)	2022/12/05		100	%	80 - 120
			Dissolved Titanium (Ti)	2022/12/05		99	%	80 - 120
			Dissolved Uranium (U)	2022/12/05		98	%	80 - 120
			Dissolved Vanadium (V)	2022/12/05		101	%	80 - 120
			Dissolved Zinc (Zn)	2022/12/05		101	%	80 - 120
8383402	PBA	Method Blank	Dissolved Aluminum (Al)	2022/12/05	ND, RDL=4.9		ug/L	
			Dissolved Antimony (Sb)	2022/12/05	ND, RDL=0.50		ug/L	
			Dissolved Arsenic (As)	2022/12/05	ND, RDL=1.0		ug/L	

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Bureau Veritas Job #: C2Z5173
Report Date: 2022/12/08

RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Barium (Ba)	2022/12/05	ND, RDL=2.0		ug/L	
			Dissolved Beryllium (Be)	2022/12/05	ND, RDL=0.40		ug/L	
			Dissolved Boron (B)	2022/12/05	ND, RDL=10		ug/L	
			Dissolved Cadmium (Cd)	2022/12/05	ND, RDL=0.090		ug/L	
			Dissolved Calcium (Ca)	2022/12/05	ND, RDL=200		ug/L	
			Dissolved Chromium (Cr)	2022/12/05	ND, RDL=5.0		ug/L	
			Dissolved Cobalt (Co)	2022/12/05	ND, RDL=0.50		ug/L	
			Dissolved Copper (Cu)	2022/12/05	ND, RDL=0.90		ug/L	
			Dissolved Iron (Fe)	2022/12/05	ND, RDL=100		ug/L	
			Dissolved Lead (Pb)	2022/12/05	ND, RDL=0.50		ug/L	
			Dissolved Magnesium (Mg)	2022/12/05	ND, RDL=50		ug/L	
			Dissolved Manganese (Mn)	2022/12/05	ND, RDL=2.0		ug/L	
			Dissolved Molybdenum (Mo)	2022/12/05	ND, RDL=0.50		ug/L	
			Dissolved Nickel (Ni)	2022/12/05	ND, RDL=1.0		ug/L	
			Dissolved Phosphorus (P)	2022/12/05	ND, RDL=100		ug/L	
			Dissolved Potassium (K)	2022/12/05	ND, RDL=200		ug/L	
			Dissolved Selenium (Se)	2022/12/05	ND, RDL=2.0		ug/L	
			Dissolved Silicon (Si)	2022/12/05	ND, RDL=50		ug/L	
			Dissolved Silver (Ag)	2022/12/05	ND, RDL=0.090		ug/L	
			Dissolved Sodium (Na)	2022/12/05	ND, RDL=100		ug/L	
			Dissolved Strontium (Sr)	2022/12/05	ND, RDL=1.0		ug/L	
			Dissolved Thallium (Tl)	2022/12/05	ND, RDL=0.050		ug/L	
			Dissolved Titanium (Ti)	2022/12/05	ND, RDL=5.0		ug/L	
			Dissolved Uranium (U)	2022/12/05	ND, RDL=0.10		ug/L	
			Dissolved Vanadium (V)	2022/12/05	ND, RDL=0.50		ug/L	
			Dissolved Zinc (Zn)	2022/12/05	ND, RDL=5.0		ug/L	
8383402	PBA	RPD	Dissolved Aluminum (Al)	2022/12/05	NC		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Antimony (Sb)	2022/12/05	NC		%	20
			Dissolved Arsenic (As)	2022/12/05	2.8		%	20
			Dissolved Barium (Ba)	2022/12/05	3.4		%	20
			Dissolved Beryllium (Be)	2022/12/05	NC		%	20
			Dissolved Boron (B)	2022/12/05	2.0		%	20
			Dissolved Cadmium (Cd)	2022/12/05	NC		%	20
			Dissolved Calcium (Ca)	2022/12/05	0.61		%	20
			Dissolved Chromium (Cr)	2022/12/05	NC		%	20
			Dissolved Cobalt (Co)	2022/12/05	NC		%	20
			Dissolved Copper (Cu)	2022/12/05	NC		%	20
			Dissolved Iron (Fe)	2022/12/05	3.4		%	20
			Dissolved Lead (Pb)	2022/12/05	NC		%	20
			Dissolved Magnesium (Mg)	2022/12/05	2.9		%	20
			Dissolved Manganese (Mn)	2022/12/05	1.1		%	20
			Dissolved Molybdenum (Mo)	2022/12/05	0.89		%	20
			Dissolved Nickel (Ni)	2022/12/05	NC		%	20
			Dissolved Phosphorus (P)	2022/12/05	NC		%	20
			Dissolved Potassium (K)	2022/12/05	2.9		%	20
			Dissolved Selenium (Se)	2022/12/05	NC		%	20
			Dissolved Silicon (Si)	2022/12/05	0.37		%	20
			Dissolved Silver (Ag)	2022/12/05	NC		%	20
			Dissolved Sodium (Na)	2022/12/05	3.8		%	20
			Dissolved Strontium (Sr)	2022/12/05	3.5		%	20
			Dissolved Thallium (Tl)	2022/12/05	NC		%	20
			Dissolved Titanium (Ti)	2022/12/05	NC		%	20
			Dissolved Uranium (U)	2022/12/05	2.8		%	20
			Dissolved Vanadium (V)	2022/12/05	NC		%	20
			Dissolved Zinc (Zn)	2022/12/05	NC		%	20
8384225	KIT	Spiked Blank	Alkalinity (Total as CaCO3)	2022/12/05		97	%	85 - 115
8384225	KIT	Method Blank	Alkalinity (Total as CaCO3)	2022/12/05	ND, RDL=1.0		mg/L	
8384225	KIT	RPD [UMD884-01]	Alkalinity (Total as CaCO3)	2022/12/05	6.3		%	20
8384227	KIT	Spiked Blank	pH	2022/12/05		101	%	98 - 103
8384227	KIT	RPD [UMD884-01]	pH	2022/12/05	0.15		%	N/A
8384233	KIT	Spiked Blank	Conductivity	2022/12/05		101	%	85 - 115
8384233	KIT	Method Blank	Conductivity	2022/12/05	ND, RDL=1.0		umho/cm	
8384233	KIT	RPD [UMD884-01]	Conductivity	2022/12/05	3.9		%	25
8384878	GID	Matrix Spike	Dissolved Organic Carbon	2022/12/05		95	%	80 - 120
8384878	GID	Spiked Blank	Dissolved Organic Carbon	2022/12/05		96	%	80 - 120
8384878	GID	Method Blank	Dissolved Organic Carbon	2022/12/05	ND, RDL=0.40		mg/L	
8384878	GID	RPD	Dissolved Organic Carbon	2022/12/05	1.3		%	20
8385020	SSV	Matrix Spike	Total Ammonia-N	2022/12/06		96	%	75 - 125
8385020	SSV	Spiked Blank	Total Ammonia-N	2022/12/06		97	%	80 - 120
8385020	SSV	Method Blank	Total Ammonia-N	2022/12/06	ND, RDL=0.050		mg/L	

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RJ Burnside Associates Ltd
Client Project #: 300055234.9000
Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8385020	SSV	RPD	Total Ammonia-N	2022/12/06	13		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Site Location: CENTRE WELLINGTON OPS
Sampler Initials: DW

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Cristina Carriere

Cristina Carriere, Senior Scientific Specialist

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Bureau Veritas
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CHAIN 02-Dec-22 14:18

Ashton Gibson

C2Z5173

N4 ENV-1582

C#907634-01-01

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#685 RJ Burnside Associates Ltd	Company Name:	RJ Burnside + Associates Limited	Quotation #:	B16792
Attention:	Accounts Payable	Attention:	Patty Workman	P.O. #:	
Address:	292 Speedvale Ave W Unit 20 Guelph ON N1H 1C4	Address:	292 Speedvale Ave W Unit 20 Guelph ON N1H 1C4	Project:	300055234.9000
Tel:	(519) 941-5331 Ext: 286 Fax: (519) 941-7721	Tel:	226 314 2135 Fax:	Project Name:	Centre Wellington Ops
Email:	ap@rjburnside.com	Email:	patty.workman@rjburnside.com	Site #:	
				Sampled By:	Patty Workman

Project Manager: Ashton Gibson

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE BUREAU VERITAS DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011): ☐ Table 1 ☐ Res/Park ☐ Medium/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☐ Table 3 ☐ Agri/Other ☐ For RSC; ☐ Table ___

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw; ☐ Reg 558. ☐ Storm Sewer Bylaw; ☐ MISA Municipality ___; ☐ PWQO ☐ Reg 406 Table ___; ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Field Filtered (please circle): (Metals / Hg / Cr VI)

ANALYSIS REQUESTED (PLEASE BE SPECIFIC): RCAp - Comprehensive

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

Regular (Standard) TAT: ☐
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission) ☐
Date Required: ___ Time Required: ___
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (Metals / Hg / Cr VI)	RCAp - Comprehensive	# of Bottles	Comments
1		BH2	Dec 1 2022	10:45	Groundwater	✓	X	4	
2		BH5	Dec 1 2022	15:00	Groundwater	✓	X	4	
3									
4									
5									
6									REC'D IN WATERLOO
7									
8									
9									NoSEAL/ONICE
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Patty Workman	22/12/01	16:44	[illegible]	2022/12/2	14:18	
			Rupinder / RUPINDER	2022/12/02	18:35	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	1/2 1°C	Present		
		Intact		✓

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BUREAU VERITAS'S STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/COC-TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVNA.COM/ENVIRONMENTAL-LABORATORIES/RESOURCES/CHAIN-CUSTODY-FORMS-COCS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO BUREAU VERITAS

White: Bureau Veritas Yellow: Client

Bureau Veritas Canada (2019) Inc.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix F

Water Balance

TABLE F-1

Pre-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 200 mm (moderately rooted crops in sandy/silty soils) - C101

Precipitation data from Fergus Shand Dam Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.40	-6.30	-1.90	5.70	12.20	17.50	20.00	19.00	14.90	8.30	2.10	-3.90	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 40' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	**946**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-17	17	40	27	0	**0**
Soil Moisture Storage max 200 mm	200	200	200	200	200	173	133	116	133	173	200	200	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
Soil Moisture Deficit max 200 mm	0	0	0	0	0	27	67	84	67	27	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	58	69	**367**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	37	31	33	24	7	0	0	0	0	0	32	38	**202**
Potential Direct Surface Water Runoff (independent of temperature)	31	25	27	20	5	0	0	0	0	0	26	31	**165**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage

Soil Moisture Storage (moderately rooted crops in sandy / silty soils)	200 mm	<-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003
*MOE SWM infiltration calculations		
topography - flat to rolling land	0.25	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - medium combinations of sand and loam	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - cultivated land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.55**	
Latitude of site (or climate station)	43 ^{O} N	

TABLE F-2

Pre- and Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 125 mm (urban lawns in sandy / silty soils) - C101 & C201

Precipitation data from Fergus Shand Dam Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.40	-6.30	-1.90	5.70	12.20	17.50	20.00	19.00	14.90	8.30	2.10	-3.90	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 40' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	**946**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-17	17	40	27	0	**0**
Soil Moisture Storage max 125 mm	125	125	125	125	125	98	58	41	58	98	125	125	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
Soil Moisture Deficit max 125 mm	0	0	0	0	0	27	67	84	67	27	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	58	69	**367**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	41	34	36	27	7	0	0	0	0	0	35	41	**220**
Potential Direct Surface Water Runoff (independent of temperature)	27	22	24	18	5	0	0	0	0	0	23	27	**147**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage

Soil Moisture Storage (urban lawns in sandy / silty soils)	125 mm	<-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003
*MOE SWM infiltration calculations		
topography - flat to rolling land	0.25	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - medium combinations of sand and loam	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - cultivated land/woodland	0.15	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.6**	
Latitude of site (or climate station)	43 ^{O} N	

TABLE F-3

Post-Development Monthly Water Balance Components

Based on Thornthwaite's Soil Moisture Balance Approach with a Soil Moisture Retention of 125 mm (urban grased berms with sandy / silty soils) - UNC1 & UNC 2

Precipitation data from Fergus Shand Dam Climate Station (1981 - 2010)

Potential Evapotranspiration Calculation	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Average Temperature (Degree C)	-7.40	-6.30	-1.90	5.70	12.20	17.50	20.00	19.00	14.90	8.30	2.10	-3.90	**6.7**
Heat index: $i = (t/5)^{1.514}$	0.00	0.00	0.00	1.22	3.86	6.66	8.16	7.55	5.22	2.15	0.27	0.00	**35.1**
Unadjusted Daily Potential Evapotranspiration U (mm)	0.00	0.00	0.00	26.65	59.36	86.76	99.85	94.61	73.26	39.58	9.32	0.00	**489**
Adjusting Factor for U (Latitude 43° 40' N)	0.81	0.82	1.02	1.12	1.26	1.28	1.29	1.2	1.04	0.95	0.81	0.77	
Adjusted Potential Evapotranspiration PET (mm)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
COMPONENTS	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**YEAR**
Precipitation (P)	68	56	60	74	87	84	89	97	93	77	93	69	**946**
Potential Evapotranspiration (PET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
P - PET	68	56	60	44	12	-27	-40	-17	17	40	85	69	**367**
Change in Soil Moisture Storage	0	0	0	0	0	-27	-40	-17	17	40	27	0	**0**
Soil Moisture Storage max 125 mm	125	125	125	125	125	98	58	41	58	98	125	125	
Actual Evapotranspiration (AET)	0	0	0	30	75	111	129	114	76	38	8	0	**579**
Soil Moisture Deficit max 125 mm	0	0	0	0	0	27	67	84	67	27	0	0	
Water Surplus - available for infiltration or runoff	68	56	60	44	12	0	0	0	0	0	58	69	**367**
Potential Infiltration (based on MOE metholodogy*; independent of temperature)	27	22	24	18	5	0	0	0	0	0	23	27	**147**
Potential Direct Surface Water Runoff (independent of temperature)	41	34	36	27	7	0	0	0	0	0	35	41	**220**
IMPERVIOUS AREA WATER SURPLUS													
Precipitation (P)	946	mm/year											
Potential Evaporation (PE) from impervious areas (assume 15%)	142	mm/year											
P-PE (surplus available for runoff from impervious areas)	804	mm/year											

Assume January storage is 100% of Soil Moisture Storage

Soil Moisture Storage (urban grassed berms in sandy / silty soils)	125 mm	<-- See "Water Holding Capacity" values in Table 3.1, MOE SWMPDM, 2003
*MOE SWM infiltration calculations		
topography - hilly land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
soils - medium combinations of clay and loam	0.2	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
cover - cultivated land	0.1	<-- Infiltration Factors from the bottom section of Table 3.1, MOE SWMPDM, 2003
Infiltration factor	**0.4**	
Latitude of site (or climate station)	43 ^{O} N	

TABLE F-4

Water Balance - Existing Conditions and Post-Development with No Mitigation

Land Use**	Approx. Land Area (m^2)**	Estimated Impervious Fraction for Land Use**	Estimated Impervious Area (m^2)	Runoff from Impervious Area* (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area* (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area* (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use												
Hardscape (Roof, Drivewways, Paved areas) (C101)	1,700	1.00	1,700	0.804	1,367	0	0.165	0	0.202	0	1,367	0
Urban Lawn (C101)	9,800	0.00	0	0.804	0	9,800	0.147	1,437	0.220	2,155	1,437	2,155
Gravel (C101)	2,400	0.90	2,160	0.804	1,736	240	0.165	40	0.202	48	1,776	48
Agricultural/ Open Space (C101)	65,800	0.00	0	0.804	0	65,800	0.165	10,853	0.202	13,264	10,853	13,264
TOTAL PRE-DEVELOPMENT	**79,700**	**-**	**3,860**		**3,103**	**75,840**	**-**	**12,329**	**-**	**15,468**	**15,432**	**15,468**
Post-Development Land Use												
Hardscape (Roof, Drivewways, Paved areas) C(C201)	46,200	1.00	46,200	0.804	37,145	0	0.147	0	0.220	0	37,145	0
Urban Lawn (C201)	16,900	0.00	0	0.804	0	16,900	0.147	2,478	0.220	3,716	2,478	3,716
SWM Facility (C201)	6,400	1.00	6,400	0.804	5,146	0	0.147	0	0.220	0	5,146	0
Grass Berm (UNC1/UNC2)	10,200	0.20	2,040	0.804	1,640	8,160	0.220	1,794	0.147	1,196	3,435	1,196
TOTAL POST-DEVELOPMENT	**79,700**	**-**	**54,640**	**-**	**43,931**	**25,060**	**-**	**4,272**	**-**	**4,913**	**48,204**	**4,913**
										% Change from Pre to Post	312	68
										Effect of development (with no mitigation)	3.1 times increase	68% reduction in infiltration
										To balance pre- to post infiltration target (m^3/a)=		**10,555**

* figures from Tables F-1, F-2 & F-3

** from Functional Servicing and Stormwater Management Report (Burnside, 2023)

TABLE F-5

Water Balance - Existing Conditions and Post-Development with Mitigation (with LIDs)

Land Use		Approx. Land Area (m^2)**	Estimated Impervious Fraction for Land Use**	Estimated Impervious Area (m^2)	Runoff from Impervious Area* (m/a)	Runoff Volume from Impervious Area (m^3/a)	Estimated Pervious Area (m^2)	Runoff from Pervious Area* (m/a)	Runoff Volume from Pervious Area (m^3/a)	Infiltration from Pervious Area* (m/a)	Infiltration Volume from Pervious Area (m^3/a)	Total Runoff Volume (m^3/a)	Total Infiltration Volume (m^3/a)
Existing Land Use													
Hardscape (Roof, Driveway, Paved Areas) (C101)		1,700	1.00	1,700	0.804	1,367	0	0.165	0	0.202	0	1,367	0
Urban Lawn (C101)		9,800	0.00	0	0.804	0	9,800	0.147	1,437	0.220	2,155	1,437	2,155
Gravel (C101)		2,400	0.90	2,160	0.804	1,736	240	0.165	40	0.202	48	1,776	48
Agrcultural/ Open Space (C101)		65,800	0.00	0	0.804	0	65,800	0.165	10,853	0.202	13,264	10,853	13,264
TOTAL PRE-DEVELOPMENT		**79,700**	**-**	**3,860**		**3,103**	**75,840**	**-**	**12,329**	**-**	**15,468**	**15,432**	**15,468**
Post-Development Land Use													
Works Yard & SWM Facility (C201)	Urban Lawn	16,900	0.00	0	0.804	0	16,900	0.147	2,478	0.220	3,716	2,478	3,716
	SWM Facility	6,400	1.00	6,400	0.804	5,146	0	0.147	0	0.220	0	5,146	0
	Hardscape (Roof, Drivewways, Paved areas)	41,300	1.00	41,300	0.804	33,206	0	0.147	0	0.220	0	33,206	0
	Roof Areas directed to infiltration trench	4,900	1.00	4,900	0.804	3,940	0	0.147	0	0.220	0	3,940	0
	Infiltration Trench - assume designed to accommodate25 mm storm from proposed buildings; 25 mm storms account for approximately 95% of total precipitation; so assume 95% of runoff from building roof will infiltrate [a]	NA	NA	NA	NA	-3,743	NA	NA	NA	NA	3,743	-3,743	3,743
Grassed berm on north and west side (not draining to SWM Facility) (UNC1, UNC2)	Urban Lawn	10,200	0.20	2,040	0.804	1,640	8,160	0.220	1,794	0.147	1,196	3,435	1,196
TOTAL POST-DEVELOPMENT		**79,700**	**-**	**54,640**	**-**	**40,189**	**25,060**	**-**	**4,272**	**-**	**8,656**	**44,461**	**8,656**
											% Change from Pre to Post	288	44
											Effect of development (with mitigation)	2.9 times increase	44% reduction in infiltration
											To balance pre- to post infiltration target (m^3/a)=		**6,812**

* figures from Tables F-1, F-2 & F-3

** from Functional Servicing and Stormwater Management Report (Burnside, 2023)

[a] based on the Toronto Wet Weather Flow Management Guidelines (City of Toronto, 2006)

101 | 0.39
7.97ha

WHPA-A

GRCA Regulation Limit

BUILDING

EDGE OF GRAVEL

EDGE OF CULTIVATION

GRAVEL DRIVE

CONCRETE

BARN

SILO

HOUSE

GRAVEL

AREA OF TREES

ALUMINUM SHED

FENCE

CHICKEN COOP

LEGEND

PROPERTY BOUNDARY

DRAINAGE BOUNDARY

OVERLAND FLOW DIRECTION

CATCHMENT No. → 101 | 0.50 ← RUNOFF COEFFICIENT

AREA → 10.00ha

TRUE NORTH

PROJECT NORTH

0 25 50 75 100

Metres

BURNSIDE

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

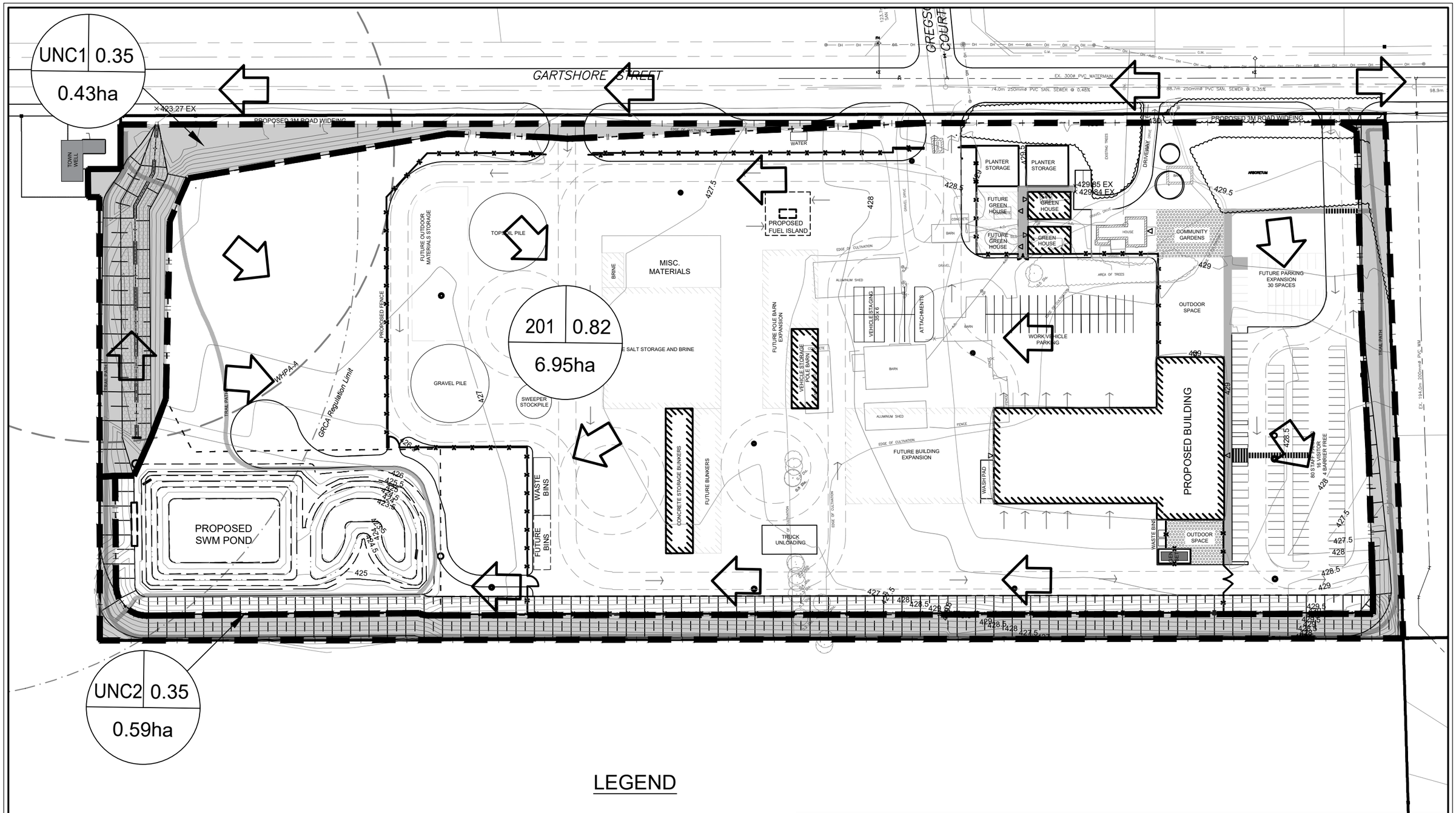
EXISTING SITE DRAINAGE CONDITIONS

Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	FG	23/02/03	4
Scale		Project No.	
1:1250		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG3 EXISTING SITE CONDITIONS.dwg Date Plotted: April 17, 2023 - 9:29 AM



LEGEND

PROPERTY BOUNDARY

DRAINAGE BOUNDARY

OVERLAND FLOW DIRECTION

CATCHMENT No. → 101 | 0.50 ← RUNOFF COEFFICIENT

AREA → 10.00ha

TRUE NORTH

PROJECT NORTH

0 25 50 75 100

Metres

BURNSIDE

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

PROPOSED SITE DRAINAGE CONDITIONS

Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	FG	23/02/03	5
Scale		Project No.	
1:1250		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG4 PROPOSED SITE CONDITIONS.dwg Date Plotted: April 17, 2023 - 9:29 AM

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

C101

Existing/Allowable Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234.0000
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.17 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.98 ha	0.35	**From Centre Wellington Design Standards*
Gravel	0.24 ha	0.70	**From Centre Wellington Design Standards*
Agricultural	6.58 ha	0.31	**From MTO Design Chart*
Totals	7.97 ha	0.34	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.699	0.167 hr	81.52 mm/hr	0.34	612.74 L/s
5 year	30.7	-0.699	0.167 hr	107.42 mm/hr	0.34	807.35 L/s
10 year	35.6	-0.699	0.167 hr	124.56 mm/hr	0.34	936.21 L/s
25 year	41.8	-0.699	0.167 hr	146.25 mm/hr	0.34	1099.26 L/s
50 year	46.4	-0.699	0.167 hr	162.35 mm/hr	0.34	1220.23 L/s
100 year	50.9	-0.699	0.167 hr	178.09 mm/hr	0.34	1338.57 L/s

Allowable release rate from the site is 1338.57 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

C201

Post Development Controlled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	4.62 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	1.69 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.64 ha	1.00	
Totals	6.95 ha	0.78	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.699	0.167 hr	81.52 mm/hr	0.78	1219.56 L/s
5 year	30.7	-0.699	0.167 hr	107.42 mm/hr	0.78	1606.88 L/s
10 year	35.6	-0.699	0.167 hr	124.56 mm/hr	0.78	1863.36 L/s
25 year	41.8	-0.699	0.167 hr	146.25 mm/hr	0.85	2406.66 L/s
50 year	46.4	-0.699	0.167 hr	162.35 mm/hr	0.93	2914.37 L/s
100 year	50.9	-0.699	0.167 hr	178.09 mm/hr	1.00	3435.98 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

UNC1

Post Development Uncontrolled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.00 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.43 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.00 ha	1.00	
Totals	0.43 ha	0.35	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.70	0.167 hr	81.52 mm/hr	0.35	34.08 L/s
5 year	30.7	-0.70	0.167 hr	107.42 mm/hr	0.35	44.91 L/s
10 year	35.6	-0.70	0.167 hr	124.56 mm/hr	0.35	52.08 L/s
25 year	41.8	-0.70	0.167 hr	146.25 mm/hr	0.39	67.26 L/s
50 year	46.4	-0.70	0.167 hr	162.35 mm/hr	0.42	81.45 L/s
100 year	50.9	-0.70	0.167 hr	178.09 mm/hr	0.44	93.07 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

UNC2

Post Development Uncontrolled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.00 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.59 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.00 ha	1.00	
Totals	0.59 ha	0.35	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.70	0.167 hr	81.52 mm/hr	0.35	46.77 L/s
5 year	30.7	-0.70	0.167 hr	107.42 mm/hr	0.35	61.62 L/s
10 year	35.6	-0.70	0.167 hr	124.56 mm/hr	0.35	71.45 L/s
25 year	41.8	-0.70	0.167 hr	146.25 mm/hr	0.39	92.29 L/s
50 year	46.4	-0.70	0.167 hr	162.35 mm/hr	0.42	111.76 L/s
100 year	50.9	-0.70	0.167 hr	178.09 mm/hr	0.44	127.70 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

R.J. Burnside & Associates Limited

Functional Servicing and Stormwater Management Report Centre Wellington Operations Centre

Township of Centre Wellington
1 MacDonald Square
Elora, ON

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph, ON N1H 1C4 CANADA

April 2023
300055234.0000

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Revision	Date	Description
0	October 21, 2022	Issued for Client Review
1	April 24, 2023	Issued for Zoning By-Law Amendment

R.J. Burnside & Associates Limited

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F. T. GOULDING
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2023/04/24
PROVINCE OF ONTARIO

Frank Goulding, P.Eng.
Civil Engineer
FG/cvh

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Appendix C Storm Sewer Design Sheet
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1.0 Introduction and Background

R.J. Burnside & Associates Limited (Burnside) has been retained by the Township of Centre Wellington (the Township) to prepare a Functional Servicing Report and Stormwater Management (SWM) Report for the proposed Operations Centre located at 965 Gartshore Street, Fergus. This report is in support of the proposed Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA), demonstrating that the subject lands can be developed in accordance with regulatory requirements and criteria.

The purpose of this report is to:

- Evaluate the existing municipal water system, including:
  - Calculate the proposed domestic water and firefighting supply needs.
  - Confirm that it has adequate flow to meet the additional required domestic and fire flow demands for the proposed development.
- Evaluate on a preliminary basis the SWM opportunities and constraints, including:
  - Calculate allowable and proposed runoff rates for the development.
  - Evaluate suitable methods for attenuation and treatment of stormwater runoff.
  - Develop and propose onsite control measures and examine theoretical performance.
  - Demonstrate compliance of the proposed stormwater control measures with the Centre Wellington Development Manual (Draft 2018).
- Identify sanitary servicing opportunities and constraints, including:
  - Calculate existing and proposed sanitary flows.
  - Evaluate the feasibility of connection to municipal infrastructure.

1.1 Background Studies and Documentation

The following documents, studies, and reports have been reviewed by Burnside and incorporated into this report:

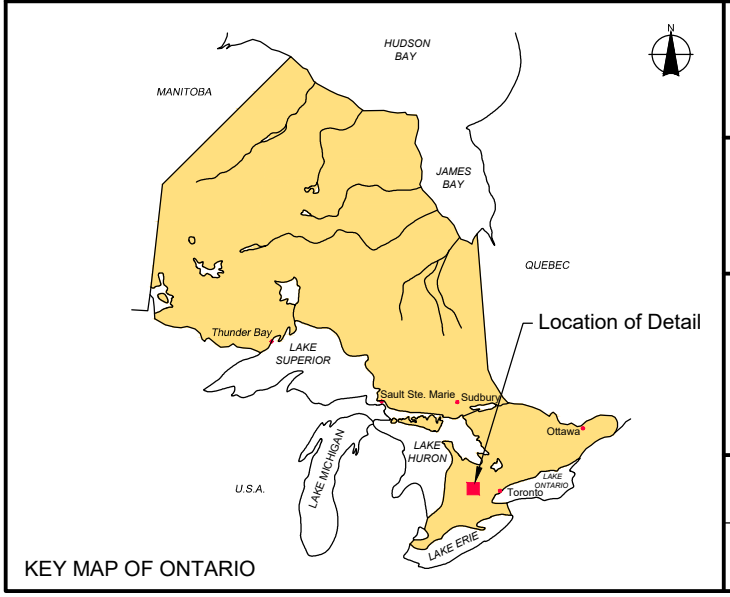
Table 1: Supporting Documents

Document Title	Prepared By	Date
Arborist Report	R.J. Burnside & Associates Ltd.	February 2023
Stage 1 Archaeological Assessment	Archaeological Research Associates Ltd.	October 17, 2022
Building Condition Assessment	R.J. Burnside & Associates Ltd.	November 17, 2022
Designated Substances and Hazardous Materials Survey	R.J. Burnside & Associates Ltd.	January 30, 2023

Environmental Impact Study	R.J. Burnside & Associates Ltd.	February 3, 2023
Preliminary Geotechnical Investigation	JLP Services Inc.	December 19, 2022
Hydrogeological Study	R.J. Burnside & Associates Ltd.	February 2023
Plan of Survey	Callon Dietz	September 12, 2022
Transportation Study	R.J. Burnside & Associates Ltd.	November 2022

1.2 Site Description

The subject site is a 8.426 ha parcel of land located within the Township of Centre Wellington former geographic Township of Nichol. Referring to true north, the site sits just northwest of the Town of Fergus boundary on Gartshore Street occupying concession 16 part lots 17 and 18. The site is bound by Gartshore Street to the northeast, agricultural lands directly west and southwest, Harper Crescent Park to the southeast, a municipal well directly north, and the municipal water tower directly south. Within the subject property is a single-family farmhouse with various secondary structures associated with current farming practices. The house is proposed to be repurposed and used within the proposed development. Figure 1 below shows the site location.



KEY MAP OF ONTARIO

BURNSIDE

Client

TOWNSHIP OF CENTRE WELLINGTON

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

SITE LOCATION PLAN

Drawn	Checked	Date	Figure No.
JR	FG	23/02/03	1
Scale		Project No.	
N.T.S.		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG1 SITE LOCATION PLAN.dwg Date Plotted: April 17, 2023 - 9:28 AM

1.3 Proposed Development

The project proposes an Operations Centre for the Township of Centre Wellington. The project is proposed to occur in two phases. The operations building will include a phase one gross floor area (GFA) of 3,560 m^2 (38,321 ft^2). It also contains a 250 m^2 (2,702 ft^2) vehicle storage, pole barn and a two 149 m^2 (1,603 ft^2) greenhouses. Phase 2 includes 1,476 m^2 (15,888 ft^2) of additional GFA in the operations building as well as a 1,951 m^2 (21,000 ft^2) salt and storage building including interior loading. Phase 2 will also include an additional 219 m^2 (2,357 ft^2) of GFA to the operations building, and two additional greenhouses with 149 m^2 (1,603 ft^2) of GFA directly adjacent to the primary greenhouse will be considered.

There are four proposed entrances to the site, which are all located along Gartshore Street. The north end of the site is within the Grand River Conservation Authority's (GRCA) regulation limit. The subject property is located in a wellhead protection area (WHPA). A WHPA is the area around a wellhead that contributes source water to a drinking water system. A WHPA shows where the groundwater is coming from to source the water system, and how fast it is getting there. A WHPA-A is a 100 m radius around the wellhead and a WHPA-B is an area where water and any contaminants that may be present can reach the well within 2-5 years. The northeast corner of the site intersects with the WHPA-A while the remainder of the property is within a WHPA-B.

Figure 2 below shows the proposed site plan.

GARTSHORE STREET

PROPOSED ROW WIDENING

PROPOSED WATER FILLING STATION

EXISTING WELLHOUSE

PROPOSED 3M ROAD WIDEING

PROPOSED LANDSCAPED AREA

PROPOSED DRIVEWAY

PROPOSED DRIVE AISLE

PROPOSED GREENHOUSE

PROPOSED OUTLET CHANNEL

EXISTING HOUSE TO REMAIN

PROPOSED FUEL ISLAND

PROPOSED 1.2m WIDE TRAIL PATH

PROPOSED DRIVE AISLE

WHPA-A

GRCA Regulation Limit

WHPA A

PROPOSED 4m WIDE ACCESS ROAD

PROPOSED SWMF

PROPOSED SWM POND

EXISTING STRUCTURES TO BE REMOVED BY OTHERS

PROPOSED BUILDING FFE = 429.15m

PROPOSED DRIVE AISLE

GRCA REGULATED AREA LIMIT

PROPOSED BERM TO ADHERE TO NOISE STUDY RECOMMENDATIONS

LEGEND

SITE BOUNDARY

PROPERTY LINE

PROPOSED BUILDING

TRUE NORTH

PROJECT NORTH

0 25 50 75 100

Metres

BURNSIDE

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

PROPOSED SITE PLAN

Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	AB	23/02/03	2
Scale		Project No.	
1:1250		300055234.0000	

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2.0 Water Servicing

2.1 Existing Water Supply

Based on as-built drawings provided by the Township, the site has an existing 300 mm dia. PVC watermain along Gartshore Street. Fergus's water tower borders the property on the southeast corner. The existing farmhouse is serviced from the Gartshore Street watermain.

2.2 Proposed Water Supply

The proposed Operations Centre containing offices and maintenance facilities will require new service connections for both domestic and fire use. The proposed greenhouse and water filling station will also require a domestic connection. The proposed water service connection configuration will be as per Township of Centre Wellington's standards. The water service was designed to account for the full build out size of the facility and the future uses within phase 2. A 150 mm diameter fire service is proposed to connect to the existing 300 mm diameter watermain along Gartshore Street with a 100 mm diameter domestic service split off the main service connection. Both fire and domestic watermain connections will be equipped with a valve and box at the property line. The 150 mm diameter fire connection will be equipped with a detector check assembly in the building. The 100 mm diameter domestic connection will enter a 3000 mm diameter water meter chamber. Refer to Figure 3 and Drawing S1 for preliminary servicing layout.

2.3 Water Demand

The proposed fire demand for the development was calculated based on the criteria outlined by the Fire Underwriters Survey (FUS) Water Supply for Public Fire Protection (2020). The proposed domestic demands for office space were calculated using the Ontario Building Code's (OBC) guidelines. The guidelines specify an average of 75 L/day/9.3 m^2 of GFA. Further, domestic flows for industrial space and wash bays were calculated using OBC and MOE guidelines. The OBC states 950 L/day per water closet and MOE states 400 L/wash for wash bays.

The anticipated domestic demand for the Site has been calculated to be 0.65 L/s based on the design criteria. The maximum hourly demand peaking factor was assumed to be 3.0 L/s. This was also used in the sanitary calculations. Therefore, this results in a peak domestic demand of 4.18 L/s. See Appendix A for full calculations.

The required fire flow for the development was calculated to be 133.33 L/s (8,000 L/min or 2,114 USGPM). The total required fire flows and domestic demand should be delivered at a pressure no less than 140 kPa (20.3 psi). Hydrant tests to confirm acceptable pressures will be completed following zoning approval.

The following criteria were applied during the calculation of fire flows, and will be updated as necessary during detailed design:

- The proposed buildings will be classified as Type II - Noncombustible, with limited combustible contents, and a 15% occupancy reduction has been applied.
- The proposed buildings will be between 10.1m to 20 m from the existing house. A total separation charge of 15% has been applied.

Therefore, the overall combined peak water demand for the site was determined to be 137.51 L/s.

The use of brine on the proposed salt/sand storage building does not require additional calculations for the future water supply. Water connection is not anticipated to be necessary for brine operations in the future.

Refer to Appendix A for complete water demand calculations. Figure 3 displays the proposed servicing for the site.

KNOWN AS GARTSHORE STREET
ROAD ALLOWANCE BETWEEN GEOGRAPHIC
TOWNSHIPS OF NICHOL & WEST GARAFRAXA

GARTSHORE STREET

CONNECT TO EXISTING WATERMAIN

EXISTING FIRE HYDRANT

PROPOSED SANITARY SEWER CONNECTION TO EXISTING MANHOLE. SEE S1 FOR DETAILS

PROPOSED 3M ROAD WIDEING

PROPOSED OUTLET CHANNEL

PROPOSED 1.2m WIDE TRAIL PATH

PROPOSED FENCE

PROPOSED 100mm PVC DR18 DOMESTIC LINE

PROPOSED 150mm PVC DR18 FIRE LINE

PROPOSED VALVE

PROPOSED FUEL ISLAND

PROPOSED GREENHOUSE

PROPOSED DRIVEWAY

PROPOSED BUILDING
FFE = 429.15m

PROPOSED INFILTRATION FACILITY
VOLUME REQUIRED = 140m³

BACKFLOW PREVENTOR AND WATER METER

PROPOSED HYDRANT AND VALVE

PROPOSED 4m WIDE ACCESS ROAD

PROPOSED WET POND SEE S1 FOR DETAILS

OGS STORMCEPTOR EFO8 OR APPROVED EQUIVALENT

15m EMERGENCY SPILLWAY c/w G2 CABLE CONCRETE OR APPROVED EQUIVALENT

EXTENDED DETENTION RISER BOTTOM DRAWN OUTLET w/ REVERSE SLOPE PIPE

MH11
TOP=428.66
DEPTH=2.9m

MH10
TOP=427.39
DEPTH=2.5m

MH01A
TOP=428.39
DEPTH=2.3m

MH09
TOP=426.95
DEPTH=2.6m

MH08
TOP=428.74
DEPTH=3.1m

MH07
TOP=427.54
DEPTH=2.8m

CTRL MH01
TOP=428.60
DEPTH=2.8m

MH06
TOP=428.59
DEPTH=2.8m

CB
TOP=428.23
DEPTH=0.9m

MH05
TOP=428.13
DEPTH=2.6m

MH01
TOP=426.50
DEPTH=2.6m

MH02
TOP=426.94
DEPTH=2.9m

MH03
TOP=427.29
DEPTH=2.7m

MH4
TOP=427.82
DEPTH=2.8m

HWL02
TOP=425.54

CTRLMH02
TOP=425.88
DEPTH=1.4m

MH75
TOP=426.52

HWL01
TOP=425.92

SWMF OUTLET
TOP=425.51

300mm STM
525mm STM
375mm STM
250mm STM
200mm SAN
900mm STM
825mm STM
750mm STM
600mm STM
450mm STM

LEGEND

PROP. STORM SEWER	
PROP. STORM MAINTENANCE HOLE	
PROP. HEADWALL	
PROP. SANITARY SEWER	
PROP. SANITARY MAINTENANCE HOLE	
PROP. WATERMAIN	
PROP. VALVE	
EX. SANITARY MAINTENANCE HOLE	
EX. SANITARY SEWER	
EX. WATERMAIN	
EX. VALVE	WV
EX. HYDRANT	

TRUE NORTH
PROJECT NORTH

0 25 50 75 100
Metres

BURNSIDE

Figure Title
CENTRE WELLINGTON OPERATIONS CENTRE
SERVICING PLAN

Client
TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	AB	23/02/03	3
Scale 1:1250		Project No. 300055234.0000	

File: \\sherlockshared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG5 SERVICING PLAN.dwg Date Plotted: April 17, 2023 - 9:29 AM

2.4 Hydrant Coverage

There are 2 existing fire hydrants located within the development's proximity. Both are located along Gartshore Street's right of way. One additional hydrant is proposed to provide sufficient fire coverage within the site. The proposed hydrant will be complete with a valve and boot to satisfy Centre Wellington requirements.

3.0 Sanitary Servicing

3.1 Existing Sanitary Sewer Flow

Based on as-built drawings provided by the Township, there is an existing 250 mm dia. PVC sanitary sewer running within Gartshore Street that can be used to service the site. The sanitary sewer is a gravity system draining to the southwest. The existing sanitary sewer connection from the residence is proposed to remain.

3.2 Proposed Sanitary Servicing

3.2.1 New Connection

One new 200 mm sanitary connection is proposed at the location indicated on the Site Servicing drawing (Drawing S1 included with this report). The proposed connection is the existing sanitary manhole located at the intersection of Gregson Court and Gartshore Street. The private sanitary sewer connection will be provided in accordance with the Municipal Standards noted on the drawing.

The connection will have an inspection manhole located entirely within the site.

3.2.2 Proposed Sanitary Flows

Calculations have been made based on the proposed office and industrial applications of the building. The total peak sanitary flow for the existing site (including infiltration allowance) has been estimated to be 1.25 L/s. The total peak sanitary flow for the proposed development (including infiltration allowance) has been calculated at 5.27 L/s, which represents an increase of 4.02 L/s when compared with the existing peak sanitary flows.

Refer to Appendix B for calculations. Refer to Figure 3 for the proposed servicing layout.

4.0 Grading and Storm Drainage

4.1 Site Grading

The grading design for this site has been completed in compliance with the following requirements and constraints:

- Matching existing grades along the development boundary as defined by the property boundary.
- Control and conveyance of stormwater within the site and minimization of external runoff.
- Providing major overland flow routes to convey runoff.

4.2 Existing Storm Drainage

The existing site has an overall high point near the northeast corner of the property. The result is that the entire site drains east to west via overland flow to the adjacent agricultural property. There is an overall elevation difference of approximately 3.9 m across the site. External drainage areas are negligible as the road runoff is conveyed by the municipal right of way and adjacent lots are directed away from the site.

The existing site consists of primarily agricultural lands, but also includes a single-family dwelling and several accessory structures that contribute a small amount of impervious area. The site was assumed as one large catchment with an area of 7.97 ha. The Preliminary Geotechnical Investigation completed by JLP Geotechnical and Environmental Consultants, dated December 19, 2022 indicates that the subsurface conditions generally consist of 200-250 mm thick topsoil, followed by discontinuous deposits of sandy silt till and silty sand. Based on Centre Wellington recommended stormwater runoff coefficients and Ontario Ministry of Transportation (MTO) Drainage Manual, design charts were used to calculate the site runoff coefficient of 0.34. The pre-development catchment can be seen within Figure 4**.**

101 | 0.39
7.97ha

WHPA-A

GRCA Regulation Limit

BUILDING

EDGE OF GRAVEL

EDGE OF CULTIVATION

GRAVEL DRIVE

CONCRETE

BARN

SILO

HOUSE

GRAVEL

AREA OF TREES

ALUMINUM SHED

FENCE

CHICKEN COOP

LEGEND

PROPERTY BOUNDARY

DRAINAGE BOUNDARY

OVERLAND FLOW DIRECTION

CATCHMENT No. → 101 | 0.50 ← RUNOFF COEFFICIENT

AREA → 10.00ha

TRUE NORTH

PROJECT NORTH

0 25 50 75 100

Metres

BURNSIDE

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

EXISTING SITE DRAINAGE CONDITIONS

Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	FG	23/02/03	4
Scale		Project No.	
1:1250		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG3 EXISTING SITE CONDITIONS.dwg Date Plotted: April 17, 2023 - 9:29 AM

4.3 Proposed Storm Drainage

The proposed development has several different areas, including the main operations building, paved parking areas, as well as a paved works yard. To control runoff, the proposed development has been designed to collect all impervious and developed areas of the site into a SWM facility located near the west corner of the property. The design will utilize a combination of surface drainage and storm sewers to convey the runoff to the SWM facility.

Two outlet scenarios were explored with township staff: The first was outletting through the WHPA-A area and into the Gartshore roadside ditch with quality control measures in place such as a clay liner along the outlet channel and an oil grit separator (OGS) at the outlet structure. The second was to petition for a municipal drain or explore a mutual drain agreement (under the Drainage Act) with the neighbouring landowner. The second option proved to have more disadvantages than the first including but not limited to:

- The Drainage Act can be a timely process;
- The cost to direct flows across the neighboring lands via an open ditch or closed pipe system would likely all be borne by the Municipality;
- The neighbouring lands, although agricultural at the present time, are zoned for future development. At the time of development would likely require the outlet from the subject property to be re-routed, which would be solely paid for by the municipality.

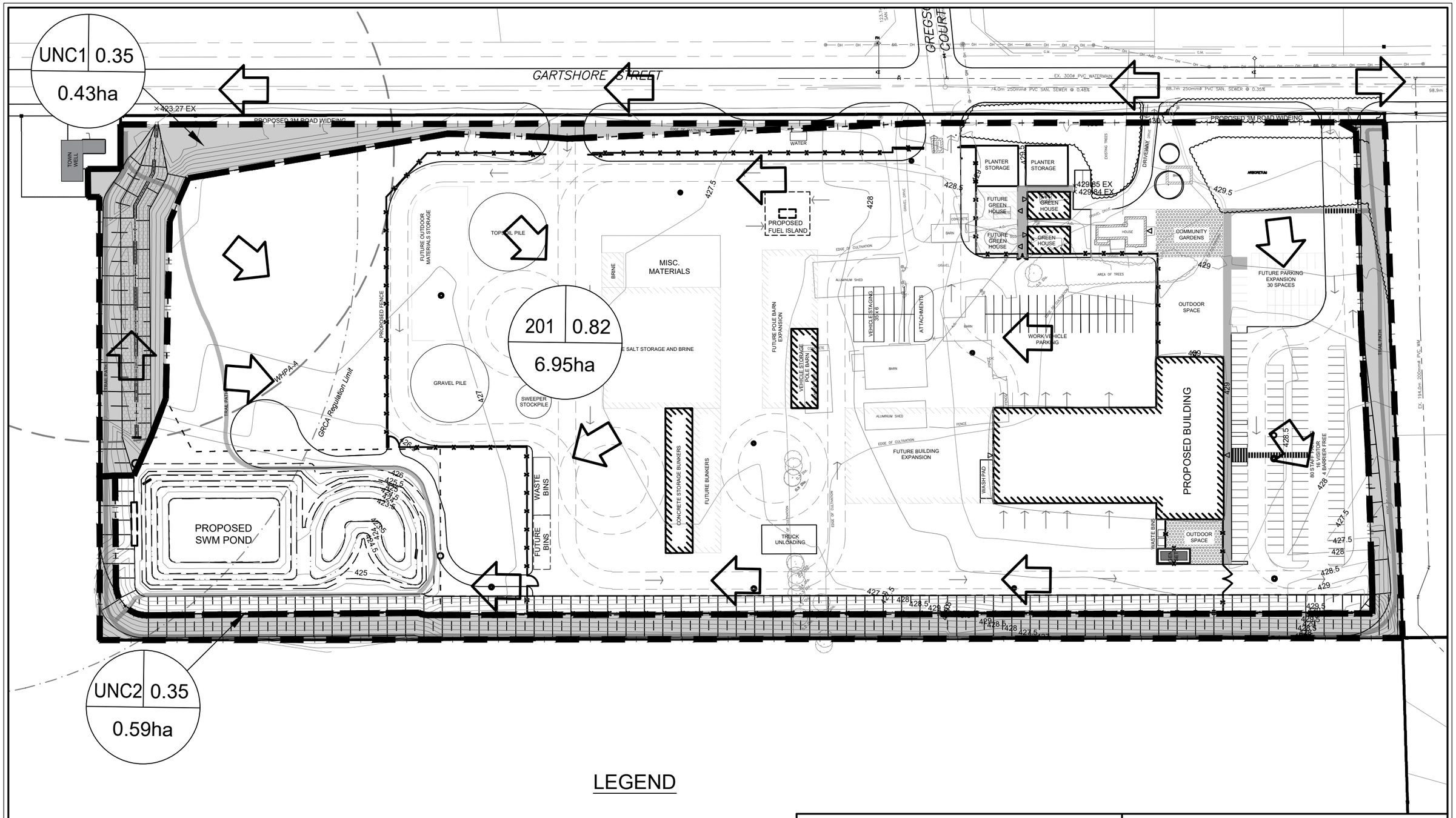
After further discussions with Township staff and the Risk Management Official for Wellington Source Water Protection, it was determined that the location of the SWM facility should be in the WHPA-B zone.

Considering the potential complications, unknown costs and unknown timelines required for petitioning for a Municipal Drain through the neighbour's property, it was decided to proceed with the option to outlet the flows toward the northeast, past the WHPA-A area.

Although the existing site flows to the neighbouring property, this proposed facility will control and release site flows to the existing Gartshore Street ROW. This will provide a suitable outlet without impacting the neighbouring property. A small portion of the site (UNC1 and UNC2) will be uncontrolled due to grading constraints. These areas will be solely landscaped. Catchment UNC1 will be directed to the Gartshore ditch, while UNC2 will discharge via overland flow to the adjacent agricultural property in a similar fashion to the existing site. Figure 5 displays the post development catchment plan and Table 2 provides a summary of the proposed drainage areas.

Table 2: Post Development Drainage Conditions

Catchment	Discharge Location	Area (ha)	Runoff Coefficient
201	Gartshore Street R.O.W.	6.95	0.78
UNC1	Gartshore Street R.O.W.	0.43	0.35
UNC2	Adjacent agricultural property	0.59	0.35
Total	-	7.97	



LEGEND

PROPERTY BOUNDARY

DRAINAGE BOUNDARY

OVERLAND FLOW DIRECTION

CATCHMENT No. → 101 | 0.50 ← RUNOFF COEFFICIENT

AREA → 10.00ha

TRUE NORTH

PROJECT NORTH

0 25 50 75 100

Metres

BURNSIDE

Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

PROPOSED SITE DRAINAGE CONDITIONS

Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	FG	23/02/03	5
Scale		Project No.	
1:1250		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG4 PROPOSED SITE CONDITIONS.dwg Date Plotted: April 17, 2023 - 9:29 AM

4.4 Minor System Conveyance

As per *Centre Wellington Development Manual (draft 2018),* the minor system flow will be conveyed within the site through a series of storm sewers sized in combination with catchbasins and catchbasin manholes. The conceptual storm servicing design for the development shown in Figure 3 and S1 displays the minor system. The minor system consists of 2 storm networks a North line and South line, joining at a control manhole to the southwest of the site before out letting to the SWM facility. One SWM facility is proposed to collect the storm discharge. Please refer to Appendix C for the storm sewer design sheet.

4.5 Major System Conveyance

The major system will convey the 100-year return period storm within the development site and direct the flow into the proposed SWM pond as overland flow.

5.0 Stormwater Management

5.1 Stormwater Management Criteria

The SWM criteria for this development are based on the Township of Centre Wellington's *Development Manual (draft 2018)* as well as the Ministry of the Environment, Conservation and Park' s(MECP) *Stormwater Management Planning and Design Manual (2003).* Climate change and severity of storm events was considered during the planning and design of the proposed SWM facility to ensure resiliency to climate change.

From these design criteria, the following SWM guidelines are to be applied:

Volume Control Maintain or improve infiltration to aquifer in Q1/Q2 Zones.

Water Quality: Level 1 - Enhanced protection corresponds to the end-of-pipe storage volumes required for the long-term removal of 80% of suspended solids.

Erosion Control: Extended detention of the 25 mm storm event

Water Quantity: Peak flow control for 2 year through 100 year storms

5.2 Existing Hydrologic Conditions

The rational method was used to calculate pre-development peak flows for existing catchments. The Intensity-Duration-Frequency (IDF) parameters used to calculate rainfall intensity were obtained from the MTO IDF Curve Lookup tool. Detailed

calculations can be found in Appendix D and the pre-development peak flow rates for the site are summarized in Table 3.

Table 3: Pre-Development Peak Flows

Return Period	Peak Flow (cms)
2-year	0.613
5-year	0.807
10-year	0.936
25-year	1.209
50-year	1.464
100-year	1.673

5.3 Proposed Hydrological Conditions

5.3.1 Quantity Control

The proposed development will utilize SWMF1 with and an outlet to the Gartshore Street ROW. SWMF1 will operate as a wet pond complete with a forebay and extended detention for the first 25 mm and detain of the 100-year post development flows. There are 2 uncontrolled areas that drain from the site, which have been accommodated in the allowable release rate from SWMF1. The rational method was used to evaluate peak flow rates from the site. Table 4 shows post-development sub-catchment areas and peak flows, detailed calculations can be found in Appendix D.

Table 4: Post-Development Peak Flows

Catchment	201	UNC1	UNC2
Drainage Area (ha)	6.95	0.43	0.59
2-year cms	1.219	0.034	0.047
5-year cms	1.606	0.045	0.061
10-year cms	1.863	0.052	0.071
25-year cms	2.406	0.067	0.092
50-year cms	2.914	0.081	0.112
100-year cms	3.435	0.093	0.128

Table 5: Flow Rate Summary, summarizes the net storm flows leaving the development site under both pre- and post-development conditions.

Table 5: Flow Rate Summary

Storm Event	Flow Rates (m^3/s)	
	Development Site	
	Pre	Post
2-Year	0.613	0.244
5-Year	0.807	0.336
10-Year	0.936	0.444
25-Year	1.209	0.702
50-Year	1.464	0.836
100-Year	1.673	1.265

As shown in the tables above, the post-development flows for the subject property will be restricted to at or below pre-development flows for all storms 2-thourgh 100-year storm events. The final SWM modelling will be completed at detailed design.

5.3.2 Volume Control to Groundwater

Pre to post infiltration to groundwater is to be conserved by infiltrating the first 25 mm of roof runoff from the Operations Centre. An infiltration facility is proposed under the asphalt parking area sized for the 25 mm runoff from both the Phase 1 and Phase 2 portions of the operations building. See Drawing S1 for additional details. Water balance and drawdown calculations will be completed during detailed design.

5.3.3 Water Quality and Erosion Control

Based on requirements outlined in the MECP's *Stormwater Management Planning and Design Manual (2003)* and Centre Wellington's Development Manual (draft), stormwater quality control for this site is required to achieve an average of 80% long-term removal of total suspended solids (TSS) for the enhanced protection level. This is based on the annual loading of all runoffs leaving the site. The wet pond has been designed to meet the guidelines to achieve 80% TSS removal with an appropriately sized permanent pool and forebay. In addition to the engineered pond, for redundancy and for additional potential to overcontrol water quality, an oil grit separator will be utilized at the pond outlet to further reduce the sediment loading on the downstream lands. Table 6 shows ultimate TSS removal efficiencies.

Table 6: TSS Removal Efficiency Summary

Description	Area (ha)	Landscape[1]	Infiltration[2]	Wet Pond[2]	OGS	Total TSS Removal
Uncontrolled Landscape	1.02	80%	-	-		80%
Controlled Landscape	1.46	80%		80%	50%	92%
Parking, Yard and SWM Facility	4.92	-	-	80%	50%	90%
Roof	0.55	-	75%	80%	50%	90%
Site Total	7.97					**89.1%**

1 Removal efficiencies from STEP/TRCA LID Treatment Train Tool.
2 Removal efficiency from City of Toronto guidelines.

The proposed plan shows a TSS removal of 89.1% has been achieved and the Enhanced Protection Level target of 80% has been met. Incorporating these measures to the proposed site plan will provide the site with the necessary water quality treatment, erosion control, and water quantity attenuation prior to out letting to the existing ditch.

The township will incorporate best practices to prevent stockpiles of any potential hazardous materials from being stored on the site within the WHP-A limit. Organic materials such as wood chips, mulch, branches or rocks, are permitted to be stored in the WHPA-A. This will avoid having access roads and road salt within the WHPA-A, preventing possible fuel spills from equipment. During detailed design, low impact development opportunities will be explored including but not limited to installation of rainwater gardens, soakaway pits, pervious pipe systems and bioswales where groundwater levels and native conditions allow. A drinking water threat disclosure report is likely to be required at detailed design to further address water quality concerns regarding the development. There is no intention to accommodate township snow storage or snow disposal on the site. All snow storage is strictly limited to snow accumulated on site. There will not be a dump out pit for the hydrovac on site.

5.3.4 Stormwater Management Facility

SWMF1 is located along the western property boundary outside of the WHPA-A limits. The pond has been designed with 4:1 side slopes and a 4 m wide access road to provide access to forebay, inlet and outlet. The pond outlet will be directed to Gartshore Street ROW through a 113 m outlet channel. SWMF1 and the outlet channel is to be lined with a 0.5m impermeable clay liner to prevent infiltration within the WHPA-A zone. A cable concrete liner is proposed for energy dissipation and erosion control during peak events. Appendix E shows detailed calculations for SWMF1 and Table 7 summarizes the

operating characteristics and storage volumes to meet the design criteria. Figure 6 and Figure 7 show the plan and section for SWMF1.

Table 7: Summary Table for SWMF1

Drainage Area	=	6.95 ha		% IMP= 65		
Pond Block Area	=	0.45 ha				
Permanent Pool Required	=	173 m^3/ha	x	6.95 ha	=	1,204 m^3
Permanent Pool Provided	=	2,140 m^3				
Max Depth	=	1.5 m				
Permanent Pool Elevation	=	424.45 m				
Erosion Control	=	25 mm x 4.5 ha				1123 m^3
Release Rate	=	11.55 L/s				
ED Active Storage Provided	=	1155 m^3				
Depth	=	0.41 m	at	424.86 m		

Return Event	Pond Out-Flow (m^3/s)	Storage Volume (m^3)	Water Elevation (m)
2-year	0.163	929	424.87
5-year	0.230	1182	424.88
10-year	0.321	1243	424.90
25-year	0.498	1445	424.96
50-year	0.643	1689	425.03
100-year	1.044	2736	425.32

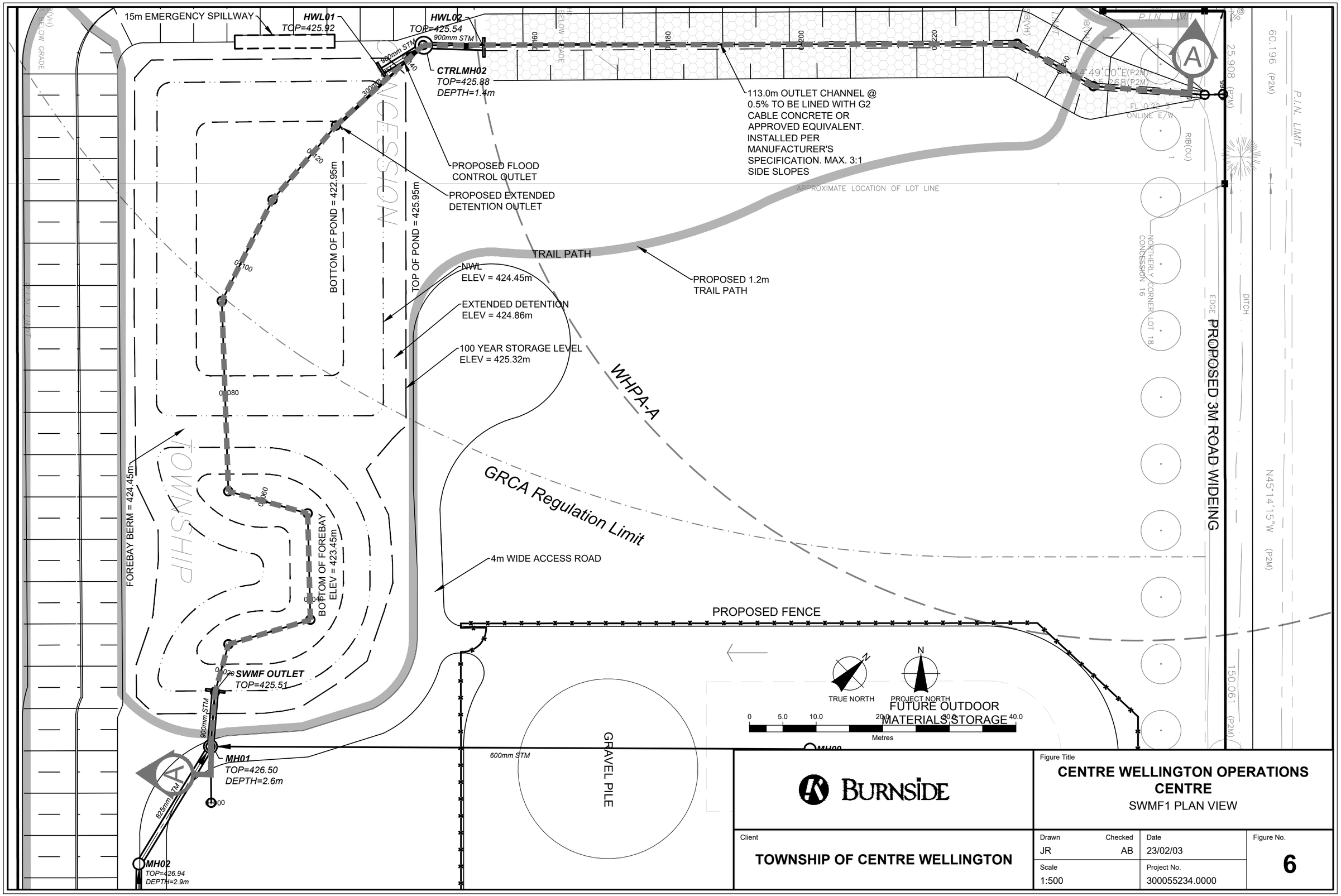


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Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE

SWMF1 PLAN VIEW

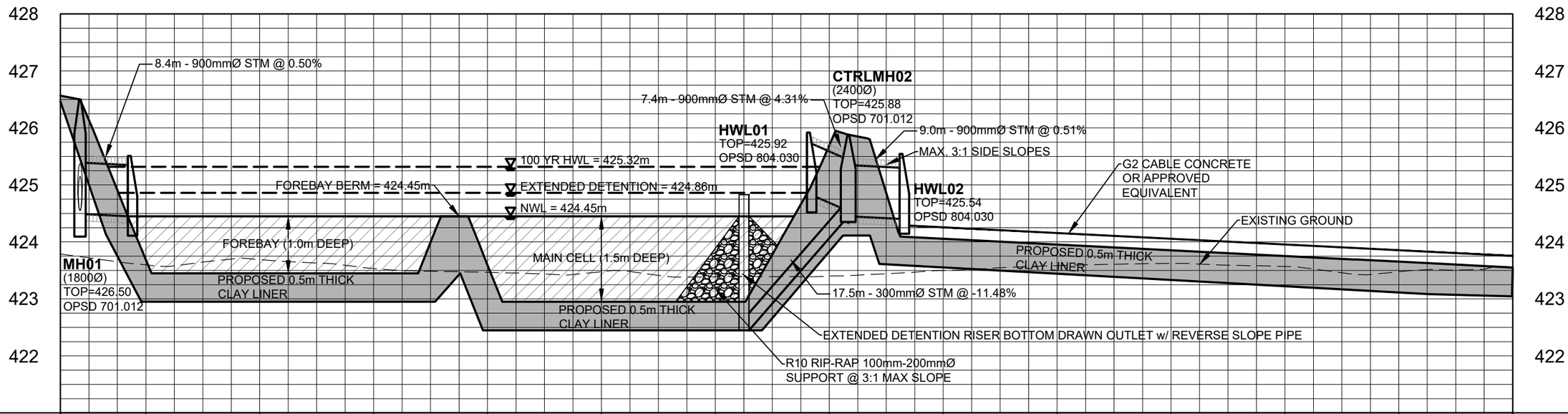
Client

TOWNSHIP OF CENTRE WELLINGTON

Drawn	Checked	Date	Figure No.
JR	AB	23/02/03	6
Scale		Project No.	
1:500		300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG6 SWM SECTIONS.dwg Date Plotted: April 17, 2023 - 9:30 AM

055234 SWM Section AA



EXIST PROP ELEV	423.79	426.567	423.60	423.690	423.69	423.450	423.53	423.450	423.47	423.594	423.48	422.950	423.39	422.950	423.40	425.695	423.50	424.056	423.58	423.954	423.63	423.854	423.57	423.753	423.48	423.654	423.55	423.552	EXIST PROP ELEV
CHAINAGE		0+005		0+020		0+040		0+060		0+080		0+100		0+120		0+140		0+160		0+180		0+200		0+220		0+240		0+260	CHAINAGE

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Client
TOWNSHIP OF CENTRE WELLINGTON

Figure Title
CENTRE WELLINGTON OPERATIONS CENTRE
SWMF1 SECTION

Drawn	Checked	Date	Figure No.
JR	AB	23/02/03	7
Scale H 1:750 V 1:7500		Project No. 300055234.0000	

File: \\sherlock\shared work areas\055234 centre wellington operations ctr\07_Figures\055234 FIG6 SWM SECTIONS.dwg Date Plotted: April 17, 2023 - 9:30 AM

6.0 Erosion and Sediment Control

The erosion and sediment control plan for the site will be designed in conformance with the standards outlined by the Toronto and Region Conservation Authority (TRCA) in the *Erosion and Sediment Control Guide for Urban Construction (2019).* Details for erosion and sedimentation control during construction will be subject to the GRCA approval prior to the issuance of the building permit. Erosion and sediment control measures include but are not limited to a heavy-duty silt fence, rock check dams and a mud mat at the construction entrance. See ESC1 for details.

7.0 Utilities

Unless stated otherwise, utilities will be installed in a joint utility trench, and design will be provided by the individual utility companies. Existing gas, telecommunications, and overhead hydro available on Gartshore Street will be used to service the proposed site. Coordination with utility companies and sizing of connections will be completed during the detailed design stage of this project.

8.0 Conclusions and Recommendations

The preceding report provides an investigation of the existing servicing with a design for the proposed servicing and SWM of this development. The proposed Centre Wellington Operations Centre on Gartshore Street will be able to be serviced using existing water and sanitary services within the ROW. A new 150 mm watermain will be required to provide domestic and fire servicing, with a 200 mm sanitary sewer required to connect into the existing 250 mm sanitary line. The design also meets requirements for site grading and SWM with a proposed wet pond on the west property line to outlet to Gartshore Street. The existing municipal infrastructure is sufficient and capable of supporting the proposed development. As such, no external upgrades to the existing infrastructure will be required.

Accordingly, we propose that this Functional Servicing and SWM Report be accepted for review and approval to facilitate the rezoning application for the subject property.

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Appendix A

Water Calculations

CALCULATION SHEET

Project:		Prepared by:	JR
Centre Wellington Operations Centre		Checked by:	FG
		Project No:	300055234.0000
Fergus, Ontario			
Water Demand Calculations		Date:	April 14, 2023

I. Fire Flow Calculation

**Based on Fire Underwriters Survey*

1 $F = 220\ C\ (A)^{1/2}$

Where F= Fire flow in Lpm

C = construction type coefficient

Type II - Noncombustible

= 0.8

A = total floor area in sq.m. excluding basements, includes garage*

Floor	Area (sq.m)		%
1st Floor	4856	m^2	100%
2nd Floor	1308	m^2	25%
N/A	0	m^2	25%

*Largest floor area + 25% of adjoining floor areas, assuming vertical opening are properly protected (one hour rating)

Largest Area = 5,183 sq.m.

F = 12,671.38 L/min

Round to nearest 1000 l/min

F = 13,000 L/min

2 Occupancy Contents Adjustment Factor

Type = Limited Combustible Contents **Office space*

Factor = -15%

Adjustment = -1,950 L/min

F = 11,050 L/min

3 Sprinkler Reduction

Sprinkler Design System = Automatc sprinkler protection in accorance with NFPA standards

Factor = 30%

Reduction = 3,315 L/min

4 Exposure Adjustment Charge

Use conservative method = YES

Face	Distance	Separation Charge
North	>30m	0%
West	>30m	0%
South	>30m	0%
East	>30m	0%

Total Separation Charge = 0%

MAX Separation Charge = 75%

Charge = 0 L/min

F = 8,000 L/min

133.33 L/s

F = 2,114 US GPM

Fire Flow Required =	**133.33**	**L/s**		
Fire Flow Required =	**8,000**	**L/min**	**2,114**	**US GPM**

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CALCULATION SHEET

Project:		Prepared by:	JR
Centre Wellington Operations Centre		Checked by:	FG
		Project No:	300055234.0000
Fergus, Ontario			
Water Demand Calculations		Date:	April 14, 2023

II. Domestic Flow Calculations - Office

GFA =	2616		**From Sanitary Design Sheet*
Average Day Demand =	75	L/day/9.3m2	
=	0.73	L/s	
=	12	US GPM	
Max. Daily Demand Peaking Factor =	1.1		
Max. Daily Demand =	0.80	L/s	
=	13	US GPM	
or			
Max. Hourly Demand Peaking Factor =	3.0		
Max. Hourly Demand =	2.19	L/s	
=	35	US GPM	
Office Domestic Flow =	**2.19**	**L/s**	**35 US GPM**

III. Domestic Flow Calculations - Industrial

	Quantity	Q / unit (L/day)	Q (L/day)	**From Sanitary Design Sheet*
per wash bay	1	400	400	
per water closet	2	950	1,900	
			2,300	

Average Day Demand =	0.08	L/s	
=	1	US GPM	
Max. Daily Demand Peaking Factor =	1.1		**From City of Toronto municipal standards*
Max. Daily Demand =	0.09	L/s	
=	1	US GPM	
or			
Max. Hourly Demand Peaking Factor =	3.0		**From Region of Waterloo standards*
Max. Hourly Demand =	0.24	L/s	
=	4	US GPM	
Industrial Domestic Flow =	**0.24**	**L/s**	**4 US GPM**

III. Flow Calculations - Greenhouse

Average Day Demand Greenhouse (4) =	6949	L/day	*From Past Project Experience*
=	0.08	L/s	
=	1.28	US GPM	
Maximum Day Demand Peaking Factor=	1.33		*From Past Project Experience*
Max. Daily Demand =	0.11	L/s	
=	1.70	US GPM	
or			
Peak Rate =	-		*From Past Project Experience*
Max. Hourly Demand =	1.75	L/s	
=	27.74	US GPM	
Greenhouse Irrigation Flow =	**1.75**	**L/s**	**63 US GPM**

Total Domestic Flow =	**4.18**	**L/s**
Fire Flow =	**133.33**	**L/s**
Peak Domestic + Fire Demand =	**137.51**	**L/s**
	8250.80	**L/min**

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Appendix B

Sanitary Calculations

CALCULATION SHEET

Project:		Prepared by:	JR
Centre Wellington Operations Centre		Checked by:	FG
Fergus, Ontario		Project No:	300055234.0000
Sanitary Servicing Calculations		Date:	April 14, 2023

Existing Site Flows

$$Q=\frac{P \times Q \times M}{86400}+(A \times I)$$

Residential Flow

Building Address	Units	Building Area (m^2)	GFA (ha)	P/m^2	P/unit	Population
965 Gartshore Street	1	127			3	3
						0
						0
Total						**3**

Q= 350 L/cap/day

$$M=1+\frac{14}{4+(P/1000)^{1/2}}$$

M= 4.45

$Q_{(residential)}$= 0.05 L/s

Site Area=	7.97	ha
Infiltration Allowance=	12960	L/day/ha
=	0.15	L/s/ha
$Q_{infiltration}$=	1.20	L/s

**From Centre Wellington Design Guidelines*

$Q_{Existing\ Total}$= 1.25 L/s

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CALCULATION SHEET

Project:		Prepared by:	JR
Centre Wellington Operations Centre		Checked by:	FG
Fergus, Ontario		Project No:	300055234.0000
Sanitary Servicing Calculations		Date:	April 14, 2023

Proposed Site Flows

Office

GFA Office = 2616 m2

	Quantity	Q / unit (L/day)	Q (L/day)	
per employee per 8hr shift, or per each 9.3m2 of floor space	281.3	75	21,101	*From OBC
			21,101	

$Q_{(Office)}$= 0.73 L/s

Max. Hourly Demand Peaking Factor = 3.0

$Q_{(Office)}$= 2.19 L/s

Industrial (Warehouse)

GFA = 3548 m2

	Washes / Day	L / per	Q (L/day)
Per Wash Bay	1	400	400
Per Water Closet	2	950	1,900
			2,300

$Q_{(Industrial)}$= 0.08 L/s

Max. Hourly Demand Peaking Factor = N/A

$Q_{(Industrial)}$= 0.08 L/s

Greenhouse Activities

$Q_{(Peak)}$= 1.75 L/s *From Water Demand

$Q_{(Greenhouses)}$= 1.75 L/s

Infiltration Allowance= 12960 L/day/ha
= 0.15 L/s/ha
A= 7.97 ha

$Q_{infiltration}$= 1.20 L/s

$Q_{proposed\ total}$= 5.27 L/s
$Q_{increase\ total}$= 4.02 L/s

Service Connection

Diameter (mm)	Slope (%)	Full Flow Velocity (m/s)	Capacity (L/s)	Spare Capacity (L/s)	Percent Full (%)
200	1.00	1.04	32.80	28.78	16.07%

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Appendix C

Storm Sewer Design Sheet

STORM SEWER DESIGN SHEET: (5 Year Storm)

965 Gartshore street

Centre of Wellington Operations Centre , Centre of Welington

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Project #: 300055234.0000
Date: 25-Jan-23
Designed: JR
Checked: FG

Min. Diameter = 300 mm
Mannings 'n'= 0.013
Starting Tc = 10 min
Factor of Safety = 10 %

Rainfall Intensity = A / (Tc+B)^c *where Tc is in hours*

A = 30.7
B = 0 *(5 Yr)*
C = 0.699

NOMINAL PIPE SIZE USED

DESCRIPTION	FROM MH	TO MH	AREA (ha)	RUNOFF COEFFICIENT "R"	'AR'	ACCUM. 'AR'	RAINFALL INTENSITY (mm/hr)	FLOW (m3/s)	CONSTANT FLOW (m3/s)	ACCUM. CONSTANT FLOW (m3/s)	TOTAL FLOW (m3/s)	LENGTH (m)	SLOPE (%)	PIPE DIAMETER (mm)	FULL FLOW CAPACITY (m3/s)	FULL FLOW VELOCITY (m/s)	INITIAL Tc (min)	TIME OF CONCENTRATION (min)	ACC. TIME OF CONCENTRATION (min)	PERCENT FULL (%)
South Line	MH06	MH05	0.79	0.72	0.57	0.57	107.4	0.169			0.169	41.5	0.50	450	0.202	1.27	10.00	0.55	10.55	84%
	MH05	MH04	0.44	0.90	0.40	0.96	103.5	0.277			0.277	90.0	0.50	600	0.434	1.54	10.55	0.98	11.52	64%
	MH04	MH03	0.28	0.90	0.25	1.22	97.3	0.329			0.329	62.8	0.50	600	0.434	1.54	11.52	0.68	12.20	76%
Branch 'A'	MH08	MH07	0.56	0.75	0.42	0.42	107.4	0.126			0.126	90.0	1.00	375	0.175	1.59	10.00	0.94	10.94	72%
	MH07	MH03	0.56	0.90	0.50	0.93	100.8	0.259			0.259	34.0	0.50	525	0.304	1.40	10.94	0.40	11.35	85%
	MH03	MH02	0.50	0.90	0.45	2.59	93.5	0.673			0.673	90.0	0.50	750	0.787	1.78	12.20	0.84	13.05	85%
	MH02	MH01	0.69	0.90	0.62	3.21	89.2	0.796			0.796	20.6	0.50	825	1.015	1.90	13.05	0.18	13.23	78%
North Line	MH11	MH10	0.28	0.63	0.18	0.18	107.4	0.052			0.052	90.0	1.00	300	0.097	1.37	10.00	1.10	11.10	54%
	MH10	MH09	0.58	0.90	0.52	0.70	99.9	0.193			0.193	90.0	0.50	525	0.304	1.40	11.10	1.07	12.16	64%
	MH09	MH01	1.25	0.63	0.79	1.48	93.7	0.386			0.386	90.0	0.50	600	0.434	1.54	12.16	0.98	13.14	89%
Outlet	MH01	SWMF1		0.90		4.70	88.3	1.153			1.153	8.4	0.50	900	1.280	2.01	13.23	0.07	13.30	90%

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Appendix D

Modified Rational Method Calculations

Ontario IDF CURVE LOOKUP

Active coordinate

43° 43' 15" N, 80° 23' 15" W (43.720833,-80.387500)

Retrieved: Mon, 06 Feb 2023 13:29:20 GMT

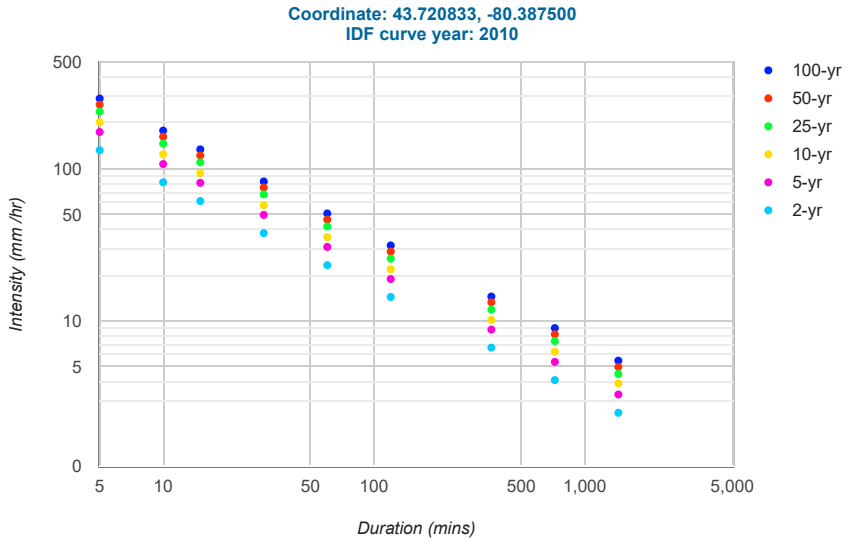
Location summary

These are the locations in the selection.

IDF Curve: 43° 43' 15" N, 80° 23' 15" W (43.720833,-80.387500)

Results

An IDF curve was found.



Coefficient summary

IDF Curve: 43° 43' 15" N, 80° 23' 15" W (43.720833,-80.387500)

Retrieved: Mon, 06 Feb 2023 13:29:20 GMT

Data year: 2010
IDF curve year: 2010

Return period	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
A	23.3	30.7	35.6	41.8	46.4	50.9
B	-0.699	-0.699	-0.699	-0.699	-0.699	-0.699

Statistics

Rainfall intensity (mm hr^{-1})

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	132.3	81.5	61.4	37.8	23.3	14.4	6.7	4.1	2.5
5-yr	174.4	107.4	80.9	49.8	30.7	18.9	8.8	5.4	3.3
10-yr	202.2	124.6	93.8	57.8	35.6	21.9	10.2	6.3	3.9
25-yr	237.4	146.3	110.2	67.9	41.8	25.7	11.9	7.4	4.5
50-yr	263.6	162.3	122.3	75.3	46.4	28.6	13.3	8.2	5.0
100-yr	289.1	178.1	134.1	82.6	50.9	31.4	14.5	9.0	5.5

Rainfall depth (mm)

Duration	5-min	10-min	15-min	30-min	1-hr	2-hr	6-hr	12-hr	24-hr
2-yr	11.0	13.6	15.4	18.9	23.3	28.7	40.0	49.2	60.6
5-yr	14.5	17.9	20.2	24.9	30.7	37.8	52.6	64.9	79.9
10-yr	16.9	20.8	23.5	28.9	35.6	43.9	61.0	75.2	92.7
25-yr	19.8	24.4	27.5	33.9	41.8	51.5	71.7	88.3	108.8
50-yr	22.0	27.1	30.6	37.7	46.4	57.2	79.6	98.0	120.8
100-yr	24.1	29.7	33.5	41.3	50.9	62.7	87.3	107.5	132.5

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BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

C101

Existing/Allowable Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234.0000
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.17 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.98 ha	0.35	**From Centre Wellington Design Standards*
Gravel	0.24 ha	0.70	**From Centre Wellington Design Standards*
Agricultural	6.58 ha	0.31	**From MTO Design Chart*
Totals	7.97 ha	0.34	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.699	0.167 hr	81.52 mm/hr	0.34	612.74 L/s
5 year	30.7	-0.699	0.167 hr	107.42 mm/hr	0.34	807.35 L/s
10 year	35.6	-0.699	0.167 hr	124.56 mm/hr	0.34	936.21 L/s
25 year	41.8	-0.699	0.167 hr	146.25 mm/hr	0.34	1099.26 L/s
50 year	46.4	-0.699	0.167 hr	162.35 mm/hr	0.34	1220.23 L/s
100 year	50.9	-0.699	0.167 hr	178.09 mm/hr	0.34	1338.57 L/s

Allowable release rate from the site is 1338.57 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

C201

Post Development Controlled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	4.62 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	1.69 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.64 ha	1.00	
Totals	6.95 ha	0.78	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.699	0.167 hr	81.52 mm/hr	0.78	1219.56 L/s
5 year	30.7	-0.699	0.167 hr	107.42 mm/hr	0.78	1606.88 L/s
10 year	35.6	-0.699	0.167 hr	124.56 mm/hr	0.78	1863.36 L/s
25 year	41.8	-0.699	0.167 hr	146.25 mm/hr	0.85	2406.66 L/s
50 year	46.4	-0.699	0.167 hr	162.35 mm/hr	0.93	2914.37 L/s
100 year	50.9	-0.699	0.167 hr	178.09 mm/hr	1.00	3435.98 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

UNC1

Post Development Uncontrolled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.00 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.43 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.00 ha	1.00	
Totals	0.43 ha	0.35	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.70	0.167 hr	81.52 mm/hr	0.35	34.08 L/s
5 year	30.7	-0.70	0.167 hr	107.42 mm/hr	0.35	44.91 L/s
10 year	35.6	-0.70	0.167 hr	124.56 mm/hr	0.35	52.08 L/s
25 year	41.8	-0.70	0.167 hr	146.25 mm/hr	0.39	67.26 L/s
50 year	46.4	-0.70	0.167 hr	162.35 mm/hr	0.42	81.45 L/s
100 year	50.9	-0.70	0.167 hr	178.09 mm/hr	0.44	93.07 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

BURNSIDE

CALCULATION SHEET

Project: **Centre Wellington Operations Centre**

UNC2

Post Development Uncontrolled Flows

Prepared by:	J. Rooke
Checked by:	F.Goulding
Project No:	300055234
Date:	6-Feb-2023

Runoff Equation Q = 2.78CIA (L/s)

where,
C = runoff coefficient
I = rainfall intensity (mm/hr)
A = area (ha)
2.78= conversion factor

Definition	Area	C	
Asphalt/Concrete/Rooftops	0.00 ha	0.90	**From Centre Wellington Design Standards*
Grass Short / Mowed	0.59 ha	0.35	**From Centre Wellington Design Standards*
SWM Facility	0.00 ha	1.00	
Totals	0.59 ha	0.35	

$$I = AT^B$$

I= Rainfall Intensity (mm/hr)
T= Time of concentration (hour)
(use T=10 min or 0.1666667hr)

Return Period	A	B	T	I	C	Q
2 year	23.3	-0.70	0.167 hr	81.52 mm/hr	0.35	46.77 L/s
5 year	30.7	-0.70	0.167 hr	107.42 mm/hr	0.35	61.62 L/s
10 year	35.6	-0.70	0.167 hr	124.56 mm/hr	0.35	71.45 L/s
25 year	41.8	-0.70	0.167 hr	146.25 mm/hr	0.39	92.29 L/s
50 year	46.4	-0.70	0.167 hr	162.35 mm/hr	0.42	111.76 L/s
100 year	50.9	-0.70	0.167 hr	178.09 mm/hr	0.44	127.70 L/s

IDF Curve Data taken from the MTO IDF Curve Lookup database for the site location

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	100	-year		
A =	50.4		A =	
C =	-0.699		B =	
			C =	

Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	1.00			
C*A =	6.95			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	5.0	min		
Target Release Rate =	1339	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	221	L/s	Max. Allowable Outflow (L/s) =	1339
Outflow =	1044	L/s	**From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	176.34	3401.95	2041	626	1415	
15.0	132.82	2562.36	2306	783	1523	
20.0	108.63	2095.60	2515	940	1575	
25.0	92.94	1792.95	2689	1096	1593	2748
30.0	81.82	1578.41	2841	1253	1588	
35.0	73.46	1417.18	2976	1409	1567	
40.0	66.91	1290.89	3098	1566	1532	
45.0	61.63	1188.86	3210	1723	1487	
50.0	57.25	1104.45	3313	1879	1434	
55.0	53.56	1033.27	3410	2036	1374	
60.0	50.40	972.30	3500	2192	1308	
65.0	47.66	919.39	3586	2349	1237	
70.0	45.25	872.98	3667	2506	1161	
75.0	43.12	831.88	3743	2662	1081	
80.0	41.22	795.18	3817	2819	998	
85.0	39.51	762.19	3887	2975	912	

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	50	-year		
A =	46.4		A =	
C =	-0.699		B =	
			C =	
Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	0.93			
C*A =	6.46			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	5.0	min		
Target Release Rate =	1220	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	193	L/s	Max. Allowable Outflow (L/s) =	1220
Outflow =	643	L/s	*From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	162.35	2914.14	1748	386	1363	
15.0	122.28	2194.94	1975	482	1493	
20.0	100.01	1795.11	2154	579	1575	
25.0	85.56	1535.85	2304	675	1629	
30.0	75.32	1352.08	2434	772	1662	
35.0	67.63	1213.97	2549	868	1681	
40.0	61.60	1105.78	2654	965	1689	1689
45.0	56.73	1018.39	2750	1061	1689	
50.0	52.71	946.08	2838	1157	1681	
55.0	49.31	885.11	2921	1254	1667	
60.0	46.40	832.88	2998	1350	1648	
65.0	43.88	787.56	3071	1447	1625	
70.0	41.66	747.80	3141	1543	1598	
75.0	39.70	712.59	3207	1640	1567	
80.0	37.95	681.16	3270	1736	1533	
85.0	36.37	652.90	3330	1833	1497	

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	25	-year		
A =	41.8		A =	
C =	-0.699		B =	
			C =	

Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	0.85			
C*A =	5.92			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	15.0	min		
Target Release Rate =	1099	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	160	L/s	Max. Allowable Outflow (L/s) =	1099
Outflow =	498	L/s	**From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	146.25	2406.47	1444	299	1145	
25.0	77.08	1268.29	1902	523	1380	
40.0	55.50	913.15	2192	747	1445	1445
55.0	44.42	730.91	2412	971	1441	
70.0	37.53	617.53	2594	1195	1398	
85.0	32.77	539.16	2750	1419	1330	
100.0	29.25	481.26	2888	1643	1244	
115.0	26.53	436.47	3012	1868	1144	
130.0	24.35	400.62	3125	2092	1033	
145.0	22.56	371.18	3229	2316	914	
160.0	21.06	346.50	3326	2540	787	
175.0	19.78	325.46	3417	2764	653	
190.0	18.67	307.28	3503	2988	515	
205.0	17.71	291.38	3584	3212	372	
220.0	16.86	277.35	3661	3436	225	
235.0	16.10	264.85	3734	3660	74	

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	10	-year		
A =	35.6		A =	
C =	-0.699		B =	
			C =	

Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	0.78			
C*A =	5.39			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	5.0	min		
Target Release Rate =	936	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	124	L/s	Max. Allowable Outflow (L/s) =	936
Outflow =	321	L/s	*From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	124.56	1863.21	1118	193	925	
15.0	93.82	1403.37	1263	241	1022	
20.0	76.73	1147.73	1377	289	1088	
25.0	65.65	981.98	1473	337	1136	
30.0	57.79	864.48	1556	385	1171	
35.0	51.89	776.17	1630	433	1197	
40.0	47.26	707.00	1697	482	1215	
45.0	43.53	651.13	1758	530	1228	
50.0	40.44	604.90	1815	578	1237	
55.0	37.83	565.91	1868	626	1242	
60.0	35.60	532.52	1917	674	1243	1243
65.0	33.66	503.54	1964	722	1242	
70.0	31.96	478.12	2008	770	1238	
75.0	30.46	455.61	2050	819	1232	
80.0	29.12	435.51	2090	867	1224	
85.0	27.91	417.44	2129	915	1214	

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	5	-year		
A =	30.7		A =	
C =	-0.699		B =	
			C =	

Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	0.78			
C*A =	5.39			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	10.0	min		
Target Release Rate =	807	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	107	L/s	Max. Allowable Outflow (L/s) =	807
Outflow =	230	L/s	**From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	107.42	1606.75	964	138	826	
20.0	66.17	989.76	1188	207	981	
30.0	49.84	745.49	1342	276	1066	
40.0	40.76	609.69	1463	345	1118	
50.0	34.87	521.64	1565	414	1151	
60.0	30.70	459.22	1653	483	1170	
70.0	27.56	412.31	1732	552	1180	
80.0	25.11	375.57	1803	621	1182	1182
90.0	23.12	345.89	1868	690	1178	
100.0	21.48	321.33	1928	759	1169	
110.0	20.10	300.62	1984	828	1156	
120.0	18.91	282.88	2037	897	1140	
130.0	17.88	267.49	2086	966	1120	
140.0	16.98	253.98	2133	1035	1098	
150.0	16.18	242.03	2178	1104	1074	
160.0	15.47	231.35	2221	1173	1048	

Project: Centre Wellington Operations Centre
Project No.: 300055234
Modelled By: J. Rooke
Date: 6-Feb-2023

MODIFIED RATIONAL METHOD
POST-DEVELOPMENT CONTROLLED FLOWS

Rainfall IDF Coefficients	2	-year		
A =	23.3		A =	
C =	-0.699		B =	
			C =	

Rational Method Calculation				
Area =	6.95	ha		
Runoff Coefficient, C =	0.78			
C*A =	5.39			
Time of Concentration, t_c =	10.0	min		
Storm Duration Increment =	10.0	min		
Target Release Rate =	613	L/s		
Constant Inflow =	0	L/s		
Uncontrolled Outflow =	81	L/s	Max. Allowable Outflow (L/s) =	613
Outflow =	163	L/s	**From SWM Design Sheet Total Orfice Flow*	

Storm Duration (min)	Rainfall Intensity (mm/hr)	Max. Runoff Flow (L/s)	Runoff Volume (m^3)	Released Volume (m^3)	Storage Volume (m^3)	Max. Storage Volume Required (m^3)
10.0	81.52	1219.46	732	98	634	
20.0	50.22	751.18	901	147	755	
30.0	37.82	565.79	1018	196	823	
40.0	30.93	462.73	1111	245	866	
50.0	26.47	395.90	1188	293	894	
60.0	23.30	348.53	1255	342	912	
70.0	20.92	312.93	1314	391	923	
80.0	19.06	285.04	1368	440	928	
90.0	17.55	262.51	1418	489	929	929
100.0	16.30	243.87	1463	538	925	
110.0	15.25	228.16	1506	587	919	
120.0	14.35	214.69	1546	636	910	
130.0	13.57	203.01	1583	685	899	
140.0	12.89	192.76	1619	734	886	
150.0	12.28	183.69	1653	782	871	
160.0	11.74	175.58	1686	831	854	

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix E

SWM Pond Calculations

EXTENDED DETENTION CALCULATIONS

Project:	Centre Wellington Operations Centre
File:	300055234
Designed by:	J. Rooke
Checked by:	F. Goulding
Date:	6-Feb-23

Extended Detention Storage Required

Requirements as per MOE

Storage =	25	mm / impervious ha
TIMP =	65.0	%
Area to Pond =	6.95	ha
Impervious Area =	4.5	ha
Storage Required =	**1123**	**cu.m**
Drawdown Required	**24**	**hrs**

Orifice Sizing per MOE 2003 SWM Manual - Falling Head Equation

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

t =	drawdown time	**86400**	seconds	
Ao =	cross sectional area of orifice		sq.m	*to be calculated
h =	maximum water elevation above orifice (depth of ED)	**0.41**	m	*depth of ED
C =	discharge coefficient	0.62		
Ap =	average pond surface area for extended detention	**4118**	sq.m	*based on pond design

Ao =	0.0222 sq.m	d =	168	mm		
Actual Diameter		d =	**160**	mm	Ao =	0.020
Actual Drawdown Time			26.5	hrs		

SEDIMENT FOREBAY SIZING

Project: Centre Wellington Operations Centre
File: 300055234
Designed by: J. Rooke
Checked by: F. Goulding
Date: 6-Feb-23

Forebay Length: Two Calculations (per MOE SWMP Manual, 2003)

1) Settling Calculations **Dist = SQRT(r * Qp / Vs)**
(Equation 4.5, MOE 2003)

where:
Dist = Forebay length (m)
r = Length to width ratio of forebay
Qp = Peak flowrate from the pond during quality design storm (cms)
Vs = Settling velocity (m/s)

given:
r = 3.5
Qp = 0.02351 cms *see below
Vs = 0.0003 m/s

therefore:
Dist = 16.6 metres
Width= 4.7 metres

Peak quality flowrate (Qp) from pond based on release rate and volume of extended detention multiplied by a factor of 2.0 for peaking

Extended Detention Vol 1123 cu.m (extended det. volume)
Release Rate 26.5 hrs
Qp 0.02351 cms

2) Dispersion Length **Dist = (8 * Q) / (d * Vf)**
(Equation 4.6,MOE 2003)

where:
Dist = Forebay length (m)
Q = inlet flowrate (cms)
d = depth of permanent pool in forebay (m)
Vf = desired forebay velocity (m/s)

given:
Q = 1.28 cms *see below
d = 1 m
Vf = 0.5 m/s

therefore:
Dist = 20.5 metres
Width= 10.2 metres
Min Bottom Width= 2.6 metres *MOE equation 4.6
Pond Side Slopes: 4
Calc. Top Width= 10.56 metres
Calc. Top Length= 36.96 meters

Peak inflow rate calculated based on STORM SEWER DESIGN FLOW per rational method sewer calculation.

Minimum Forebay Dimension:

Length= 37.0 meters
Width= 10.6 meters

Actual Forebay Design:

Length= 56.0 meters
Width= 16.0 meters

Check Average velocity in forebay <= 0.15 m/s
Pond Side Slopes: 4 H : 1 V
Q = V x A Q = 1.28 A = 12 sq.metres

therefore: V = 0.1067 m/s
Design: **OK**

STAGE STORAGE DISCHARGE CURVE CALCULATIONS

BURNSIDE

Project: Centre Wellington Operations Centre
File: 300055234
Designed by: J. Rooke
Checked by: F. Goulding
Date: 2/6/2023

Storage - Outflow Relationship for SWM Pond

Permanent Pool Elevation:	424.45	m	Storm outflow controlled by a single outlet pipe
Extended Detention Elevation:	424.86	m	Extended detention outflow controlled by a reverse sloped pipe
Extended Detention Orifice Size:	160	mm	
Orifice Area	0.02	m2	
Computational Increment	0.05	m	

Orifice Outlets:

	Orifice #1	
Flood Control Orifice Diameter	0.825	m
Flood Control Inlet	0.00	m above pp (ED Elev)
Flood Control Orifice Area	0.53	m2
Flood Control Inlet Elevation	424.45	
Flood Control Orifice Elevation	424.45	m
Flood Control Orifice Coeff	0.62	

Weir Outlets:

	Weir #1	
Flood Control Weir Width	15	m
Flood Control Weir Coeff	1.7	LSRCA Guidelines
Flood Control Weir Rectangular	n	(Y or N)
Flood Control Weir Crest Height	0.3	m
Flood Control Weir Crest EL	425.85	m
Flood Control Weir Side Slope X:1	4	(X:1, USE 0:1 FOR RECTANGULAR)

	Water Surface Elevation m	Depth above PP m	Depth of ED Orifice m	Depth of Flood Orifice m	Pond Storage Volume cum	ED Orifice Outflow cms	Flood Control Orifice #1 cms	Total Orifice Flow cms	Flood Control Weir #1 cms	Total Weir Flow cms	Total Pond Outflow cms	Pond Storage Volume ha m
NWL	424.45	0.00	0.00	0.00	0	0.0000		0.000		0.000	0.000	0.000
	424.50	0.05	0.05	0.05	132.0	0.0021	0.000	0.002		0.000	0.002	0.013
	424.55	0.10	0.10	0.10	263.0	0.0175	0.000	0.017		0.000	0.017	0.026
	424.60	0.15	0.15	0.15	402.0	0.0214	0.000	0.021		0.000	0.021	0.040
	424.65	0.20	0.20	0.20	540.0	0.0247	0.000	0.025		0.000	0.025	0.054
	424.70	0.25	0.25	0.25	685.0	0.0276	0.000	0.028		0.000	0.028	0.069
	424.75	0.30	0.30	0.30	829.0	0.0302	0.000	0.030		0.000	0.030	0.083
	424.80	0.35	0.35	0.35	992.0	0.0327	0.000	0.033		0.000	0.033	0.099
ED	424.86	0.41	0.41	0.41	1155.0	0.0354	0.000	0.035		0.000	0.035	0.116
2- year	424.87	0.42	0.42	0.42	929.0	0.0358	0.127	0.163		0.000	0.163	0.093
5- year	424.88	0.43	0.43	0.43	1182.0	0.0362	0.194	0.230		0.000	0.230	0.118
10-year	424.90	0.45	0.45	0.45	1243.0	0.0370	0.284	0.321		0.000	0.321	0.124
25- year	424.96	0.51	0.51	0.51	1445.0	0.0394	0.458	0.498		0.000	0.498	0.145
50- year	425.03	0.58	0.58	0.58	1689.0	0.0421	0.601	0.643		0.000	0.643	0.169
	425.05	0.60	0.60	0.60	1776.0	0.0428	0.636	0.678		0.000	0.678	0.178
	425.10	0.65	0.65	0.65	1950.0	0.0445	0.715	0.760		0.000	0.760	0.195
	425.15	0.70	0.70	0.70	2124.0	0.0462	0.787	0.833		0.000	0.833	0.212
	425.25	0.80	0.80	0.80	2484.0	0.0494	0.914	0.963		0.000	0.963	0.248
100- year	425.32	0.87	0.87	0.87	2736.0	0.0515	0.993	1.044		0.000	1.044	0.274
	425.35	0.90	0.90	0.90	2855.0	0.0524	1.025	1.077		0.000	1.077	0.286

Assessment of Past Uses Report

965 Gartshore Street
Fergus, Ontario

Client:
Township of Centre Wellington c/o R.J. Burnside & Associates Ltd.

Attention: HT Lam, Principal, Senior Landscape Architect

Type of Document:
Final Report

Project Number:
G4599-22-6

Project Name:
Proposal #21-22
Site Development, Operations Centre

JLP Services Inc.
Geotechnical and Environmental Consultants
405 York Road,
Guelph, ON
N1E 3H3

Date Submitted:
December 30, 2022

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Appendix H – Chain of Title

1. Executive Summary

JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Ltd. ("Client") to conduct Excess Soil Management Program (sampling and reporting activities) for the proposed site development of a Township Operations Centre located in Fergus, Ontario, herein referred to as the "Site" and "Project Area".

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed, reused, and/or disposed of in a safe and sustainable manner. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, additional sampling and reporting may be required when further development plans and excess soil volumes are available.

The following Assessment of Past Uses (APU) report was conducted in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

Based on the findings of the Assessment of Past Uses:

- The Project Area was first developed for agricultural use in the early 1900s.
- The Project Area was vacant and undeveloped prior to being developed as a farm.
- Potentially Contaminating Activities were identified in the project area.:
  - PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles
  - PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks
  - PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications
  - PCA (Other)- De-icing activities of roads and sidewalks for public and vehicular safety.
  - PCA #51 - Solvent Manufacturing, Processing and Bulk Storage
  - PCA #33 - Metal Treatment, Coating, Plating and Finishing
  - PCA #39 - Paints Manufacturing, Processing and Bulk Storage
  - PCA #57 - Vehicles and Associated Parts Manufacturing
- Areas of Potential Environmental Concern (APEC) were identified in the Project Area.
- Contaminants of potential concern in the APECs are associated with agricultural pesticide storage and use on-Site and off-Site commercial and/or light-industrial properties to the east and southeast of the Site.

Recommendations:

A Sampling and Analysis Plan (SAP) should be prepared to ensure that APECs and Contaminants of Potential Concern (COPCs) are adequately assessed through the collection of soil samples and laboratory analysis. The SAP should capture and ensure that the quality of excess soil in relation to the PCAs and APECs identified in the APU are adequately assessed.

Furthermore, a O.Reg. 406/19 compliant Excess Soil Characterization Report should be prepared to document the soil quality of excess soil within the Project Area.

2. Introduction

JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Ltd. ("Client") to conduct Excess Soil Management sampling and reporting activities for the proposed site development of an Operations Centre located in Fergus, Ontario, herein referred to as the "Site" and "Project Area".

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed, reused, and/or disposed of in a safe and sustainable manner. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, additional sampling and reporting may be required when further development plans and excess soil volumes are available.

The following Assessment of Past Uses (APU) report was conducted in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

2.1 Property Information

The Site is located approximately 800 metres northeast from Ontario Highway 6, as shown on Figure 1 and 2. The Site measures approximately 8 hectares (20 acres) in area. At the time of the investigation, the Site was a vacant agricultural property.

At the time of the investigation, the Site was owned by the Township of Centre Wellington. The Township of Centre Wellington has reportedly owned the Site since 2021.

The current PIN for the Site is 71129-0509 (LT). The Site was also listed under the PIN 71129-0284, which is now inactive.

The approximate Universal Transverse Mercator (UTM) coordinates for the site centroid are NAD83 17- 4841291N 549328E. The UTM coordinates were based on Global Positioning System (GPS) measurements obtained from Google Earth.

2.2 Contact Information

Contact information for R.J. Burnside & Associates Ltd. are as follows:

- HT Lam
  Principal Senior Landscape Architect
  HT.Lam@rjburnside.com
  1-800-265-9662

2.3 Project Leader

Contact information for the Project Leader are as follows:

- Township of Centre Wellington
  1 MacDonald Square,
  Elora, ON N0B 1S0
  Tel: (519) 846-9691, Fax: (519) 846-2074

3. Scope of Investigation

The scope of work for the APU was conducted in accordance with O. Reg. 406/19 and the MECP document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

General objectives of the APU are as follows:

- Develop preliminary determination of the likelihood that one of more contaminants have affected soil and/or rock in a location where soil and/or crushed rock is to be excavated within the Site and/or Project Area;

- Identify any areas of potential environmental concern (APECs) within the project area and to determine if any location where soil and/or crushed rock is to be excavated could have been affected by any potentially contaminative activity (PCA); and,

- Identify contaminants of potential concern (COPCs) in order to develop a sampling and analysis pan, if any areas of potential environmental concern (APECs) are identified.

The associated scope of work included:

- Records review- research and database search of the study area;
- Interview- information gathered from individuals familiar with the Project Area;
- Site reconnaissance- site visit and documented observations of Site and Project Area; and,
- Preparation of an APU report.

4. Record Review

4.1 General

4.1.1 Assessment of Past Uses Study Area Determination

The Study Area included the surrounding land extending a distance of 250 metres from the boundary of the Project Area. At the time of the site reconnaissance, land usage within 250 metres of the site boundaries included residential use to the south, commercial and light industrial use to the east, woodlands to the north and agricultural use to the west.

Assessment of Past Use Study Area shown as Figure 3.

4.1.2 First Developed Use Determination

Based on the interviews, the Site was first developed in the early 1900s. However, records such as the National Air Photo Library only display records up to 1964 where it was used as an agricultural property. The surrounding area to the north and west of the Site has had agricultural use. There has been commercial/light industrial use to the east and south of the Site since at least between 1964 and 1980.

4.1.3 Fire Insurance Plans

A search of the Catalogue of Canadian Fire Insurance Plans 1875 – 1975 (Catalogue) was conducted by Opta Information Intelligence (Opta) to determine if FIPs for the Site existed. Based on a review of the Catalogue, no FIPs were available for the Site.

Fire Insurance Plan details are attached as Appendix F.

4.1.4 Historical Site Plans

No historical site plans were available for review. However, aerial photographs are discussed in further detail in section 4.3.1.

4.1.5 City Directory

A search of the archives was completed by Environmental Risk Information Services (ERIS) and it was reported that Fergus, Ontario does not have any city directories available.

City Directory details are attached as Appendix E.

4.1.6 Chain of Title

Land registry records were reviewed to determine historical ownership of Site. The parcel register indicates the Site was historically listed under the PIN 71129-0284, which is now inactive. The Site was owned by REC Farms Inc. since 1961 until it was sold to Richard Booy in 2017, sold it to the current owners, The Corporation of the Township of Centre Wellington, in 2021. The Site is currently listed under the PIN 71129-0509 (LT).

Chain of Title details are attached as Appendix H.

4.1.7 Environmental Reports

No environmental reports were not available for review.

4.2 Environmental Source Information

4.2.1 Federal and Provincial Database Search

A search of provincial, federal and private environmental databases for records pertaining to the Site and properties within the APU Study Area was completed by ERIS on July 19, 2022. JLP has confirmed neither the completeness nor the accuracy of the records that were provided.

The ERIS database search identified a total of 99 records within the Study Area. There were 2 records associated with the Subject Site. The remaining 97 records were associated with off-site locations. Based on the topographic map (Figure 5), groundwater flow is estimated to be southwesterly towards the wetlands in Gibbons Drive Park and the Grand River. Records downgradient of the Subject Site were not considered to be an environmental concern. Records of interest upgradient and/or directly adjacent to the Subject Property are summarized below in Table 4.2.1.

The ERIS Report is provided in Appendix B.

Records associated with Subject Property are summarized in Table 4.2.1.

Table 4.2.1 – ERIS Summary

Address	Description of PCA	Database	Assessment
965 Gartshore Street (On-Site)	Environmental Compliance Approval (ECA) for municipal drinking water systems. Gas pipeline damage.	EBR/PINC	This listing is not considered to be an environmental concern to soil or groundwater.

105 Gregson Court (34.8 m east of Site)	Registered standby power system	EASR	This listing is not considered to be an environmental concern to soil or groundwater.
950 Gartshore Street (57.9 m east of Site)	Waste generation of Aliphatic Solvents, Waste Oils and Lubricants	GEN/ECA	This listing is of potential environmental concern to soil and groundwater
935 Gartshore Street (67.3 m east of Site)	Registered manufacturer of Service Establishment Machinery, Equipment and Supplies Wholesaler-Distributors; Machine Shops; Hardware Wholesale Distributors; All Other Machinery, Equipment and Supplies Wholesaler-Distributors; Industrial Machinery, Equipment and Supplies Wholesaler-Distributors; All Other General Purpose Machinery Manufacturing; All Other Textile Product Mills; Hardware Manufacturing; Other Metalworking Machinery Manufacturing; Other Plate Work and Fabricated Structural Product Manufacturing.	SCT	This listing is of potential environmental concern to soil and groundwater given the proximity to the Site.
940 Gartshore Street (77.2 m east of Site)	Registered manufacturer of Urethane and Other Foam Product (except Polystyrene) Manufacturing; and All Other Plastic Product Manufacturing. Waste generation of Halogenated Solvents and Residues; Organic Laboratory Chemicals; Oil Skimmings & Sludges; Waste Oils/Sludges (Petroleum Based); Misc. Waste Organic Chemicals.	SCT/GEN	This listing is not considered to be a potential environmental concern to the on-Site soil due to the proximity and given that it cross-gradient to Project Area.
131 Gregson Court (89.9 m east of Site)	Natural Gas pipeline damage	PINC	This listing is not considered to be an environmental concern to soil.
925 Gartshore Street (142.2 m east of Site)	Natural Gas pipeline release	HINC	This listing is not considered to be an environmental concern to soil.
151 Gregson Court (220.3 m east of Site)	Waste generation of Emulsified Oils; Waste Crankcase Oils and Lubricants; Waste Oils/Sludges (Petroleum Based)	GEN	This listing is not considered to be an environmental concern to soil.
938 Glengarry Crescent	Approval for discharge into air. Waste generation of Paint/Pigment/Coating Residues; Transfer	EBR/GEN/SPL	This listing is not considered to be a potential environmental concern to the on-Site soil due to the proximity.

(225.2 m east of Site)	Station Oil Wastes; Wastes from the Use of Pigments, Coatings and Paints; Aliphatic Solvents and Residues; Petroleum Distillates; Waste Oils/Sludges (Petroleum Based); Oily Water/Waste Oil from Waste Transfer/Processing Sites. Reported leak of methane.		
930 Gartshore Street (227.1 m east of Site)	Registered manufacturer of All Other Plastic Product Manufacturing; All Other Converted Paper Product Manufacturing; All Other Non-Metallic Mineral Product Manufacturing; Polystyrene Foam Product Manufacturing; Urethane and Other Foam Product Manufacturing; Semiconductor and Other Electronic Component Manufacturing; Wiring Device Manufacturing; Power, Distribution and Specialty Transformers Manufacturing; All Other Non-Metallic Mineral Product Manufacturing; Other Specialty-Line Building Supplies Wholesaler-Distributers; Electrical Wiring and Construction Supplies Wholesaler-Distributer; Other Paper and Disposable Plastic Product Wholesaler-Distributers; Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing; Electronic Components, Navigational and Communications Equipment and Supplies Wholesaler-Distributers; Industrial Machinery, Equipment and Supplies Wholesaler-Distributors; Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing. Waste generation of Petroleum Distillates; Halogenated Solvents; Waste Oils and Lubricants; Aromatic Solvents; Aliphatic Solvents; Polymeric Resins; Waste Compressed Gases, including cylinders; Acid Waste-Other Metals; Paint/Pigment/Coating Residues; Inorganic Laboratory Chemicals; Organic Laboratory Chemicals; Acid Solutions-Containing Other Metals and Non-Metals; Crankcase Oils and Lubricants; Other	SCT/GEN/EASR	This listing is not considered to be a potential environmental concern to the on-Site soil due to the proximity and given that it cross-gradient to Project Area.

	Specified Inorganic Sludges, Slurries or Solids; Amines ECA for an air-related process.		

Databases:
EASR – Environmental Activity and Sector Registry
EBR – Environmental Registry
ECA – Environmental Compliance Approval
GEN – O. Reg. 347 Waste Generators
HINC – TSSA Historic Incidents
PINC – Pipeline Incidents
SPL – Ontario Spills
SCT – Scott's Manufacturing Directory

4.2.2 Ministry of the Environmental, Conservation and Parks

Records pertaining to the Site were requested from the MECP through the Freedom of Information (FOI) and Protection of Privacy Act on July 11, 2022. The FOI records were released to JLP on September 19, 2022. FOI details are listed in Appendix C.

The records detail one incident reported to the Spills Action Centre in 2020. The incident involved a damaged residential natural gas service line and is noted to be of minor environmental consequence.

The study included a search of MECP databases for records related to potential contamination. Details for MECP related records identified in the APU Study Area are listed in the ERIS report in Appendix B.

4.2.3 Technical Standards and Safety Authority

The Technical Standards and Safety Authority (TSSA) was contacted for records of underground storage tanks (USTs) at the Site and adjacent properties. The TSSA Public Information Coordinator was contacted via email on July 11, 2022. The TSSA informed us that there are no records in their data base of any fuel storage tanks at the Site.

It is noted that the Fuels Safety Division did not register private USTs or ASTs prior to January of 1990, or furnace oil tanks prior to May 1, 2002. The Fuels Safety Division also does not register waste oil tanks in apartments, office buildings, residences etc., or aboveground gas or diesel tanks.

A copy of the TSSA communications is provided in Appendix C.

4.3 Physical Setting Sources

4.3.1 Aerial Photographs

Aerial photographs from 1961 and 1980 was examined to identify historical land and/or property uses, development and activity of the APU Study Area. Satellite images from Google Maps were also reviewed to identify historical land and/or property uses, development and activity of the APU Study Area

Table 4.3.1: Aerial Photographs and Satellite Image Summary

Year	Description of Structures on the Site	Description of Surrounding Properties
1964	Developed as agricultural field	Agricultural use in all surrounding areas
1980	Same as above	Agricultural use to the north and west and industrial use to the east and south
2006	Developed as agricultural field with farm structure	Agricultural use to the north and west and industrial use to the east and residential to south
2019	Same as above	Same as above

Based on a review of the aerial photographs, there are possible environmental concerns to the east and southeast of the site.

Copies of the aerial photographs and satellite images are included in Appendix D.

4.3.2 Topography, Hydrology and Geology

The Site is located in the physiographic region known as Guelph Drumlin Field with glaciofluvial outwash (sorted and rounded) deposits. The native quaternary soils in this region typically consist of glaciofluvial outwash deposits and Port Stanley Till (Figure 8 - Ontario Geological Survey, 2000). The bedrock is estimated to be present at about 25 metres below grade.

According to the Ontario Geological Survey map of the area, the underlying geology is comprised of the Guelph Formation. Bedrock at the Site consists of Lower Silurian: sandstone, shale, dolostone and siltstone (Figure 7 - Ontario Geological Survey, 2011).

According to the Ontario Geological Survey map of the area, the surficial geology consists of sandy glaciofluvial deposits (river deposits and delta topset facies) on the northern boundaries of the Site. The southern boundaries of the Site consist of stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain (Figure 6 - Ontario Geological Survey, 2010).

Based on the elevation measurements provided on Google Earth, the Site is relatively flat; there a 4-metre increase in elevation from the northern limit of the property to the southern limit. Based on the topographic map (Figure 5), groundwater flow is estimated to be southwesterly towards the wetlands in Gibbons Drive Park and the Grand River

Topographic Map shown as Figure 5.

Surficial Geology Map shown as Figure 6.

Bedrock Geology Map shown as Figure 7.

Quaternary Geology Map shown as Figure 8.

4.3.3 Fill Materials

Given the first developed use of the Site as an agricultural field/farm, fill material is not expected. There were no visual or olfactory indicators such as staining and/or odour evident. However, fill materials may be present and localized around the on-Site farm structures and/or buildings.

4.3.4 Water Bodies and Areas of Natural Significance

There are no water bodies on the Site. The nearest surface water body to the Site is a tributary that connects to the Grand River located approximately 1600 meters to the southeast.

Based on the Ministry of Natural Resources and Forestry's "Make a Map: Natural Heritage Areas", the northern corner of the Site is designated as the following:

- An area reserved or set apart as a natural heritage system under the Wellington County Natural Heritage System, 2018.

Based on the Ministry of Natural Resources and Forestry's "Make a Map: Natural Heritage Areas", the Site is not located within 30 metres of any of the following:

- An area reserved or set apart as a provincial park or conservation reserve under the Provincial Parks and Conservation Reserves Act, 2006;
- An area of natural and scientific interest (life science or earth science) identified by the Ministry of Natural Resources and Forestry as having provincial significance;
- A wetland identified by the Ministry of Natural Resources and Forestry as having provincial significance;
- An area designated as an escarpment natural area or an escarpment protection area by the Niagara Escarpment Plan under the Niagara Escarpment Planning and Development Act;
- An area identified by the Ministry of Natural Resources and Forestry as significant habitat of a threatened or endangered species;
- An area which is habitat of a species that is classified under section 7 of the Endangered Species Act, 2007 as a threatened or endangered species;
- Property within an area designated as a natural core area or natural linkage area within the area to which the Oak Ridges Moraine Conservation Plan under the Oak Ridges Moraine Conservation Act, 2001 applies; and,
- An area set apart as a wilderness area under the Wilderness Areas Act.

4.3.5 Well Records

One potable drinking well record identified on-Site and four well records identified within 250 metres of the Project Area. The on-Site well record identifies a municipal water supply well installed in 1989. The 4 off-Site wells were installed for monitoring purposes, of which 3 wells have been abandoned. It is to be noted that the residential dwelling is now serviced via municipal drinking water.

4.3.6 Site Operating Records

There were no operating records available for this Site.

5. Interviews

An interview was conducted by JLP staff with the individual identified to be the most knowledgeable with respect to both the current and historical site uses. The interview was conducted during the site reconnaissance in order to obtain information to assist in identifying details of potentially contaminating activities, potential contaminant pathways in, on, or below the Site, and areas of potential environmental concern. Any information provided during the interviews is presented alongside information from the site reconnaissance in Section 6.

During the completion of this Assessment of Past Uses (APU) report, the following individual was interviewed:

- Mr. Richard Booy, Owner/Operator of REC Farms (knowledgeable of Project Area since 2016) – previous owner of Site and surrounding properties, was interviewed on December 19, 2022 via telephone.

Mr. Booy is unaware of any current or former USTs, fill material, spills, fires, or orders and/or fines charged to the Site by municipal, regional and/or provincial agencies. To the best of his knowledge, the Site was developed in the early 1900's as a agricultural farm.

He indicated that he purchased the site in 2016 from the previous owners that owned the site for approximately 50 years. The previous owners also operated a farm. Mr. Booy also noted that fertilizer/pesticide was not stored on site but rather brought in and applied when and as required.

6. Site Reconnaissance

6.1 General Requirements

The APU site reconnaissance was conducted on October 24 and December 15 of 2022, between 1 pm and 2pm, by Mr. Aakash Kuruvath under the supervision of Mr. Ajay Jayalath and Mr. Alexander Lee.

On December 15, 2022, the weather was overcast with a temperature of 3°C.

At the time of the site reconnaissance, the Site was a vacant farm with existing buildings.

Photographs documenting the site reconnaissance including the photographs included in Appendix G.

6.2 Site Description and Buildings

Attempts were made to gain access into the single residential dwelling located on the eastern potion of the site. However, given that the Site was vacant during the site visits, the on-Site residential dwelling was inaccessible. The two-storey residential dwelling was of brick construction with what appeared to be a full basement.

A large wooden framed barn was present northwest of the residential dwelling, on the eastern portion of the Site. The wooden barn was in poor condition. The barn was separated into two storeys.

A small slab on grade storage building was present south of the wooden barn. The building had three bay doors and was boarded shut. Various wooden structures used to contain livestock were present around the wooden barn.

Two steel grain bins were present south of the wooden barn. The grain bins appeared to be in poor condition.

One concrete silo was present north of the wooden barn building.

Two temporary Quonset huts was present during the site visit, both which were empty.

No unidentified substances were noted during the site reconnaissance.

No groundwater monitoring wells were observed during the site reconnaissance.

6.3 Adjacent and Surrounding Properties

At the time of the site reconnaissance, land usage within 250 metres of the site boundaries included residential properties to the south, residential/agricultural to the west and north. Some commercial land uses to the east.

6.4 Designated Substances and Other Issues

6.4.1 Heating and Cooling Systems

Based on the interviews conducted, the residential dwelling is heated via a forced air furnace located on the main floor. No air conditioning units are present.

6.4.2 Special Attention Items

The APU requires that the potential presence of several substances be identified during an APU investigation due to heightened public concern or specific environmental legislation. These special attention items include PCBs, asbestos-containing materials (ACMs), lead, ozone-depleting materials (ODMs), urea foam formaldehyde insulation (UFFI), radon, mould, noise and vibrations, and electric and magnetic fields.

Based on the age of the building lead piping and asbestos-containing insulation may be present within the on-Site structures. However, it is to be noted that testing for PCBs, ACMs, ODMs, UFFI were not completed as part of this APU.

No testing for radon gas was completed as part of this APU.

Overhead electrical lines were present within the Project Area. No high voltage transmission lines or electrical substations which could generate significant electromagnetic frequencies were identified within or adjacent to the Project Area. It is to be noted that testing for electromagnetic frequencies was not completed as part of this APU.

Ambient noise at the Project Area was limited to the intermittent traffic along the roads. Other noise sources were not observed during the site visits. It is to be noted that noise and vibration testing was not completed as part of this APU.

A Designated Substance Survey bust be completed to asses for the aforementioned substances.

7. Review and Evaluation of Information

7.1 Current and Past Uses

Current and past property uses of the Project Area are summarized below.

Table 7.1.1: Current and Past Uses Summary

Year	Description	Property Use
Prior to 1964 to present	Site developed as farm	Agricultural Use

The Project Area has been used for a farm (agricultural) for more than 58 years.

7.2 Potentially Contaminating Activities

A Potentially Contaminating Activity (PCA) is a property use or activity listed in O.Reg. 153/04, as amended, that is occurring and/or has occurred in the study area. Table 7.3.1 below lists PCAs identified in the study area.

Table 7.2.1: Summarizing PCAs

PCA (PCA Location)	Description	Contributing to APECs at Site	Details
PCA 1 (On-Site)	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes	Use of pesticides on fields on-Site, as well as the fields located west of the Site.
PCA 2 (On-Site)	PCA (Other)- De-icing activities	Yes	De-icing of asphalt/gravel roadway to the farm area.
PCA 3 Off-Site (950 Gartshore Street)	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes	At adjacent property to the east. Potential groundwater contamination would migrate westerly.
PCA 4 Off-Site (935 Gartshore Steet)	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes	At adjacent property to the east. Potential groundwater migration to Subject Site.
PCA 5 Off-Site (940 Gartshore Street)	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No	At adjacent property to the east. Site is cross gradient to Subject Site. De-minimis.
PCA 6 Off-Site (151 Gregson Court)	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes	PCA upgradient from Subject Site. Potential groundwater migration to Subject Site.
PCA 7 Off-Site (938 Glengarry Crescent)	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes	PCA upgradient from Subject Site. Potential groundwater migration to Subject Site.
PCA 8 Off-Site (930 Gartshore Street)	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No	At adjacent property to the east. Site is cross gradient to Subject Site. De-minimis.

PCAs and APECs shown as Figure 4.

7.3 Areas of Potential Environmental Concern

An area of potential environmental concern (APEC) is an area where contaminants are potentially present.

Based on the PCAs identified as a potential environmental concern in Table 7.2.1, the following APECs were identified in the project area:

- APEC #1 Entire Project area – pesticide/herbicide use for on-Site farm
- APEC #2 Central Farm Portion of Project Area - de-icing of asphalt/gravel roadway to the farm area.

- APEC #3 Southern Portion of Project Area - light industrial land uses observed to the east of Project Area

Table 7.3.1 below lists APEC identified in project area and lists contaminants of potential concern associates with APECs.

Table 7.3.1: Summarizing APECs

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1 (on-Site)	Entire Project Area	PCA #40	20 acres	OCPs Metals
APEC #2 (on-Site)	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3 (on-Site)	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHCs F1 to F4 & BTEX
		PCA #39		Metals & HFM VOCs
		PCA #33		Metals & HFM VOCs PHC F1 to F4 & BTEX
		PCA #57		Metals VOCs PHCs F1 to F4 & BTEX

Notes:
APEC: Area of Potential Environmental Concern
PCA: Potentially Contaminating Activity
PHCs F1 to F4: Petroleum Hydrocarbons Fractions F1 to F4
BTEX: Benzene, Toluene, Ethylbenzene and Xylenes
VOCs: Volatile Organic Compounds
EC: Electrical Conductivity
SAR: Sodium Adsorption Ratio
OCPs: Organochlorine Pesticides
PAH: Polycyclic Aromatic Hydrocarbons
HFM: Hydride Forming Metals

The aforementioned APECs are shown on Figure 4.

8. Conclusions

JLP was retained by Township of Centre Wellington to conduct Excess Soil Management activities for 965 Gartshore Street, located in Fergus, Ontario.

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects and redeveloped as the Township of Center Wellington Operations Center. The reconstruction activities will generate excess soil which will need to be managed and disposed of in a sustainable and safe manner. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, a due diligence approach is recommended. Further sampling and reporting may be required based on the development plans and excavation volumes.

The APU was conducted in accordance with Ontario Regulation (O.Reg.) 406/19 and the Soil Rules.

Based on the findings of the APU:

- The Project Area was first developed for agricultural use in the early 1900s.
- The Project Area was vacant and undeveloped prior to being developed as a farm.

- Potentially Contaminating Activities were identified in the project area:
  - PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles
  - PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks
  - PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications
  - PCA (Other)- De-icing activities of roads and sidewalks for public and vehicular safety.
  - PCA #51 - Solvent Manufacturing, Processing and Bulk Storage
  - PCA #33 - Metal Treatment, Coating, Plating and Finishing
  - PCA #39 - Paints Manufacturing, Processing and Bulk Storage
  - PCA #57 - Vehicles and Associated Parts Manufacturing
- Areas of Potential Environmental Concern (APEC) were identified within the Project Area.
- Contaminants of potential concern in the APECs are associated with agricultural pesticide storage and use on-Site and off-Site commercial and/or light-industrial properties to the east and southeast of the Site.

9. Recommendations

A Sampling and Analysis Plan (SAP) should be prepared to ensure that APECs and COPCs are adequately assessed through the collection of soil samples and laboratory analysis. The SAP should capture and ensure that the quality of excess soil in relation to the PCAs and APECs identified in the APU are adequately assessed.

Furthermore, a O.Reg. 406/19 compliant Excess Soil Characterization Report should be prepared to document the soil quality of excess soil within the Project Area.

10. Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

JLP Services Inc.

Cindy Luu, B.Sc
Environmental Scientist

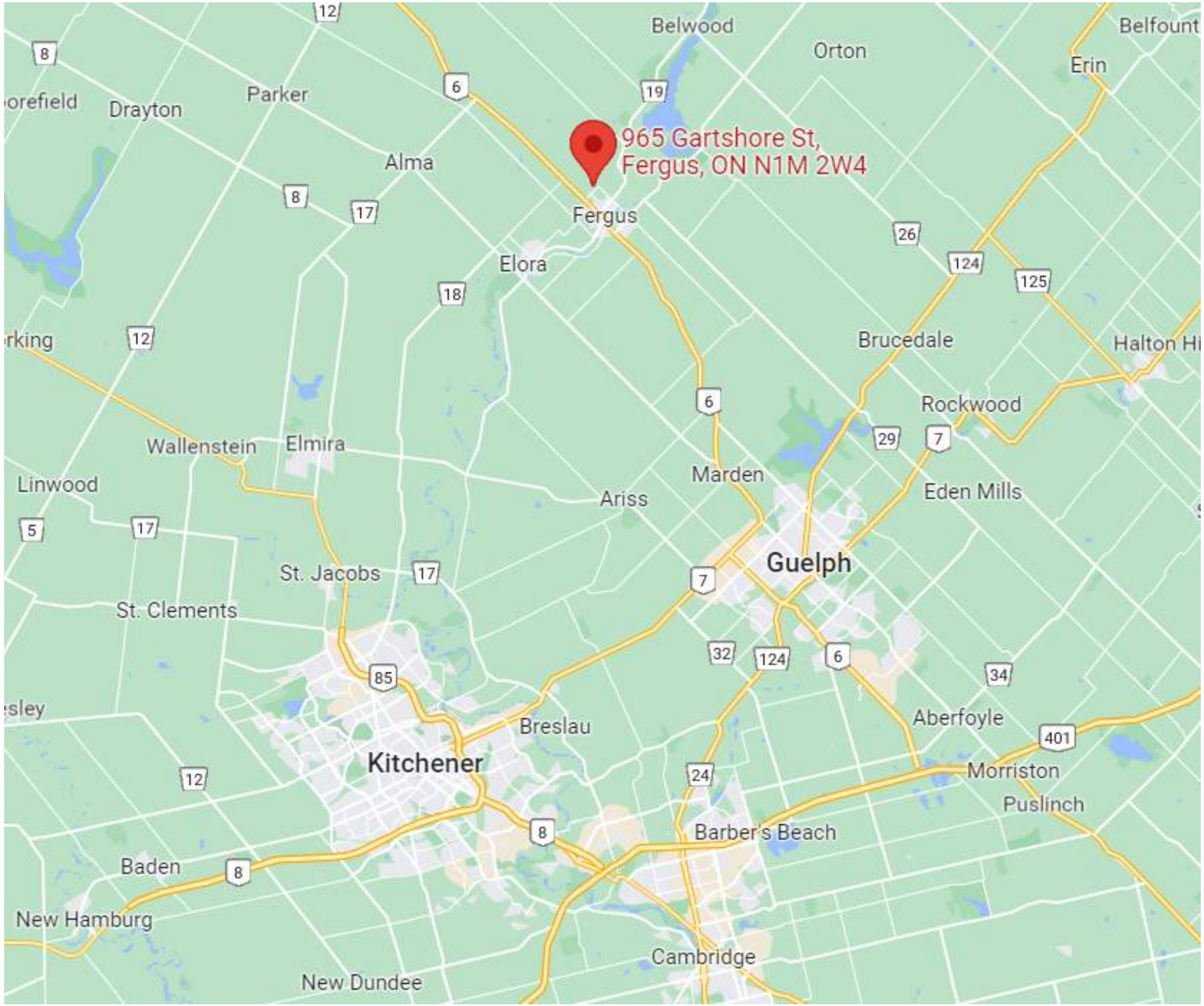
Ajay Jayalath, M.Sc., MBA, P.Geo., QP.
Senior Environmental Scientist

Alexander Lee, M.Sc. (Eng.), P.Eng., QP
Senior Consultant, Partner

11. References

- Canadian Standards Association (CSA), Z769-00 (R2018) Phase II Environmental Site Assessment, 2000.
- Google Maps. 965 Gartshore Street, Fergus, Ontario, 2022
- Make-a-Map: Natural Heritage Areas, Ontario Ministry of Natural Resources and Forestry, 2022.
- Ontario Geological Survey 2000. 1:1,000,000 scale. Quaternary geology, seamless coverage of the Province of Ontario; Ontario Geological Survey, Data Set 14- Revised.
- Ontario Geological Survey 2010. 1:50,000 scale. Surficial geology of Southern Ontario; Ontario Geological Survey, Miscellaneous release – Data 128- Revised.
- Ontario Geological Survey 2011. 1: 250,000 scale. Bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release – Data 126 – Revision 1.
- Ontario Ministry of Environmental, Conservation and Parks, Rules for Soil Management and Excess Soil Quality Standards, 2020.
- Ontario Regulation 153/04 (as amended). Environmental Protection Act. March 2021.
- Ontario Regulation 406/19. Onsite and Excess Soil management. December 2019.

Figures



Project North

JLP
Geotechnical & Environmental Consultants

Locality Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 1
Source: Google Maps	Scale: N.T.S.	

Legend

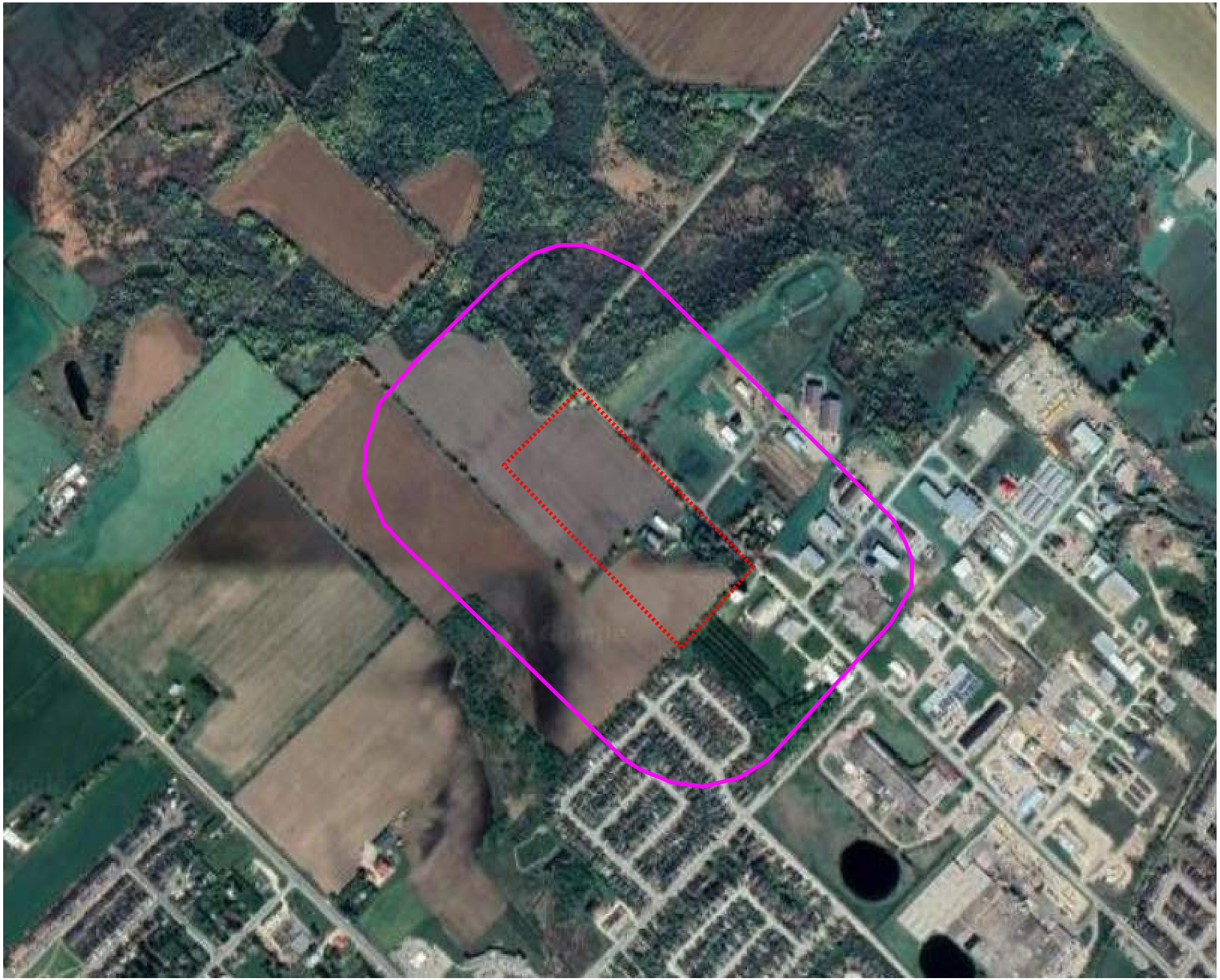
Project Area

Project North

JLP
Geotechnical & Environmental Consultants

Site Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 2
Source: Google Maps	Scale: N.T.S.	



Legend:

Project Area

Study Area

Project North

JLP

Geotechnical & Environmental Consultants

Study Area
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 3
Source: Google Maps	Scale: N.T.S.	

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1	Entire Project Area	PCA #40	20 acres	Organochlorine Pesticides, Metals
APEC #2	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHC & BTEX
		PCA #39		Metals & HFM, VOCs
		PCA #33		Metals & HFM, VOCs, PHC & BTEX
		PCA #57		Metals, VOCs, PHC & BTEX

Legend:

Project Area

Areas of Potential Concern (APECs)

APEC 1- Entire Site Area

APEC 2 - Central Farm Portion

APEC 3 - Southern Portion of Site

Potentially Contaminating Activities (PCAs)

PCA Location

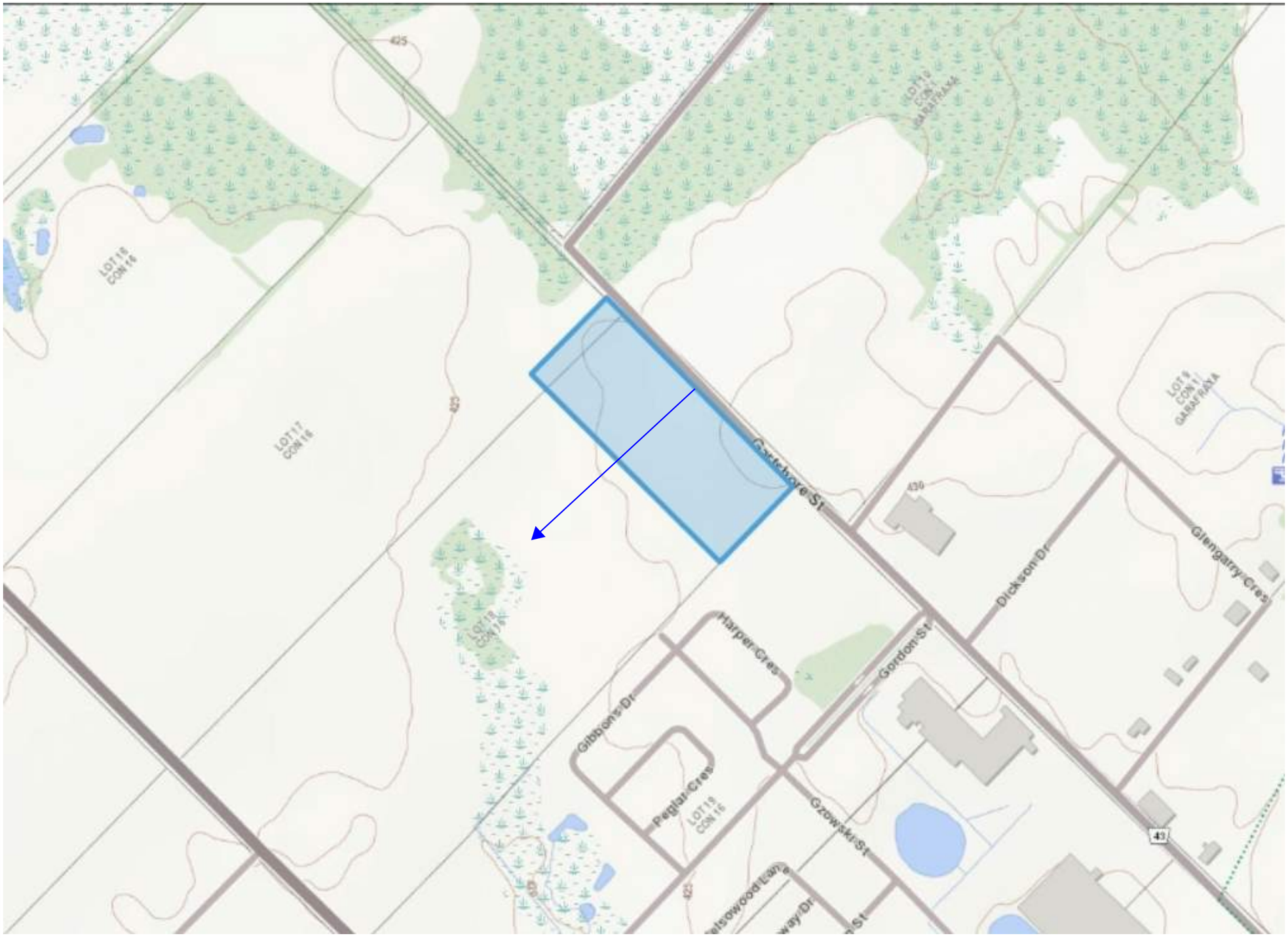
PCA	Description	Contributing to APECs at Site
PCA 1	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes (On-Site)
PCA 2	PCA (Other)- De-icing activities	Yes (On-Site)
PCA 3	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes (potential groundwater migration)
PCA 4	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 5	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)
PCA 6	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 7	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes (potential groundwater migration)
PCA 8	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)

N
Project North

JLP
Geotechnical & Environmental Consultants

Potentially Contaminating Activities
965 Gartshore Street,
Fergus, Ontario

Date: Aug. 3, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 4
Source: Google Maps	Scale: N.T.S.	



Legend

- Project Area
- Inferred Groundwater Flow
- Railway \ Train Station
- Railway with Bridge
- Railway with Tunnel
- Road (Major → Minor)
- Winter Road
- Road with Bridge
- Road with Tunnel
- Primary, Kings or 400 Series Highway (7)
- Secondary Highway (524)
- Tertiary Highway (801)
- District, County, Regional or Municipal Road (28)
- Toll Highway (407)
- One Way Road
- Spot Height (208)
- Index Contour (200)
- Contour
- Wooded Area
- Wetland
- Waterbody
- Waterbody Elevation (184)
- Watercourse
- Falls
- Rapids
- Rapids \ Falls
- Rapids
- Rocks

N
Project North

JLP
Geotechnical & Environmental Consultants

Topographic Map
965 Gartshore Street,
Fergus, Ontario

Date: July 18, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 5
Source: Ontario Ministry of Natural Resources & Forestry, 2022	Scale: N.T.S.	

Legend

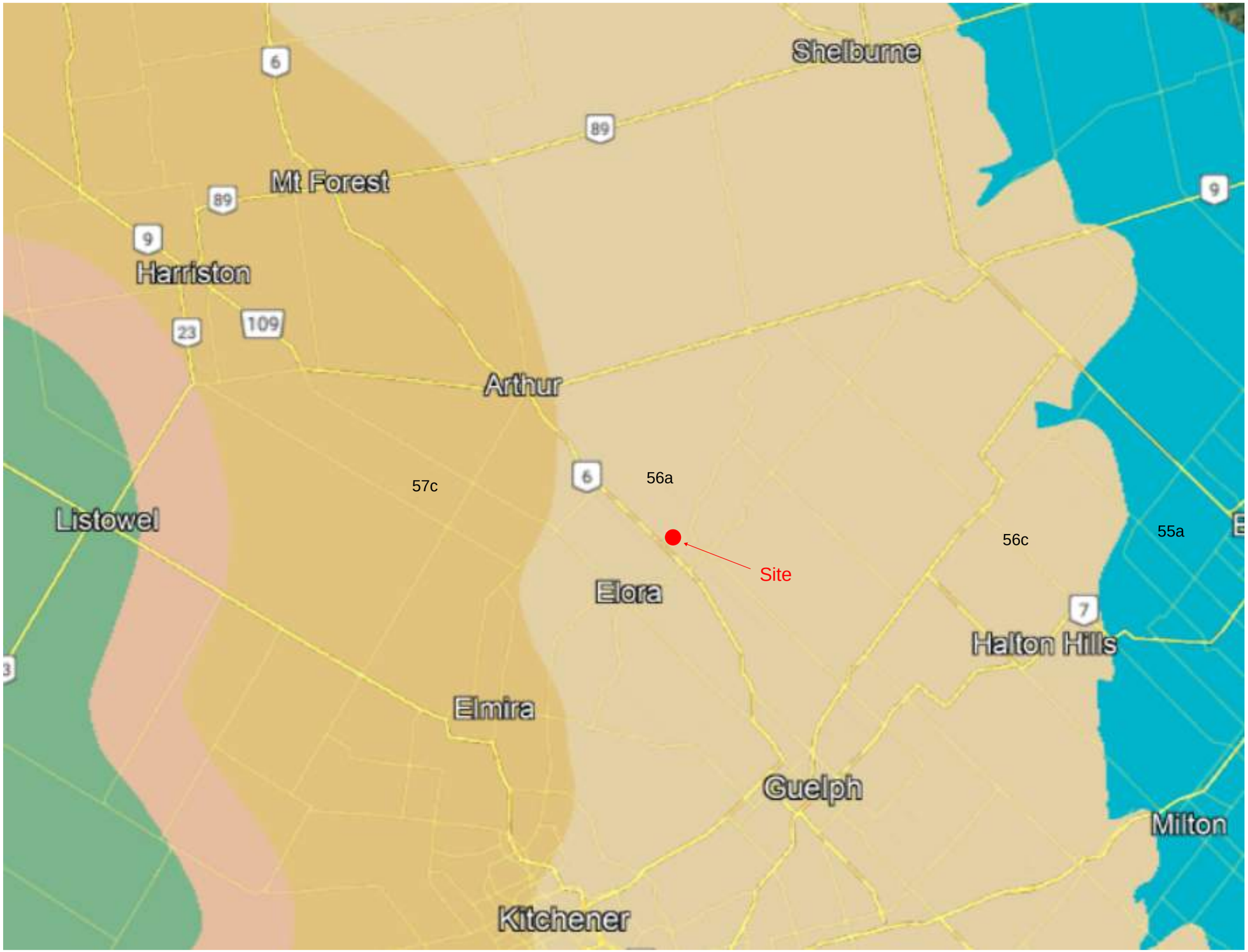
	Property Area
21	**Man-made deposits:** fill, sewage lagoon, landfill, urban development
20	**Organic Deposits:** peat, muck, marl
19	**Modern alluvial deposits:** clay, silt, sand, gravel, may contain organic remains
18	**Colluvial deposits:** boulders, scree, talus, undifferentiated landslide materials
7	**Glaciofluvial deposits:** river deposits and delta topset facies 7a Sandy deposits 7b Gravelly deposits
6	**Ice-contact stratified deposits:** sand and gravel, minor silt, clay and till 6a In moraines, eskers, kames and crevasse fills 6b In subaquatic fans
5a	**Till:** Silty sand to sand-textured till on Precambrian terrain 5a Silty sand to sand-textured till on Precambrian terrain
5b	5b Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain
5c	5c Stony, sandy silt to silty sand-textured till on Paleozoic terrain
5d	5d Clay to silt-textured till (derived from glaciolacustrine deposits or shale)
5e	5e Undifferentiated older tills, may include stratified deposits

N
Project North

JLP
Geotechnical & Environmental Consultants

Surficial Geology Map
965 Gartshore Street,
Fergus, Ontario

Date: July 18, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 6
Source: Ontario Geological Survey, 2010	Scale: N.T.S.	



Legend

Site/ Subject Property

LOWER DEVONIAN

58 **Sandstone, dolostone, limestone**

- 58a Bois Blanc Fm.; Oriskany Fm.
- 58b Stooping River Fm.
- 58c Sextant Fm.

SILURIAN (416.0 Ma to 443.7 Ma)

UPPER SILURIAN

57 **Limestone, dolostone, shale, sandstone, gypsum, salt**

- 57a Bass Islands Fm.
- 57b Bertie Fm.
- 57c Salina Fm.
- 57d Kenogami River Fm. (Upper Silurian to Lower Devonian)

LOWER SILURIAN

56 **Sandstone, shale, dolostone, siltstone**

- 56a Guelph Fm. (also present in the Upper Silurian)
- 56b Lockport Fm.
- 56c Amabel Fm.

ORDOVICIAN (443.7 Ma to 488.3 Ma)

UPPER ORDOVICIAN

55 **Shale, limestone, dolostone, siltstone**

- 55a Queenston Fm.
- 55b Georgian Bay Fm.; Blue Mountain Fm.; Billings Fm.; Collingwood Mb.; Eastview Mb.
- 55c Liskeard Gp.
- 55d Red Head Rapids Fm.
- 55e Churchill River Gp.
- 55f Bad Cache Rapids Gp.

MIDDLE ORDOVICIAN

54 **Limestone, dolostone, shale, arkose, sandstone**

- 54a Ottawa Gp.; Simcoe Gp.; Shadow Lake Fm. (now considered Upper Ordovician)
- 54b Chazy Gp.; Rockcliffe Fm.

LOWER ORDOVICIAN

53 **Dolostone, sandstone:** Beekmantown Gp.

CAMBRIAN (488.3 Ma to 542.0 Ma)

52 **Conglomerate, sandstone, shale, dolostone:** Potsdam Gp.; Nepean Fm.; Covey Hill Fm.

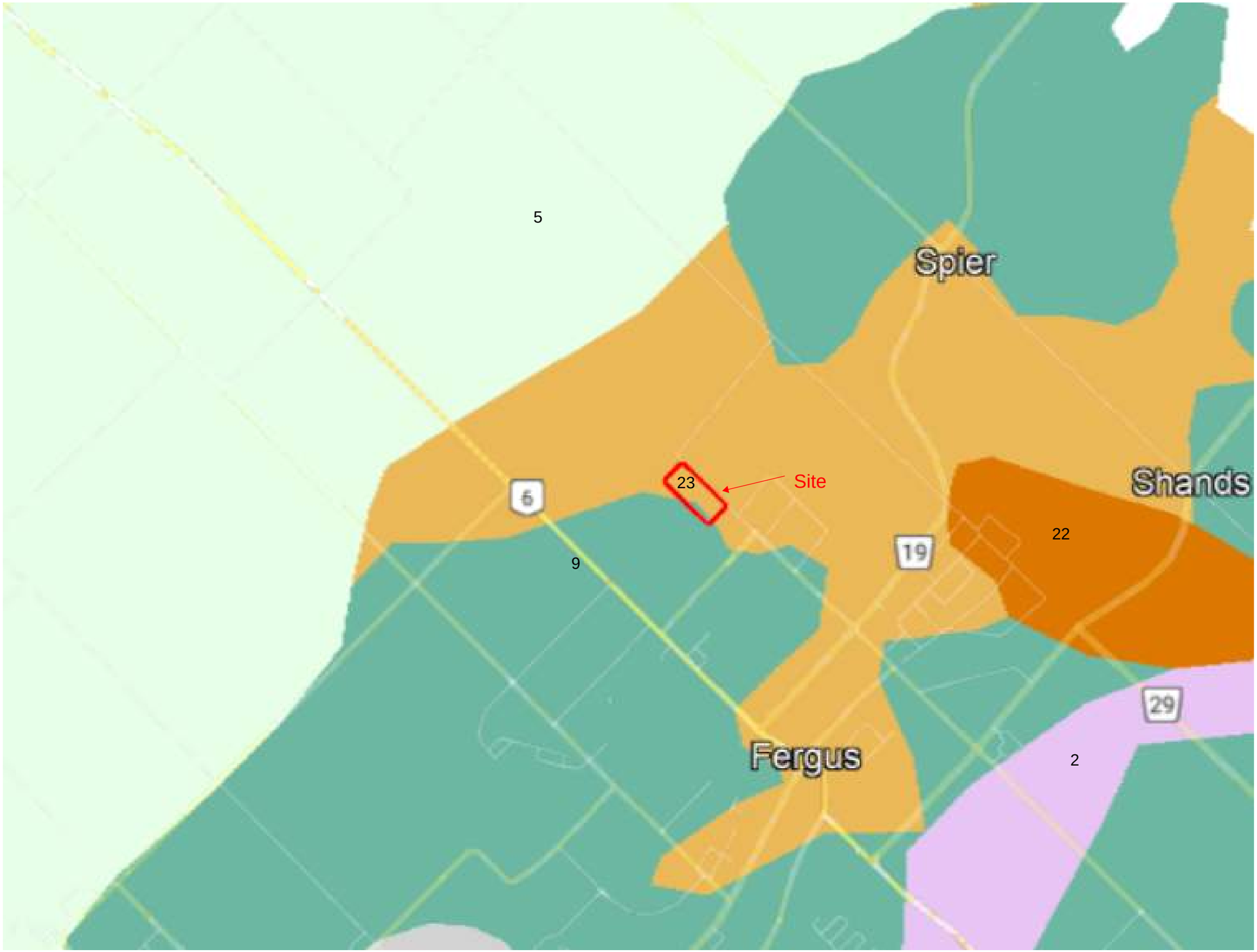
UNCONFORMITY

N
Project North

JLP
Geotechnical & Environmental Consultants

Bedrock Geology Map
965 Gartshore Street,
Fergus, Ontario

Date: July 18, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 7
Source: Ontario Geological Survey, 2011	Scale: N.T.S.	



Legend

Site/ Project Area

LEGEND

PHANEROZOIC
CENOZOIC
QUATERNARY
RECENT

32 Organic deposits: peat, muck and marl

31 Fluvial deposits: gravel, sand, silt and clay deposited on modern flood plains

30 Lacustrine deposits: sand, gravelly sand and gravel nearshore and beach deposits

29 Lacustrine deposits: silt and clay basin or quiet water deposits

PLEISTOCENE

28 Fluvial deposits: gravel, sand, silt and clay deposited on abandoned flood plains, terrace remnants

27 Glaciomarine and marine deposits: sand, gravelly sand and gravel nearshore and beach deposits

26 Glaciomarine and marine deposits: silt and clay basin and quiet water deposits

25 Glaciomarine deposits: sand, gravelly sand and gravel nearshore and beach deposits

24 Glaciomarine deposits: silt and clay, minor sand basin and quiet water deposits

23 Glaciofluvial outwash deposits: gravel and sand includes proglacial river and deltaic deposits

22 Glaciofluvial ice-contact deposits: gravel and sand minor till includes esker, kame, end moraine, ice-marginal delta and subaqueous fan deposits

21 Till: undifferentiated, fine grained, predominantly silty clay to silt matrix, commonly clast poor, high matrix carbonated content

20 Till: undifferentiated, predominantly sand matrix, extremely stony, bouldery and high in total matrix carbonated, often associated with stratified sediments

19 Till: undifferentiated, predominantly sandy silt to silt matrix, commonly rich in clasts, often high in total martix carbonate content

8 Wartburg Till (Huron-Georgian Bay lobe): silty clay matrix, high carbonate content in matrix, clast poor

7 Stratford Till (Huron-Georgian Bay lobe): sandy silt matrix, strongly calcareous, moderately stony

6 Mornington Till (Huron-Georgian Bay lobe): silty clay matrix, moderate to high matrix carbonate content, clast poor.

5 Tavistock Till (Huron-Georgian Bay lobe): sandy silt to silt matrix, silty clay matrix in south and north, moderate to high carbonate content, clast content decreases from moderate to poor northward

N
Project North

JLP
Geotechnical & Environmental Consultants

Quaternary Geology Map
965 Gartshore Street,
Fergus, Ontario

Date: July 18, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 8
Source: Ontario Geological Survey, 2000	Scale: N.T.S.	

Appendix A – Limitations and Use of Report

REPORT TERMS AND CONDITIONS

NOTICE: THE FOLLOWING PROVISIONS SET FORTH IMPORTANT QUALIFICATIONS AND LIMITATIONS ON THE FINDINGS AND RECOMMENDATIONS IN THE REPORT AS WELL AS THE USE OF, AND RELIANCE ON, THE REPORT.

1. **DEFINITIONS**. The following capitalized terms have the following meanings:

   (a) "**Additional Investigations**" means investigations that JLP has indicated to the Client should be undertaken to take into account any Out-of-Scope Requirements, but that are not otherwise specifically within the scope of investigations conducted for the purpose of the Report.

   (b) "**Applicable Laws**" means and includes without limitation all applicable provincial laws, regulations, guidelines, policies, standards, protocols, and objectives administered by the Ministry of the Environment and Climate Change or any other duly-constituted governmental authority, all as in force as of the date of the Report.

   (c) "**Client**" means the Client as referred to in the Report.

   (d) "**Client Information**" means the information, representations, and instructions provided by the Client, the Client's representatives, and/or others and upon which the Report is based, in whole or in part.

   (e) "**Findings**" means the evaluations and conclusions set forth in the Report.

   (f) "**JLP**" means JLP Services Inc.

   (g) "**Out-of-Scope Requirements**" means special concerns or requirements of the Client in respect of the subject matter of the Report.

   (h) "**Recommendations**" mean the findings and recommendations referred to in the Report, taking into account any Out-of-Scope Requirements that were disclosed to JLP prior to the date of the Report.

   (i) "**Report**" means the report to which these Terms and Conditions are attached and form part.

   (j) "**Report Documents**" means the underlying documents, records, data, and files, in any medium whatsoever, generated in connection with the preparation of the Report, including without limitation, the instructions and objectives communicated to JLP by the Client, communications between JLP and the Client, and other reports, proposals, or documents prepared by JLP for the Client in connection with the Site.

   (k) "**Site**" means the site in respect of which the Report was prepared.

   (l) "**Site Conditions**" means Site conditions known as a result of, or reasonably imputed by, the investigations that were undertaken as of the date of the Report.

2. **BASIS OF REPORT**. The Report is based on the Site Conditions. Any changes to the Site Conditions after the date of the Report that could or will affect the Site Conditions may or will have a corresponding effect on the Recommendations. The Report does not take into account any (a) Additional Investigations that were not undertaken, or (b) Out-of-Scope Requirements that were not communicated prior to completion of the investigations that were been undertaken as of the date of the Report. Where recommended field services are referred to, they are the minimum services necessary to determine compliance of construction with Applicable Laws, generally accepted industry-standard practices, and the Recommendations.

3. **RELIANCE & USE**. The Report has been prepared only for the Site and the related design, development, building, or building assessment objectives identified by the Client. The Findings and Recommendations are based on the Site Conditions and the Client Information. In preparing the Report, JLP has relied upon the Client Information and disclaims any responsibility for any inaccuracy, misstatement, omission, unintentional misrepresentation, or other deficiency contained in the Report as a result of such reliance. Unless specifically stated otherwise, the applicability and reliability of the Findings and the Recommendations expressed in the Report are only valid to the extent that (a) there has been no material change to or variation from any of the Client Information, (b) the Client Information contains no untrue statement of a material fact, or (c) the Client Information omits no statement of a material fact necessary in order to make the Client Information not misleading.

   The Report and the Findings and Recommendations are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the prior written consent of JLP, which may be arbitrarily withheld or conditioned.

   RELIANCE UPON THE REPORT OR ANY OF THE DETERMINATIONS MADE HEREIN BY A THIRD PARTY WITHOUT JLP'S CONSENT IS PROHIBITED AND JLP MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY IN FAVOUR OF ANY

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4. **STANDARD OF CARE**. The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances. No other warranty, expressed or implied, is made or intended in the Report. It is intended that the Findings and Recommendations are meant to assist in reducing the Client's risk associated with environmental impairment at the Site. The Report should not be considered risk mitigation.

5. **ENTIRE REPORT**. The Report also includes the Report Documents. In order to properly understand the Findings and Recommendations, reference must be made to the Report in its entirety. JLP is not responsible for use by any party of a part of the Report only.

6. **GOVERNING FORMAT**. Notwithstanding that JLP may have submitted an electronic version of the Report or any document forming part of the Report, only the signed and sealed physical copy of the Report shall be deemed to be the original and in the event of any dispute or discrepancy, the physical copy shall govern. JLP makes no representation about the compatibility of its electronic or digital file format with the Client's current or future software and/or hardware systems. The documents described herein are JLP's instruments of professional service and shall not be altered without the written consent of JLP.

7. **GENERAL LIMITATIONS**.

   (a) Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

   (b) The Report contains no opinion or determination as to any matters governed by laws other than the laws of the Province of Ontario and the federal laws of Canada applicable therein as of the date hereof.

   (c) During any future development of the Site, conditions not observed during JLP's investigations may become apparent. If this occurs, JLP should be contacted to assess the situation and whether there is a need for additional testing.

   (d) JLP's investigations were carried out to address the intent of Applicable Laws, which are subject to change, and such changes, when coming into legal force and effect, could alter the Findings and Recommendations in a material way.

   (e) Achieving the objectives stated in the Report has required JLP to arrive at conclusions based upon the best information presently known to JLP. Current investigative methodologies do not completely eliminate the possibility of imprecise or incomplete information. Rather, they merely reduce such possibility to acceptable levels. Professional judgment was exercised in gathering and analyzing information obtained and in the formulation of the Findings. JLP does not act as an absolute insurer of the Findings and will only be responsible for gross negligence with respect thereto.

   (f) The Report may not be reproduced in whole or in part by any party other than the Client without JLP's prior written consent. All intellectual property rights in the Report are reserved to JLP.

Appendix B – ERIS Report

DATABASE REPORT

Project Property:	*965 Gartshore St, Fergus* *965 Gartshore St* *Fergus ON N1M 2W4*
Project No:	*G4599*
Report Type:	*RSC Report - Quote*
Order No:	*22071101248*
Requested by:	*JLP Services Inc.*
Date Completed:	*July 19, 2022*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

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Notice: IMPORTANT LIMITATIONS and YOUR LIABILITY

Reliance on information in Report: This report DOES NOT replace a full Phase I Environmental Site Assessment but is solely intended to be used as a database review of environmental records.

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Executive Summary

Property Information:

Project Property:	*965 Gartshore St, Fergus* *965 Gartshore St Fergus ON N1M 2W4*
Project No:	*G4599*

Order Information:

Order No:	*22071101248*
Date Requested:	*July 11, 2022*
Requested by:	*JLP Services Inc.*
Report Type:	*RSC Report - Quote*

Historical/Products:

Aerial Photographs	*Aerials - National Collection*
City Directory Search	*CD - Subject Site plus 250m Radius*
ERIS Xplorer	*ERIS Xplorer*
Insurance Products	*Fire Insurance Maps/Inspection Reports/Site Plans*
Topographic Map	*National Topographic Maps*
Topographic Map	*RSC Maps*

Executive Summary: Report Summary

Database	Name	Searched	Project Property	Boundary to 0.30km	Total
AAGR	Abandoned Aggregate Inventory	Y	0	0	0
AGR	Aggregate Inventory	Y	0	0	0
AMIS	Abandoned Mine Information System	Y	0	0	0
ANDR	Anderson's Waste Disposal Sites	Y	0	0	0
AST	Aboveground Storage Tanks	Y	0	0	0
AUWR	Automobile Wrecking & Supplies	Y	0	0	0
BORE	Borehole	Y	0	0	0
CA	Certificates of Approval	Y	0	3	3
CDRY	Dry Cleaning Facilities	Y	0	0	0
CFOT	Commercial Fuel Oil Tanks	Y	0	0	0
CHEM	Chemical Manufacturers and Distributors	Y	0	0	0
CHM	Chemical Register	Y	0	0	0
CNG	Compressed Natural Gas Stations	Y	0	0	0
COAL	Inventory of Coal Gasification Plants and Coal Tar Sites	Y	0	0	0
CONV	Compliance and Convictions	Y	0	0	0
CPU	Certificates of Property Use	Y	0	0	0
DRL	Drill Hole Database	Y	0	0	0
DTNK	Delisted Fuel Tanks	Y	0	0	0
EASR	Environmental Activity and Sector Registry	Y	0	5	5
EBR	Environmental Registry	Y	0	3	3
ECA	Environmental Compliance Approval	Y	1	5	6
EEM	Environmental Effects Monitoring	Y	0	0	0
EHS	ERIS Historical Searches	Y	0	7	7
EIIS	Environmental Issues Inventory System	Y	0	0	0
EMHE	Emergency Management Historical Event	Y	0	0	0
EPAR	Environmental Penalty Annual Report	Y	0	0	0
EXP	List of Expired Fuels Safety Facilities	Y	0	0	0
FCON	Federal Convictions	Y	0	0	0
FCS	Contaminated Sites on Federal Land	Y	0	0	0
FOFT	Fisheries & Oceans Fuel Tanks	Y	0	0	0
FRST	Federal Identification Registry for Storage Tank Systems (FIRSTS)	Y	0	0	0
FST	Fuel Storage Tank	Y	0	0	0
FSTH	Fuel Storage Tank - Historic	Y	0	0	0
GEN	Ontario Regulation 347 Waste Generators Summary	Y	0	52	52
GHG	Greenhouse Gas Emissions from Large Facilities	Y	0	0	0
HINC	TSSA Historic Incidents	Y	0	1	1

Database	Name	Searched	Project Property	Boundary to 0.30km	Total
IAFT	Indian & Northern Affairs Fuel Tanks	Y	0	0	0
INC	Fuel Oil Spills and Leaks	Y	0	0	0
LIMO	Landfill Inventory Management Ontario	Y	0	0	0
MINE	Canadian Mine Locations	Y	0	0	0
MNR	Mineral Occurrences	Y	0	0	0
NATE	National Analysis of Trends in Emergencies System (NATES)	Y	0	0	0
NCPL	Non-Compliance Reports	Y	0	0	0
NDFT	National Defense & Canadian Forces Fuel Tanks	Y	0	0	0
NDSP	National Defense & Canadian Forces Spills	Y	0	0	0
NDWD	National Defence & Canadian Forces Waste Disposal Sites	Y	0	0	0
NEBI	National Energy Board Pipeline Incidents	Y	0	0	0
NEBP	National Energy Board Wells	Y	0	0	0
NEES	National Environmental Emergencies System (NEES)	Y	0	0	0
NPCB	National PCB Inventory	Y	0	0	0
NPRI	National Pollutant Release Inventory	Y	0	0	0
OGWE	Oil and Gas Wells	Y	0	0	0
OOGW	Ontario Oil and Gas Wells	Y	0	0	0
OPCB	Inventory of PCB Storage Sites	Y	0	0	0
ORD	Orders	Y	0	0	0
PAP	Canadian Pulp and Paper	Y	0	0	0
PCFT	Parks Canada Fuel Storage Tanks	Y	0	0	0
PES	Pesticide Register	Y	0	4	4
PINC	Pipeline Incidents	Y	1	2	3
PRT	Private and Retail Fuel Storage Tanks	Y	0	0	0
PTTW	Permit to Take Water	Y	0	0	0
REC	Ontario Regulation 347 Waste Receivers Summary	Y	0	0	0
RSC	Record of Site Condition	Y	0	0	0
RST	Retail Fuel Storage Tanks	Y	0	0	0
SCT	Scott's Manufacturing Directory	Y	0	7	7
SPL	Ontario Spills	Y	0	3	3
SRDS	Wastewater Discharger Registration Database	Y	0	0	0
TANK	Anderson's Storage Tanks	Y	0	0	0
TCFT	Transport Canada Fuel Storage Tanks	Y	0	0	0
VAR	Variances for Abandonment of Underground Storage Tanks	Y	0	0	0
WDS	Waste Disposal Sites - MOE CA Inventory	Y	0	0	0
WDSH	Waste Disposal Sites - MOE 1991 Historical Approval Inventory	Y	0	0	0
WWIS	Water Well Information System	Y	0	5	5
		Total:	2	97	99

Executive Summary: Site Report Summary - Project Property

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev diff (m)	Page Number
1	ECA	The Corporation of the Township of Centre Wellington	945 Gartshore St , , Fergus Centre Wellington ON N0B 1S0	E/0.0	2.05	29
2	PINC	ENBRIDGE GAS INC	965 GARTSHORE ST,,FERGUS,ON,N1M 3W1,CA ON	W/108.6	-3.96	29

Executive Summary: Site Report Summary - Surrounding Properties

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
3	WWIS		lot 17 con 16 ON ***Well ID:*** 6709834	NW/17.8	-3.95	29
4	WWIS		945 GARTSHORE ST FERGUS ON ***Well ID:*** 7144020	ESE/18.3	2.05	35
5	WWIS		945 GARTSHORE ST FERGUS ON ***Well ID:*** 7139355	ESE/22.6	2.05	37
6	EASR	WIGHTMAN COMMUNICATIONS LTD.	105 Gregson CRT Fergus ON N1M 1N0	ENE/34.8	1.80	44
7	GEN	Scott Royce Enterprises	950 Gartshore Street Fergus ON N1M 2W4	E/57.9	2.05	44
7	ECA	Scott Royce Enterprises Inc.	950 Gartshore St Centre Wellington ON N1M 2W4	E/57.9	2.05	44
8	EHS		935 Gartshore Street Fergus ON	ESE/61.5	2.05	45
9	SCT	CMJ Manufacturing Inc.	935 Gartshore St Unit A Fergus ON N1M 2W8	ESE/67.3	2.05	45
9	EHS		935 Gartshore Street Fergus ON N1M 3V8	ESE/67.3	2.05	45
10	SCT	Royalthane Inc.	940 Gartshore St Fergus ON N1M 3E2	E/77.2	2.05	46
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	46
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	46

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	46
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	47
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	47
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	E/77.2	2.05	47
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	48
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	48
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	48
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	49
10	EBR	Royalthane Incorporated	940 Gartshore Street Fergus, ON N1M 3W1 Canada ON	E/77.2	2.05	49
10	ECA	Royalthane Inc.	940 Gartshore St Fergus Centre Wellington ON N1M 3E2	E/77.2	2.05	49
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	50
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	50
10	GEN	ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	E/77.2	2.05	50

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
11	EASR	ACORN STAIR & RAILING COMPANY INC.	131 Gregson CRT Fergus ON N1M 2W8	ENE/89.9	1.28	51
11	PINC	PIPELINE HIT 2"	131 GREGSON CRT,,FERGUS,ON,N1M 2W4,CA ON	ENE/89.9	1.28	51
12	HINC		925 GARTSHORE STREET FERGUS ON	ESE/142.2	2.08	51
13	WWIS		PROPERTY OF GLENGARRY ST E OF GARTSHORE lot 10 con 1 FERGUS ON ***Well ID:*** 7042802	ENE/152.8	2.05	52
14	EHS		111 Gregson Court Fergus ON	ENE/156.2	2.05	55
15	EASR	RAILMASTER STAIRWAYS LTD	ON	E/171.8	2.05	55
16	PINC	ENBRIDGE GAS INC	972 GZOWSKI ST,,FERGUS,ON,N1M 3W2,CA ON	SSE/175.1	-1.02	56
17	GEN	Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	ENE/220.3	2.05	56
17	GEN	Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	ENE/220.3	2.05	56
18	EBR	Walinga Inc.	938 Glengarry Crescent Centre Wellington County of Wellington TOWNSHIP OF CENTRE WELLINGTON ON	E/225.2	2.08	57
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	57
18	CA	Walinga Inc.	938 Glengarry Cres Centre Wellington ON	E/225.2	2.08	57

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON	E/225.2	2.08	58
18	EHS		938 Glengarry Crescent Fergus ON	E/225.2	2.08	58
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON	E/225.2	2.08	58
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON	E/225.2	2.08	58
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	59
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON	E/225.2	2.08	59
18	ECA	Walinga Inc.	938 Glengarry Cres Centre Wellington ON N1H 6J2	E/225.2	2.08	59
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	60
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	60
18	GEN	Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	60
18	GEN	Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	61
18	EASR	WALINGA INC	938 Glengarry CRES Fergus ON N1M 2W7	E/225.2	2.08	61
18	SPL	Union Gas Limited	938 Glengarry Crescent Centre Wellington ON	E/225.2	2.08	61

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
18	GEN	Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	62
18	GEN	Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	62
18	GEN	Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	E/225.2	2.08	63
19	CA	EHV WEIDMANN IND. LTD.	930 GARTSHORE STREET FERGUS TOWN ON	ESE/227.1	2.05	63
19	SCT	The Gund Company Canada	930 Gartshore St Fergus ON N1M 2W7	ESE/227.1	2.05	63
19	EHS		930 Garthshore St. Fergus ON N1M 2W7	ESE/227.1	2.05	64
19	GEN	EHV WEIDMANN IND. LTD.	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	65
19	GEN	WEIDMANN INDUSTRIES, LP. 14-694	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	65
19	GEN	EHV WEIDMANN INDUSTRIES LTD. 14-694	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	65
19	GEN	WEIDMANN INDUSTRIES, LP	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	66
19	GEN	EHV WEIDMANN INDUSTRIES	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	66
19	EHS		930 Gartshore Street Fergus ON	ESE/227.1	2.05	66
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	67

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	ESE/227.1	2.05	67
19	EHS		930 Gartshore St Fergus ON N1M	ESE/227.1	2.05	68
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	ESE/227.1	2.05	68
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	ESE/227.1	2.05	68
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	68
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	ESE/227.1	2.05	69
19	EBR	The Gund Company Canada ULC	930 Gartshore Street Centre Wellington County of Wellington N1M 2W7 TOWNSHIP OF CENTRE WELLINGTON ON	ESE/227.1	2.05	69
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	70
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	70
19	GEN	TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	71
19	GEN	The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	ESE/227.1	2.05	71
19	ECA	The Gund Company Canada ULC	930 Gartshore St Centre Wellington ON N1M 2W7	ESE/227.1	2.05	72
19	GEN	The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	ESE/227.1	2.05	73

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
19	GEN	The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	ESE/227.1	2.05	73
19	EASR	THE GUND COMPANY CANADA ULC	930 Gartshore ST Fergus ON N1M 2W7	ESE/227.1	2.05	75
19	GEN	The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W7	ESE/227.1	2.05	75
20	SPL	The Corporation of the Township of Centre Wellington	131 Gregson Court, Fergus Centre Wellington ON	ENE/229.6	2.05	76
21	WWIS		FERGUS ON ***Well ID:*** 7315535	NW/260.6	-4.95	76
22	GEN	Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	ENE/265.0	2.05	79
23	SCT	ELECTRALOGICS INCORPORATED	905 GARTSHORE ST FERGUS ON N1M	ESE/271.1	0.80	79
23	SCT	ELECTRALOGICS INCORPORATED	905 GARTSHORE ST FERGUS ON N1M 2W8	ESE/271.1	0.80	79
23	SCT	The Wellington Advertiser	905 Gartfore St Fergus ON N1M 2W8	ESE/271.1	0.80	80
23	SCT	The Wellington Advertiser	905 Gartshore St Fergus ON N1M 2W8	ESE/271.1	0.80	80
24	GEN	CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	E/284.9	2.05	80
24	GEN	CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	E/284.9	2.05	80
24	GEN	CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	E/284.9	2.05	81

Map Key	DB	Company/Site Name	Address	Dir/Dist (m)	Elev Diff (m)	Page Number
25	PES		35 PEGLAR CRES FERGUS ON N1M 3T3	S/291.3	-1.95	81
26	SPL		37 Peglar Cres, Fergus Centre Wellington ON	SSE/296.3	-1.95	81
27	GEN	THISTLETOWN MOTOR FREIGHT LTD.	509 DICKSON ROAD FERGUS ON N1M 2W7	ESE/299.6	2.05	82
27	PES	JENI MOBILE WASH LTD	509 DICKSON DR FERGUS ON N1M2W7	ESE/299.6	2.05	82
27	CA	Remelt Environmental Technologies Inc.	509 Dickson Dr Wellington North ON	ESE/299.6	2.05	82
27	PES	JENI MOBILE WASH LTD	BOX 100, 509 DICKSON DR FERGUS ON N1M 2W7	ESE/299.6	2.05	83
27	PES	JENI MOBILE WASH LTD	509 DICKSON DR FERGUS ON N1M 2W7	ESE/299.6	2.05	83
27	ECA	Remelt Environmental Technologies Inc.	509 Dickson Dr Wellington North ON N1M 3E2	ESE/299.6	2.05	83

Executive Summary: Summary By Data Source

CA - Certificates of Approval

A search of the CA database, dated 1985-Oct 30, 2011* has found that there are 3 CA site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Walinga Inc.	938 Glengarry Cres Centre Wellington ON	225.2	18
EHV WEIDMANN IND. LTD.	930 GARTSHORE STREET FERGUS TOWN ON	227.1	19
Remelt Environmental Technologies Inc.	509 Dickson Dr Wellington North ON	299.6	27

EASR - Environmental Activity and Sector Registry

A search of the EASR database, dated Oct 2011- Apr 30, 2022 has found that there are 5 EASR site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
WIGHTMAN COMMUNICATIONS LTD.	105 Gregson CRT Fergus ON N1M 1N0	34.8	6
ACORN STAIR & RAILING COMPANY INC.	131 Gregson CRT Fergus ON N1M 2W8	89.9	11
RAILMASTER STAIRWAYS LTD	ON	171.8	15
WALINGA INC	938 Glengarry CRES Fergus ON N1M 2W7	225.2	18
THE GUND COMPANY CANADA ULC	930 Gartshore ST Fergus ON N1M 2W7	227.1	19

Site	Address	Distance (m)	Map Key

EBR - Environmental Registry

A search of the EBR database, dated 1994 - Jun 30, 2022 has found that there are 3 EBR site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Royalthane Incorporated	940 Gartshore Street Fergus, ON N1M 3W1 Canada ON	77.2	10
Walinga Inc.	938 Glengarry Crescent Centre Wellington County of Wellington TOWNSHIP OF CENTRE WELLINGTON ON	225.2	18
The Gund Company Canada ULC	930 Gartshore Street Centre Wellington County of Wellington N1M 2W7 TOWNSHIP OF CENTRE WELLINGTON ON	227.1	19

ECA - Environmental Compliance Approval

A search of the ECA database, dated Oct 2011- Apr 30, 2022 has found that there are 6 ECA site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
The Corporation of the Township of Centre Wellington	945 Gartshore St , , Fergus Centre Wellington ON N0B 1S0	0.0	1
Scott Royce Enterprises Inc.	950 Gartshore St Centre Wellington ON N1M 2W4	57.9	7
Royalthane Inc.	940 Gartshore St Fergus Centre Wellington ON N1M 3E2	77.2	10
Walinga Inc.	938 Glengarry Cres Centre Wellington ON N1H 6J2	225.2	18

Site	Address	Distance (m)	Map Key
The Gund Company Canada ULC	930 Gartshore St Centre Wellington ON N1M 2W7	227.1	19
Remelt Environmental Technologies Inc.	509 Dickson Dr Wellington North ON N1M 3E2	299.6	27

EHS - ERIS Historical Searches

A search of the EHS database, dated 1999-Mar 31, 2022 has found that there are 7 EHS site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	935 Gartshore Street Fergus ON	61.5	8
	935 Gartshore Street Fergus ON N1M 3V8	67.3	9
	111 Gregson Court Fergus ON	156.2	14
	938 Glengarry Crescent Fergus ON	225.2	18
	930 Garthshore St. Fergus ON N1M 2W7	227.1	19
	930 Gartshore St Fergus ON N1M	227.1	19
	930 Gartshore Street Fergus ON	227.1	19

GEN - Ontario Regulation 347 Waste Generators Summary

A search of the GEN database, dated 1986-Feb 28, 2022 has found that there are 52 GEN site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Scott Royce Enterprises	950 Gartshore Street Fergus ON N1M 2W4	57.9	7
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10

Site	Address	Distance (m)	Map Key
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
ROYALTHANE INC.	940 GARTSHORE STREET FERGUS ON N1M3E2	77.2	10
Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	220.3	17
Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	220.3	17
Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18

Site	Address	Distance (m)	Map Key
Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
Walinga Incorporated Pneumatics Division	938 Glengarry Cres. Fergus ON N1M 2W8	225.2	18
The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	227.1	19
EHV WEIDMANN IND. LTD.	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
WEIDMANN INDUSTRIES, LP. 14-694	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
EHV WEIDMANN INDUSTRIES	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19

Site	Address	Distance (m)	Map Key
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
EHV WEIDMANN INDUSTRIES LTD. 14-694	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
WEIDMANN INDUSTRIES, LP	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
TGC Canada, LLC	930 GARTSHORE STREET FERGUS ON N1M 2W7	227.1	19
The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	227.1	19

Site	Address	Distance (m)	Map Key
The Gund Company Canada ULC	930 GARTSHORE STREET FERGUS ON N1M 2W4	227.1	19
Wellington Perforated Sheet & Plate	151 Gregson Court Fergus ON N1M 2W8	265.0	22
CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	284.9	24
CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	284.9	24
CSN Hutten Collision Centre CSN Hutten Collision Centre	943 Glengarry Crescent Fergus ON N1M2W7	284.9	24
THISTLETOWN MOTOR FREIGHT LTD.	509 DICKSON ROAD FERGUS ON N1M 2W7	299.6	27

HINC - TSSA Historic Incidents

A search of the HINC database, dated 2006-June 2009* has found that there are 1 HINC site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	925 GARTSHORE STREET FERGUS ON	142.2	12

PES - Pesticide Register

A search of the PES database, dated Oct 2011- Apr 30, 2022 has found that there are 4 PES site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	35 PEGLAR CRES FERGUS ON N1M 3T3	291.3	25

Site	Address	Distance (m)	Map Key
JENI MOBILE WASH LTD	BOX 100, 509 DICKSON DR FERGUS ON N1M 2W7	299.6	27
JENI MOBILE WASH LTD	509 DICKSON DR FERGUS ON N1M2W7	299.6	27
JENI MOBILE WASH LTD	509 DICKSON DR FERGUS ON N1M 2W7	299.6	27

PINC - Pipeline Incidents

A search of the PINC database, dated Feb 28, 2021 has found that there are 3 PINC site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
ENBRIDGE GAS INC	965 GARTSHORE ST,,FERGUS,ON,N1M 3W1,CA ON	108.6	2
PIPELINE HIT 2"	131 GREGSON CRT,,FERGUS,ON,N1M 2W4,CA ON	89.9	11
ENBRIDGE GAS INC	972 GZOWSKI ST,,FERGUS,ON,N1M 3W2, CA ON	175.1	16

SCT - Scott's Manufacturing Directory

A search of the SCT database, dated 1992-Mar 2011* has found that there are 7 SCT site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
CMJ Manufacturing Inc.	935 Gartshore St Unit A Fergus ON N1M 2W8	67.3	9
Royalthane Inc.	940 Gartshore St Fergus ON N1M 3E2	77.2	10

Site	Address	Distance (m)	Map Key
The Gund Company Canada	930 Gartshore St Fergus ON N1M 2W7	227.1	19
The Wellington Advertiser	905 Gartfore St Fergus ON N1M 2W8	271.1	23
ELECTRALOGICS INCORPORATED	905 GARTSHORE ST FERGUS ON N1M 2W8	271.1	23
ELECTRALOGICS INCORPORATED	905 GARTSHORE ST FERGUS ON N1M	271.1	23
The Wellington Advertiser	905 Gartshore St Fergus ON N1M 2W8	271.1	23

SPL - Ontario Spills

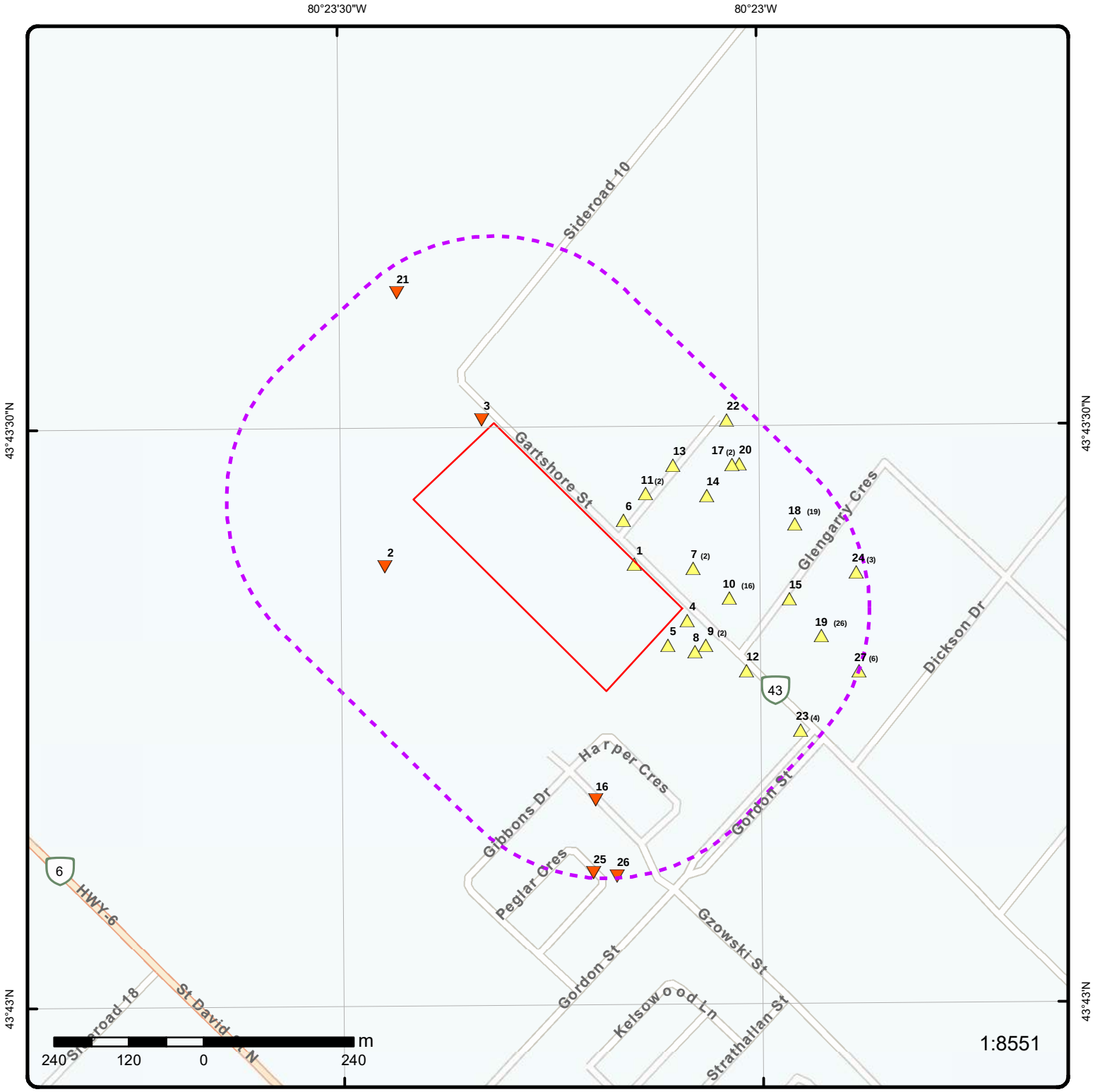
A search of the SPL database, dated 1988-Sep 2020; Dec 2020-Mar 2021 has found that there are 3 SPL site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
Union Gas Limited	938 Glengarry Crescent Centre Wellington ON	225.2	18
The Corporation of the Township of Centre Wellington	131 Gregson Court, Fergus Centre Wellington ON	229.6	20
	37 Peglar Cres, Fergus Centre Wellington ON	296.3	26

WWIS - Water Well Information System

A search of the WWIS database, dated Jan 31, 2022 has found that there are 5 WWIS site(s) within approximately 0.30 kilometers of the project property.

Site	Address	Distance (m)	Map Key
	lot 17 con 16 ON ***Well ID:*** 6709834	17.8	3
	945 GARTSHORE ST FERGUS ON ***Well ID:*** 7144020	18.3	4
	945 GARTSHORE ST FERGUS ON ***Well ID:*** 7139355	22.6	5
	PROPERTY OF GLENGARRY ST E OF GARTSHORE lot 10 con 1 FERGUS ON ***Well ID:*** 7042802	152.8	13
	FERGUS ON ***Well ID:*** 7315535	260.6	21



Map: 0.3 Kilometer Radius

Order Number: 22071101248

Address: 965 Gartshore St, Fergus, ON

- Project Property
- Buffer Outline
- Eris Sites with Higher Elevation
- Eris Sites with Same Elevation
- Eris Sites with Lower Elevation
- Eris Sites with Unknown Elevation
- Freeways; Highways
- Traffic Circle; Ramp
- Major Arterial; Minor Arterial
- Local Road
- Service Road; Traffic Circle; Ramp
- Rail
- Beach
- Airport
- Industrial Area
- Military Base
- Aircraft Roads
- Native Reservation
- Hospital
- Shopping & Sports Area
- University/College
- Cemetery; Golf Course
- Parkt (National)
- Park (City/County)

Source: © 2021 ESRI StreetMap Premium.

© ERIS Information Limited Partnership

Aerial

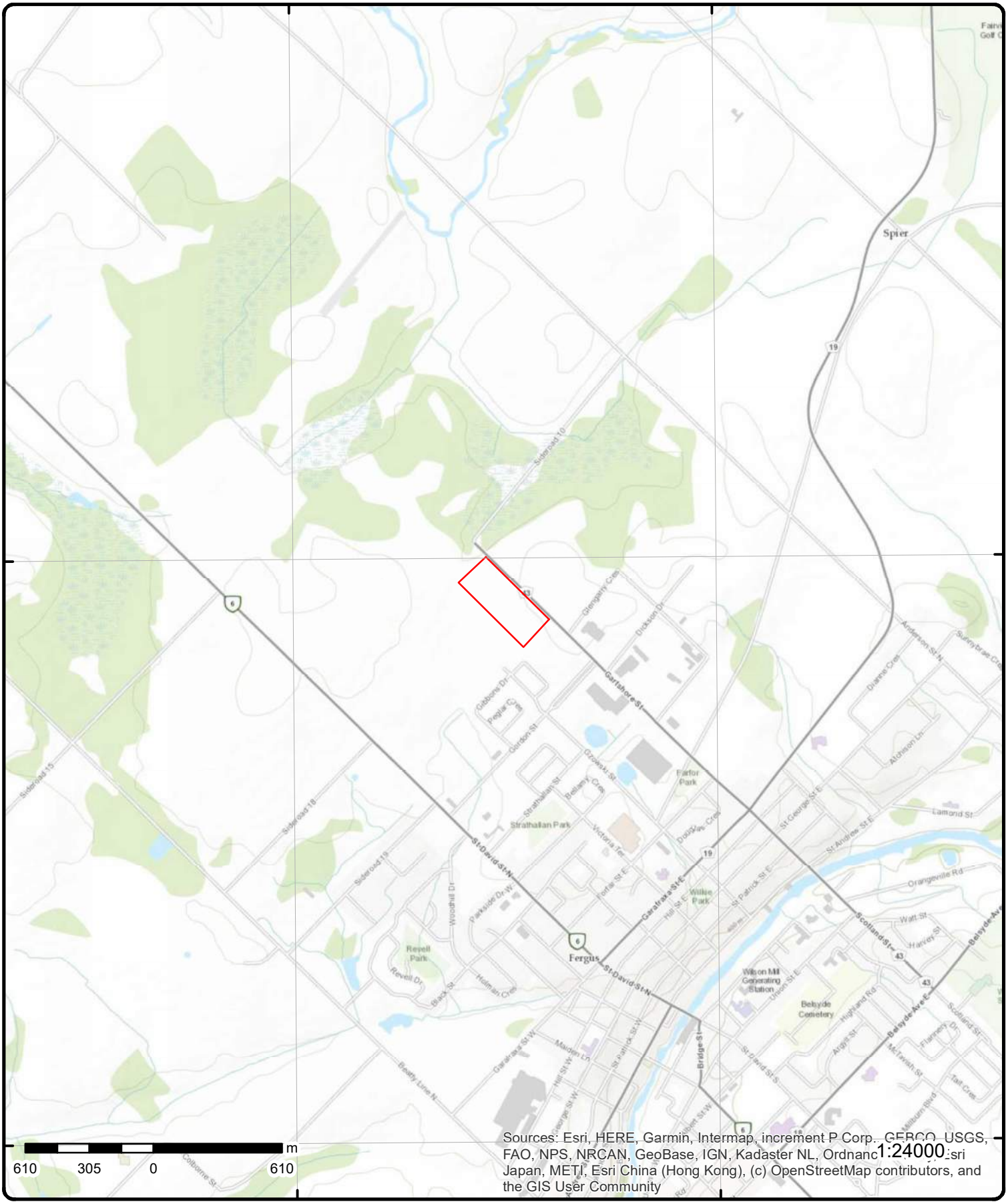
Year: 2021

Order Number: 22071101248

Address: 965 Gartshore St, Fergus, ON

Source: ESRI World Imagery

© ERIS Information Limited Partnership



Topographic Map

Order Number: 22071101248

Address: 965 Gartshore St, ON

Source: ESRI World Topographic Map

© ERIS Information Limited Partnership

Detail Report

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
1	1 of 1	E/0.0	429.9 / 2.05	The Corporation of the Township of Centre Wellington 945 Gartshore St , , Fergus Centre Wellington ON N0B 1S0	ECA

Approval No:	3522-84PKHV	**MOE District:**	Guelph
Approval Date:	2010-04-27	**City:**	
Status:	Approved	**Longitude:**	-80.3872
Record Type:	ECA	**Latitude:**	43.717800000000004
Link Source:	IDS	**Geometry X:**	
SWP Area Name:	Grand River	**Geometry Y:**	

Approval Type: ECA-Municipal Drinking Water Systems
Project Type: Municipal Drinking Water Systems
Business Name: The Corporation of the Township of Centre Wellington
Address: 945 Gartshore St , , Fergus
Full Address:
Full PDF Link:
PDF Site Location:

2	1 of 1	W/108.6	423.8 / -3.96	ENBRIDGE GAS INC 965 GARTSHORE ST,,FERGUS,ON,N1M 3W1,CA ON	PINC

Incident Id:		**Pipe Material:**	
Incident No:	2891734	**Fuel Category:**	
Incident Reported Dt:	7/21/2020	**Health Impact:**	
Type:	FS-Pipeline Incident	**Environment Impact:**	
Status Code:		**Property Damage:**	
Tank Status:	Pipeline Damage Reason Est	**Service Interrupt:**	
Task No:		**Enforce Policy:**	
Spills Action Centre:		**Public Relation:**	
Fuel Type:		**Pipeline System:**	
Fuel Occurrence Tp:		**PSIG:**	
Date of Occurrence:		**Attribute Category:**	
Occurrence Start Dt:		**Regulator Location:**	
Depth:		**Method Details:**	

Customer Acct Name: ENBRIDGE GAS INC
Incident Address: 965 GARTSHORE ST,,FERGUS,ON,N1M 3W1,CA
Operation Type:
Pipeline Type:
Regulator Type:
Summary:
Reported By:
Affiliation:
Occurrence Desc:
Damage Reason:
Notes:

3	1 of 1	NW/17.8	423.9 / -3.95	lot 17 con 16 ON	WWIS

Well ID:	6709834	**Flowing (Y/N):**	

Construction Date:		***Flow Rate:***	
Use 1st:	Municipal	***Data Entry Status:***	
Use 2nd:	0	***Data Src:***	1
Final Well Status:	Water Supply	***Date Received:***	20-Jul-1989 00:00:00
Water Type:		***Selected Flag:***	TRUE
Casing Material:		***Abandonment Rec:***	
Audit No:	31325	***Contractor:***	2801
Tag:		***Form Version:***	1
Constructn Method:		***Owner:***	
Elevation (m):		***County:***	WELLINGTON
Elevatn Reliabilty:		***Lot:***	017
Depth to Bedrock:		***Concession:***	16
Well Depth:		***Concession Name:***	CON
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	NICHOL TOWNSHIP		
Site Info:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/670\6709834.pdf

Additional Detail(s) (Map)

Well Completed Date:	1989/05/15
Year Completed:	1989
Depth (m):	122.5296
Latitude:	43.7251136121692
Longitude:	-80.3888736671651
Path:	670\6709834.pdf

Bore Hole Information

Bore Hole ID:	10473682	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	549222.20
Code OB Desc:		***North83:***	4841524.00
Open Hole:		***Org CS:***	
Cluster Kind:		***UTMRC:***	3
Date Completed:	15-May-1989 00:00:00	***UTMRC Desc:***	margin of error : 10 - 30 m
Remarks:		***Location Method:***	gps
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	932645248
Layer:	3
Color:	2
General Color:	GREY
Mat1:	05
Most Common Material:	CLAY
Mat2:	11
Mat2 Desc:	GRAVEL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	24.0

Formation End Depth: 84.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645246
Layer: 1
Color: 6
General Color: BROWN
Mat1: 05
Most Common Material: CLAY
Mat2: 01
Mat2 Desc: FILL
Mat3: 11
Mat3 Desc: GRAVEL
Formation Top Depth: 0.0
Formation End Depth: 18.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645247
Layer: 2
Color: 6
General Color: BROWN
Mat1: 05
Most Common Material: CLAY
Mat2: 11
Mat2 Desc: GRAVEL
Mat3:
Mat3 Desc:
Formation Top Depth: 18.0
Formation End Depth: 24.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645250
Layer: 5
Color: 6
General Color: BROWN
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 165.0
Formation End Depth: 213.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645254
Layer: 9
Color: 6
General Color: BROWN
Mat1: 15

Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 315.0
Formation End Depth: 378.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645252
Layer: 7
Color: 6
General Color: BROWN
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 225.0
Formation End Depth: 232.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645256
Layer: 11
Color: 1
General Color: WHITE
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 400.0
Formation End Depth: 402.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645249
Layer: 4
Color: 2
General Color: GREY
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 84.0
Formation End Depth: 165.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645253
Layer: 8
Color: 2
General Color: GREY
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 232.0
Formation End Depth: 315.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645255
Layer: 10
Color: 2
General Color: GREY
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 378.0
Formation End Depth: 400.0
Formation End Depth UOM: ft

Overburden and Bedrock Materials Interval

Formation ID: 932645251
Layer: 6
Color: 2
General Color: GREY
Mat1: 15
Most Common Material: LIMESTONE
Mat2:
Mat2 Desc:
Mat3:
Mat3 Desc:
Formation Top Depth: 213.0
Formation End Depth: 225.0
Formation End Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 966709834
Method Construction Code: 2
Method Construction: Rotary (Convent.)
Other Method Construction:

Pipe Information

Pipe ID: 11022252
Casing No: 1
Comment:

Alt Name:

Construction Record - Casing

Casing ID:	930771206
Layer:	1
Material:	1
Open Hole or Material:	STEEL
Depth From:	
Depth To:	110.0
Casing Diameter:	12.0
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Construction Record - Casing

Casing ID:	930771207
Layer:	2
Material:	4
Open Hole or Material:	OPEN HOLE
Depth From:	
Depth To:	402.0
Casing Diameter:	11.0
Casing Diameter UOM:	inch
Casing Depth UOM:	ft

Results of Well Yield Testing

Pump Test ID:	996709834
Pump Set At:	
Static Level:	58.0
Final Level After Pumping:	153.0
Recommended Pump Depth:	250.0
Pumping Rate:	350.0
Flowing Rate:	
Recommended Pump Rate:	300.0
Levels UOM:	ft
Rate UOM:	GPM
Water State After Test Code:	1
Water State After Test:	CLEAR
Pumping Test Method:	1
Pumping Duration HR:	24
Pumping Duration MIN:	0
Flowing:	No

Draw Down & Recovery

Pump Test Detail ID:	934618359
Test Type:	Draw Down
Test Duration:	30
Test Level:	112.0
Test Level UOM:	ft

Draw Down & Recovery

Pump Test Detail ID:	934343830
Test Type:	Draw Down
Test Duration:	15
Test Level:	110.0
Test Level UOM:	ft

Draw Down & Recovery

Pump Test Detail ID:	935130584
Test Type:	Draw Down
Test Duration:	60
Test Level:	116.0
Test Level UOM:	ft

Water Details

Water ID:	933963322
Layer:	1
Kind Code:	1
Kind:	FRESH
Water Found Depth:	128.0
Water Found Depth UOM:	ft

Links

Bore Hole ID:	10473682	***Tag No:***	
Depth M:	122.5296	***Contractor:***	2801
Year Completed:	1989	***Path:***	670\6709834.pdf
Well Completed Dt:	1989/05/15	***Latitude:***	43.7251136121692
Audit No:	31325	***Longitude:***	-80.3888736671651

4	1 of 1	ESE/18.3	429.9 / 2.05	945 GARTSHORE ST FERGUS ON	WWIS

Well ID:	7144020	***Flowing (Y/N):***	
Construction Date:		***Flow Rate:***	
Use 1st:	Monitoring and Test Hole	***Data Entry Status:***	
Use 2nd:	0	***Data Src:***	
Final Well Status:	Abandoned-Other	***Date Received:***	30-Apr-2010 00:00:00
Water Type:		***Selected Flag:***	TRUE
Casing Material:		***Abandonment Rec:***	
Audit No:	Z105901	***Contractor:***	7366
Tag:	A083485	***Form Version:***	7
Constructn Method:		***Owner:***	
Elevation (m):		***County:***	WELLINGTON
Elevatn Reliabilty:		***Lot:***	
Depth to Bedrock:		***Concession:***	
Well Depth:		***Concession Name:***	
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	FERGUS TOWN		
Site Info:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/714\7144020.pdf

Additional Detail(s) (Map)

Well Completed Date:	2010/03/24
Year Completed:	2010
Depth (m):	
Latitude:	43.722201546715
Longitude:	-80.3848087894497
Path:	714\7144020.pdf

Bore Hole Information

Bore Hole ID:	1002966447	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:		**East83:**	549552.00
Code OB Desc:		**North83:**	4841203.00
Open Hole:		**Org CS:**	UTM83
Cluster Kind:		**UTMRC:**	4
Date Completed:	24-Mar-2010 00:00:00	**UTMRC Desc:**	margin of error : 30 m - 100 m
Remarks:		**Location Method:**	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Annular Space/Abandonment Sealing Record

Plug ID:	1003142186
Layer:	1
Plug From:	0.0
Plug To:	10.0
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	1003142194
Method Construction Code:	9
Method Construction:	Driving
Other Method Construction:	

Pipe Information

Pipe ID:	1003142183
Casing No:	0
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	1003142189
Layer:	2
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	0.0
Depth To:	4.5
Casing Diameter:	2.5399999618530273
Casing Diameter UOM:	cm
Casing Depth UOM:	m

Construction Record - Casing

Casing ID:	1003142188
Layer:	1
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	0.0
Depth To:	4.800000190734863
Casing Diameter:	0.0
Casing Diameter UOM:	cm

Casing Depth UOM: m

Construction Record - Screen

Screen ID: 1003142191
Layer: 2
Slot: 10
Screen Top Depth: 1.7999999523162842
Screen End Depth: 4.800000190734863
Screen Material: 5
Screen Depth UOM: m
Screen Diameter UOM: cm
Screen Diameter: 2.5399999618530273

Construction Record - Screen

Screen ID: 1003142190
Layer: 1
Slot: 10
Screen Top Depth: 1.5
Screen End Depth: 4.5
Screen Material: 5
Screen Depth UOM: m
Screen Diameter UOM: cm
Screen Diameter: 2.5399999618530273

Water Details

Water ID: 1003142187
Layer:
Kind Code:
Kind:
Water Found Depth:
Water Found Depth UOM: m

Hole Diameter

Hole ID: 1003142185
Diameter: 10.0
Depth From: 0.0
Depth To: 13.300000190734863
Hole Depth UOM: m
Hole Diameter UOM: cm

Links

Bore Hole ID:	1002966447	**Tag No:**	A083485
Depth M:		**Contractor:**	7366
Year Completed:	2010	**Path:**	714\7144020.pdf
Well Completed Dt:	2010/03/24	**Latitude:**	43.722201546715
Audit No:	Z105901	**Longitude:**	-80.3848087894497

5	1 of 1	ESE/22.6	429.9 / 2.05	945 GARTSHORE ST FERGUS ON	WWIS

Well ID:	7139355	**Flowing (Y/N):**	
Construction Date:		**Flow Rate:**	
Use 1st:	Monitoring	**Data Entry Status:**	
Use 2nd:		**Data Src:**	
Final Well Status:	0	**Date Received:**	08-Feb-2010 00:00:00
Water Type:		**Selected Flag:**	TRUE

Casing Material:		***Abandonment Rec:***	
Audit No:	M04742	***Contractor:***	7366
Tag:	A083485	***Form Version:***	5
Constructn Method:		***Owner:***	
Elevation (m):		***County:***	WELLINGTON
Elevatn Reliabilty:		***Lot:***	
Depth to Bedrock:		***Concession:***	
Well Depth:		***Concession Name:***	
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	FERGUS TOWN		
Site Info:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/713\7139355.pdf

Additional Detail(s) (Map)

Well Completed Date:	2010/01/28
Year Completed:	2010
Depth (m):	4.8
Latitude:	43.722201546715
Longitude:	-80.3848087894497
Path:	713\7139355.pdf

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/713\7139355.pdf

Additional Detail(s) (Map)

Well Completed Date:	2010/01/27
Year Completed:	2010
Depth (m):	
Latitude:	43.722201546715
Longitude:	-80.3848087894497
Path:	713\7139355.pdf

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/713\7139355.pdf

Additional Detail(s) (Map)

Well Completed Date:	2010/01/27
Year Completed:	2010
Depth (m):	
Latitude:	43.7218434802122
Longitude:	-80.3851973174719
Path:	713\7139355.pdf

Bore Hole Information

Bore Hole ID:	1002933693	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	549552.00
Code OB Desc:		***North83:***	4841203.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	28-Jan-2010 00:00:00	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			

Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Overburden and Bedrock Materials Interval

Formation ID:	1003262979
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	06
Most Common Material:	SILT
Mat2:	28
Mat2 Desc:	SAND
Mat3:	77
Mat3 Desc:	LOOSE
Formation Top Depth:	0.6000000238418579
Formation End Depth:	4.800000190734863
Formation End Depth UOM:	m

Overburden and Bedrock Materials Interval

Formation ID:	1003262978
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	02
Most Common Material:	TOPSOIL
Mat2:	06
Mat2 Desc:	SILT
Mat3:	77
Mat3 Desc:	LOOSE
Formation Top Depth:	0.0
Formation End Depth:	0.6000000238418579
Formation End Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	1003262982
Layer:	2
Plug From:	1.2000000476837158
Plug To:	4.599999904632568
Plug Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	1003262981
Layer:	1
Plug From:	0.0
Plug To:	1.2000000476837158
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	1003262986
Method Construction Code:	9
Method Construction:	Driving

Other Method Construction:

Pipe Information

Pipe ID: 1003262977
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1003262983
Layer: 1
Material: 5
Open Hole or Material: PLASTIC
Depth From: 0.0
Depth To: 4.599999904632568
Casing Diameter: 2.5399999618530273
Casing Diameter UOM: cm
Casing Depth UOM: m

Construction Record - Screen

Screen ID: 1003262984
Layer: 1
Slot: 10
Screen Top Depth:
Screen End Depth:
Screen Material: 5
Screen Depth UOM: m
Screen Diameter UOM: cm
Screen Diameter: 3.299999952316284

Hole Diameter

Hole ID: 1003262980
Diameter: 10.0
Depth From: 0.0
Depth To: 4.599999904632568
Hole Depth UOM: m
Hole Diameter UOM: cm

Bore Hole Information

Bore Hole ID: 1003262968
DP2BR:
Spatial Status:
Code OB:
Code OB Desc:
Open Hole:
Cluster Kind: This is a record from cluster log sheet
Date Completed: 27-Jan-2010 00:00:00
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation:
Elevrc:
Zone: 17
East83: 549521.00
North83: 4841163.00
Org CS: UTM83
UTMRC: 4
UTMRC Desc: margin of error : 30 m - 100 m
Location Method: wwr

Annular Space/Abandonment

Sealing Record

Plug ID:	1003262972
Layer:	
Plug From:	
Plug To:	
Plug Depth UOM:	

Method of Construction & Well Use

Method Construction ID:	1003262971
Method Construction Code:	
Method Construction:	
Other Method Construction:	DRIVING

Pipe Information

Pipe ID:	1003262973
Casing No:	0
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	1003262975
Layer:	
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	
Depth To:	2.700000047683716
Casing Diameter:	
Casing Diameter UOM:	
Casing Depth UOM:	m

Construction Record - Screen

Screen ID:	1003262974
Layer:	
Slot:	
Screen Top Depth:	1.7999999523162842
Screen End Depth:	4.800000190734863
Screen Material:	
Screen Depth UOM:	m
Screen Diameter UOM:	
Screen Diameter:	

Results of Well Yield Testing

Pump Test ID:	1003262976
Pump Set At:	
Static Level:	
Final Level After Pumping:	
Recommended Pump Depth:	
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	
Rate UOM:	
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	

Pumping Duration HR:
Pumping Duration MIN:
Flowing:

Hole Diameter

Hole ID: 1003262970
Diameter: 10.0
Depth From:
Depth To: 4.800000190734863
Hole Depth UOM: m
Hole Diameter UOM: cm

Bore Hole Information

Bore Hole ID: 1003262959
DP2BR:
Spatial Status:
Code OB:
Code OB Desc:
Open Hole:
Cluster Kind: This is a record from cluster log sheet
Date Completed: 27-Jan-2010 00:00:00
Remarks:
Elevrc Desc:
Location Source Date:
Improvement Location Source:
Improvement Location Method:
Source Revision Comment:
Supplier Comment:

Elevation:
Elevrc:
Zone: 17
East83: 549552.00
North83: 4841203.00
Org CS: UTM83
UTMRC: 4
UTMRC Desc: margin of error : 30 m - 100 m
Location Method: wwr

Annular Space/Abandonment Sealing Record

Plug ID: 1003262963
Layer:
Plug From:
Plug To:
Plug Depth UOM:

Method of Construction & Well Use

Method Construction ID: 1003262962
Method Construction Code:
Method Construction:
Other Method Construction: DRIVING

Pipe Information

Pipe ID: 1003262964
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1003262966
Layer:
Material: 5
Open Hole or Material: PLASTIC

Depth From:	
Depth To:	2.4000000953674316
Casing Diameter:	
Casing Diameter UOM:	
Casing Depth UOM:	m

Construction Record - Screen

Screen ID:	1003262965
Layer:	
Slot:	
Screen Top Depth:	1.5
Screen End Depth:	4.5
Screen Material:	
Screen Depth UOM:	m
Screen Diameter UOM:	
Screen Diameter:	

Results of Well Yield Testing

Pump Test ID:	1003262967
Pump Set At:	
Static Level:	
Final Level After Pumping:	
Recommended Pump Depth:	
Pumping Rate:	
Flowing Rate:	
Recommended Pump Rate:	
Levels UOM:	
Rate UOM:	
Water State After Test Code:	
Water State After Test:	
Pumping Test Method:	
Pumping Duration HR:	
Pumping Duration MIN:	
Flowing:	

Hole Diameter

Hole ID:	1003262961
Diameter:	10.0
Depth From:	
Depth To:	4.5
Hole Depth UOM:	m
Hole Diameter UOM:	cm

Links

Bore Hole ID:	1002933693	***Tag No:***	A083485
Depth M:	4.8	***Contractor:***	7366
Year Completed:	2010	***Path:***	713\7139355.pdf
Well Completed Dt:	2010/01/28	***Latitude:***	43.722201546715
Audit No:	M04742	***Longitude:***	-80.3848087894497

Links

Bore Hole ID:	1003262968	***Tag No:***	A083485
Depth M:		***Contractor:***	7366
Year Completed:	2010	***Path:***	713\7139355.pdf
Well Completed Dt:	2010/01/27	***Latitude:***	43.7218434802122
Audit No:	M04742	***Longitude:***	-80.3851973174719

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Links

Bore Hole ID:	1003262959	**Tag No:**	A083485
Depth M:		**Contractor:**	7366
Year Completed:	2010	**Path:**	713\7139355.pdf
Well Completed Dt:	2010/01/27	**Latitude:**	43.722201546715
Audit No:	M04742	**Longitude:**	-80.3848087894497

6	1 of 1	ENE/34.8	429.6 / 1.80	WIGHTMAN COMMUNICATIONS LTD. 105 Gregson CRT Fergus ON N1M 1N0	EASR

Approval No:	R-002-2404871262	**MOE District:**	
Status:	REGISTERED	**Municipality:**	Fergus
Date:	2014-03-18	**Latitude:**	43.72416667
Record Type:	EASR	**Longitude:**	80.38527778
Link Source:	MOFA	**Geometry X:**	
Project Type:	Standby Power System	**Geometry Y:**	
Full Address:			
Approval Type:	EASR-Standby Power System		
SWP Area Name:			
PDF URL:			
PDF Site Location:			

7	1 of 2	E/57.9	429.9 / 1.05	Scott Royce Enterprises 950 Gartshore Street Fergus ON N1M 2W4	GEN

Generator No:	ON4539252	**Status:**	
SIC Code:	562990	**Co Admin:**	
SIC Description:	All Other Waste Management Services	**Choice of Contact:**	
Approval Years:	07,08	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	212
Waste Class Desc:	ALIPHATIC SOLVENTS
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS

7	2 of 2	E/57.9	429.9 / 1.05	Scott Royce Enterprises Inc. 950 Gartshore St Centre Wellington ON N1M 2W4	ECA

Approval No:	7444-8VVM9K	**MOE District:**	
Approval Date:	2012-07-19	**City:**	
Status:	Approved	**Longitude:**	
Record Type:	ECA	**Latitude:**	
Link Source:	IDS	**Geometry X:**	
SWP Area Name:		**Geometry Y:**	
Approval Type:	ECA-WASTE MANAGEMENT SYSTEMS		
Project Type:	WASTE MANAGEMENT SYSTEMS		
Business Name:	Scott Royce Enterprises Inc.		
Address:	950 Gartshore St		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/0848-8ULJP7-14.pdf		
PDF Site Location:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

8 | **1 of 1** | **ESE/61.5** | **429.9 / 2.05** | **935 Gartshore Street**
Fergus ON | **EHS**

Order No:	20170217109	**Nearest Intersection:**	
Status:	C	**Municipality:**	Fergus
Report Type:	Standard Report	**Client Prov/State:**	ON
Report Date:	24-FEB-17	**Search Radius (km):**	.25
Date Received:	17-FEB-17	**X:**	-80.384658
Previous Site Name:		**Y:**	43.721748
Lot/Building Size:			
Additional Info Ordered:	Aerial Photos		

9 | **1 of 2** | **ESE/67.3** | **429.9 / 2.05** | **CMJ Manufacturing Inc.**
935 Gartshore St Unit A
Fergus ON N1M 2W8 | **SCT**

Established: 01-JAN-97
Plant Size (ft²):
Employment:

--Details--
Description: Machine Shops
SIC/NAICS Code: 332710

Description: Service Establishment Machinery, Equipment and Supplies Wholesaler-Distributors
SIC/NAICS Code: 417920

Description: Hardware Wholesaler-Distributors
SIC/NAICS Code: 416330

Description: All Other Machinery, Equipment and Supplies Wholesaler-Distributors
SIC/NAICS Code: 417990

Description: Industrial Machinery, Equipment and Supplies Wholesaler-Distributors
SIC/NAICS Code: 417230

Description: All Other General-Purpose Machinery Manufacturing
SIC/NAICS Code: 333990

Description: All Other Textile Product Mills
SIC/NAICS Code: 314990

Description: Hardware Manufacturing
SIC/NAICS Code: 332510

Description: Other Metalworking Machinery Manufacturing
SIC/NAICS Code: 333519

Description: Other Plate Work and Fabricated Structural Product Manufacturing
SIC/NAICS Code: 332319

9 | **2 of 2** | **ESE/67.3** | **429.9 / 2.05** | **935 Gartshore Street**
Fergus ON N1M 3V8 | **EHS**

Order No:	22021000513	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Standard Report	**Client Prov/State:**	ON
Report Date:	11-FEB-22	**Search Radius (km):**	.25
Date Received:	10-FEB-22	**X:**	-80.3844443
Previous Site Name:		**Y:**	43.7218386

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Lot/Building Size:
Additional Info Ordered: Fire Insur. Maps and/or Site Plans; Aerial Photos

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10	1 of 16	E/77.2	429.9 / 2.05	Royalthane Inc. 940 Gartshore St Fergus ON N1M 3E2	SCT

Established: 01-AUG-85
Plant Size (ft²): 6000
Employment:

--Details--
Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
SIC/NAICS Code: 326150

Description: All Other Plastic Product Manufacturing
SIC/NAICS Code: 326198

10	2 of 16	E/77.2	429.9 / 2.05	ROYALTHANE INC. 940 GARTSHORE STREET FERGUS ON	GEN

Generator No: ON5359014
SIC Code: 326150
SIC Description: Urethane and Other Foam Product (except Polystyren
Approval Years: 06,07,08
PO Box No:
Country:

Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

10	3 of 16	E/77.2	429.9 / 2.05	ROYALTHANE INC. 940 GARTSHORE STREET FERGUS ON	GEN

Generator No: ON5359014
SIC Code: 326150
SIC Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
Approval Years: 2009
PO Box No:
Country:

Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

10	4 of 16	E/77.2	429.9 / 2.05	ROYALTHANE INC. 940 GARTSHORE STREET FERGUS ON	GEN

Generator No: ON5359014
SIC Code: 326150

Status:
Co Admin:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

SIC Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
Approval Years: 2010
PO Box No:
Country:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | ***5 of 16*** | ***E/77.2*** | ***429.9 / 2.05*** | ***ROYALTHANE INC.***
940 GARTSHORE STREET
FERGUS ON | ***GEN***

Generator No: ON5359014
SIC Code: 326150
SIC Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
Approval Years: 2011
PO Box No:
Country:
Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | ***6 of 16*** | ***E/77.2*** | ***429.9 / 2.05*** | ***ROYALTHANE INC.***
940 GARTSHORE STREET
FERGUS ON | ***GEN***

Generator No: ON5359014
SIC Code: 326150
SIC Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
Approval Years: 2012
PO Box No:
Country:
Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | ***7 of 16*** | ***E/77.2*** | ***429.9 / 2.05*** | ***ROYALTHANE INC.***
940 GARTSHORE STREET
FERGUS ON | ***GEN***

Generator No: ON5359014
SIC Code: 326150
SIC Description: URETHANE AND OTHER FOAM PRODUCT (EXCEPT POLYSTYRENE) MANUFACTURING
Approval Years: 2013
PO Box No:
Country:
Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | **8 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No:	ON5359014	**Status:**	
SIC Code:	326150	**Co Admin:**	BONNIE KIDNIE
SIC Description:	URETHANE AND OTHER FOAM PRODUCT (EXCEPT POLYSTYRENE) MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2015	**Phone No Admin:**	5198435254 Ext.
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | **9 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No:	ON5359014	**Status:**	
SIC Code:	326150	**Co Admin:**	BONNIE KIDNIE
SIC Description:	URETHANE AND OTHER FOAM PRODUCT (EXCEPT POLYSTYRENE) MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2016	**Phone No Admin:**	5198435254 Ext.
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 263
Waste Class Desc: ORGANIC LABORATORY CHEMICALS

Waste Class: 251
Waste Class Desc: OIL SKIMMINGS & SLUDGES

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

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10 | **10 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No:	ON5359014	**Status:**	
SIC Code:	326150	**Co Admin:**	BONNIE KIDNIE
SIC Description:	URETHANE AND OTHER FOAM PRODUCT (EXCEPT POLYSTYRENE) MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2014	**Phone No Admin:**	5198435254 Ext.
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 241

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Waste Class Desc: HALOGENATED SOLVENTS

10	11 of 16	E/77.2	429.9 / 2.05	ROYALTHANE INC. 940 GARTSHORE STREET FERGUS ON N1M3E2	GEN

Generator No: ON5359014
SIC Code:
SIC Description:
Approval Years: As of Dec 2018
PO Box No:
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 241 H
Waste Class Desc: Halogenated solvents and residues

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

10	12 of 16	E/77.2	429.9 / 2.05	Royalthane Incorporated 940 Gartshore Street Fergus, ON N1M 3W1 Canada ON	EBR

EBR Registry No: 013-1480
Ministry Ref No: 6595-AFXQSJ
Notice Type: Instrument
Notice Stage: Decision
Notice Date:
Proposal Date: September 15, 2017
Year: 2017

Decision Posted: October 18, 2019
Exception Posted:
Section: Part II.1 (20.3 or 20.5)
Act 1: Environmental Protection Act, R.S.O. 1990
Act 2: Environmental Protection Act
Site Location Map: 43.722521,-80.383967

Instrument Type: Environmental Compliance Approval (air)
Off Instrument Name: Environmental Compliance Approval (air) (EPA s.9)
Posted By: Ministry of the Environment, Conservation and Parks
Company Name:
Site Address: 940 Gartshore Street Fergus, ON N1M 3W1 Canada
Location Other:
Proponent Name: Royalthane Incorporated
Proponent Address: Station Main Fergus Postal Station Delivery 327 Centre Wellington, ON N1M 3E2 Canada
Comment Period: September 15, 2017 - October 30, 2017 (45 days) Closed
URL: https://ero.ontario.ca/notice/013-1480

Site Location Details:

10	13 of 16	E/77.2	429.9 / 2.05	Royalthane Inc. 940 Gartshore St Fergus Centre Wellington ON N1M 3E2	ECA

Approval No: 9500-ARBJYY
Approval Date: 2017-10-31
Status: Approved
Record Type: ECA
Link Source: IDS
SWP Area Name: Grand River
Approval Type: ECA-AIR
Project Type: AIR

MOE District: Guelph
City:
Longitude: -80.38394
Latitude: 43.722531
Geometry X:
Geometry Y:

Business Name: Royalthane Inc.
Address: 940 Gartshore St Fergus
Full Address:
Full PDF Link: https://www.accessenvironment.ene.gov.on.ca/instruments/6595-AFXQSJ-14.pdf
PDF Site Location:

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10 | **14 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No: ON5359014
SIC Code:
SIC Description:
Approval Years: As of Jul 2020
PO Box No:
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Waste Class: 241 H
Waste Class Desc: Halogenated solvents and residues

---

10 | **15 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No: ON5359014
SIC Code:
SIC Description:
Approval Years: As of Nov 2021
PO Box No:
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 241 H
Waste Class Desc: Halogenated solvents and residues

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

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10 | **16 of 16** | **E/77.2** | **429.9 / 2.05** | **ROYALTHANE INC.**
940 GARTSHORE STREET
FERGUS ON N1M3E2 | **GEN**

Generator No: ON5359014
SIC Code:
SIC Description:
Approval Years: As of Feb 2022
PO Box No:
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Waste Class: 241 H
Waste Class Desc: Halogenated solvents and residues

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11 | ***1 of 2*** | ***ENE/89.9*** | ***429.1 / 1.28*** | ***ACORN STAIR & RAILING COMPANY INC.***
131 Gregson CRT
Fergus ON N1M 2W8 | ***EASR***

Approval No: R-010-8110316415
Status: REGISTERED
Date: 2017-12-22
Record Type: EASR
Link Source: MOFA
Project Type: Air Emissions
Full Address:
Approval Type: EASR-Air Emissions
SWP Area Name: Grand River
PDF URL:
PDF Site Location:

MOE District: Guelph
Municipality: Fergus
Latitude: 43.72444444
Longitude: -80.38361111
Geometry X:
Geometry Y:

---

11 | ***2 of 2*** | ***ENE/89.9*** | ***429.1 / 1.28*** | ***PIPELINE HIT 2"***
131 GREGSON CRT,,FERGUS,ON,N1M 2W4,CA
ON | ***PINC***

Incident Id:
Incident No: 2146028
Incident Reported Dt: 8/31/2017
Type: FS-Pipeline Incident
Status Code:
Tank Status: Pipeline Damage Reason Est
Task No:
Spills Action Centre:
Fuel Type:
Fuel Occurrence Tp:
Date of Occurrence:
Occurrence Start Dt:
Depth:
Customer Acct Name: PIPELINE HIT 2"
Incident Address: 131 GREGSON CRT,,FERGUS,ON,N1M 2W4,CA
Operation Type:
Pipeline Type:
Regulator Type:
Summary:
Reported By:
Affiliation:
Occurrence Desc:
Damage Reason:
Notes:

Pipe Material:
Fuel Category:
Health Impact:
Environment Impact:
Property Damage:
Service Interrupt:
Enforce Policy:
Public Relation:
Pipeline System:
PSIG:
Attribute Category:
Regulator Location:
Method Details:

---

12 | ***1 of 1*** | ***ESE/142.2*** | ***429.9 / 2.08*** | ***925 GARTSHORE STREET***
FERGUS ON | ***HINC***

External File Num: FS INC 0710-06381
Fuel Occurrence Type: Vapour Release

Date of Occurrence:	3/3/2008
Fuel Type Involved:	Natural Gas
Status Desc:	Completed - No Action Required
Job Type Desc:	Incident/Near-Miss Occurrence (FS)
Oper. Type Involved:	Construction Site (pipeline strike)
Service Interruptions:	No
Property Damage:	No
Fuel Life Cycle Stage:	Transmission, Distribution and Transportation
Root Cause:	
Reported Details:	
Fuel Category:	Gaseous Fuel
Occurrence Type:	Incident
Affiliation:	Industry Stakeholder (Licensee/Registration/Certificate Holder, Facility Owner, etc.)
County Name:	Wellington
Approx. Quant. Rel:	
Nearby body of water:	
Enter Drainage Syst.:	
Approx. Quant. Unit:	
Environmental Impact:	

13	1 of 1	ENE/152.8	429.9 / 2.05	PROPERTY OF GLENGARRY ST E OF GARTSHORE lot 10 con 1 FERGUS ON	WWIS

Well ID:	7042802	**Flowing (Y/N):**	
Construction Date:		**Flow Rate:**	
Use 1st:		**Data Entry Status:**	
Use 2nd:		**Data Src:**	
Final Well Status:	Observation Wells	**Date Received:**	18-Apr-2007 00:00:00
Water Type:		**Selected Flag:**	TRUE
Casing Material:		**Abandonment Rec:**	
Audit No:	Z70431	**Contractor:**	6607
Tag:	A053557	**Form Version:**	3
Constructn Method:		**Owner:**	
Elevation (m):		**County:**	WELLINGTON
Elevatn Reliabilty:		**Lot:**	010
Depth to Bedrock:		**Concession:**	01
Well Depth:		**Concession Name:**	
Overburden/Bedrock:		**Easting NAD83:**	
Pump Rate:		**Northing NAD83:**	
Static Water Level:		**Zone:**	
Clear/Cloudy:		**UTM Reliability:**	
Municipality:	FERGUS TOWN		
Site Info:			

PDF URL (Map): https://d2khazk8e83rdv.cloudfront.net/moe_mapping/downloads/2Water/Wells_pdfs/704\7042802.pdf

Additional Detail(s) (Map)

Well Completed Date:	2007/02/23
Year Completed:	2007
Depth (m):	3.8
Latitude:	43.7244359333019
Longitude:	-80.3850714803282
Path:	704\7042802.pdf

Bore Hole Information

Bore Hole ID:	11765440	**Elevation:**	
DP2BR:		**Elevrc:**	
Spatial Status:		**Zone:**	17
Code OB:		**East83:**	549529.00

Code OB Desc:		***North83:***	4841451.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	3
Date Completed:	23-Feb-2007 00:00:00	***UTMRC Desc:***	margin of error : 10 - 30 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	933098154
Layer:	1
Color:	6
General Color:	BROWN
Mat1:	06
Most Common Material:	SILT
Mat2:	02
Mat2 Desc:	TOPSOIL
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0.0
Formation End Depth:	0.3499999940395355
Formation End Depth UOM:	m

Overburden and Bedrock Materials Interval

Formation ID:	933098156
Layer:	3
Color:	6
General Color:	BROWN
Mat1:	28
Most Common Material:	SAND
Mat2:	06
Mat2 Desc:	SILT
Mat3:	
Mat3 Desc:	
Formation Top Depth:	1.5
Formation End Depth:	2.4000000953674316
Formation End Depth UOM:	m

Overburden and Bedrock Materials Interval

Formation ID:	933098155
Layer:	2
Color:	6
General Color:	BROWN
Mat1:	06
Most Common Material:	SILT
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	0.3499999940395355
Formation End Depth:	1.5
Formation End Depth UOM:	m

Overburden and Bedrock Materials Interval

Formation ID:	933098157
Layer:	4
Color:	6
General Color:	BROWN
Mat1:	06
Most Common Material:	SILT
Mat2:	28
Mat2 Desc:	SAND
Mat3:	
Mat3 Desc:	
Formation Top Depth:	2.4000000953674316
Formation End Depth:	3.799999952316284
Formation End Depth UOM:	m

Annular Space/Abandonment Sealing Record

Plug ID:	933317424
Layer:	1
Plug From:	0.0
Plug To:	2.0
Plug Depth UOM:	m

Method of Construction & Well Use

Method Construction ID:	967042802
Method Construction Code:	6
Method Construction:	Boring
Other Method Construction:	

Pipe Information

Pipe ID:	11773130
Casing No:	1
Comment:	
Alt Name:	

Construction Record - Casing

Casing ID:	930898259
Layer:	1
Material:	5
Open Hole or Material:	PLASTIC
Depth From:	-0.3499999940395355
Depth To:	2.299999952316284
Casing Diameter:	5.099999904632568
Casing Diameter UOM:	cm
Casing Depth UOM:	m

Construction Record - Screen

Screen ID:	933424038
Layer:	1
Slot:	10
Screen Top Depth:	2.299999952316284
Screen End Depth:	3.799999952316284
Screen Material:	5

Screen Depth UOM: m
Screen Diameter UOM: cm
Screen Diameter: 6.400000095367432

Water Details

Water ID: 934085433
Layer: 1
Kind Code:
Kind:
Water Found Depth: 1.5
Water Found Depth UOM: m

Hole Diameter

Hole ID: 11851594
Diameter: 15.0
Depth From: 0.0
Depth To: 3.799999952316284
Hole Depth UOM: m
Hole Diameter UOM: cm

Links

Bore Hole ID: 11765440
Depth M: 3.8
Year Completed: 2007
Well Completed Dt: 2007/02/23
Audit No: Z70431
Tag No: A053557
Contractor: 6607
Path: 704\7042802.pdf
Latitude: 43.7244359333019
Longitude: -80.3850714803282

14	1 of 1	ENE/156.2	429.9 / 2.05	111 Gregson Court Fergus ON	EHS

Order No: 20170327085
Status: C
Report Type: Standard Report
Report Date: 03-APR-17
Date Received: 27-MAR-17
Previous Site Name:
Lot/Building Size: 3.05 Acres
Additional Info Ordered:
Nearest Intersection:
Municipality: Geographic Twp of (West) Garafraxa (Presently Centre Wellington)
Client Prov/State: ON
Search Radius (km): .25
X: -80.384405
Y: 43.723996

15	1 of 1	E/171.8	429.9 / 2.05	RAILMASTER STAIRWAYS LTD ON	EASR

Approval No: R-010-5110172304
Status: REGISTERED
Date: 2018-04-25
Record Type: EASR
Link Source: MOFA
Project Type: Air Emissions
Full Address:
Approval Type: EASR-Air Emissions
SWP Area Name: Grand River
PDF URL:
PDF Site Location:
MOE District: Guelph
Municipality:
Latitude: 43.7225
Longitude: -80.38277778
Geometry X:
Geometry Y:

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
16	1 of 1	SSE/175.1	426.8 / -1.02	ENBRIDGE GAS INC 972 GZOWSKI ST,,FERGUS,ON,N1M 3W2,CA ON	PINC

Incident Id:		**Pipe Material:**	
Incident No:	3078338	**Fuel Category:**	
Incident Reported Dt:	7/12/2021	**Health Impact:**	
Type:	FS-Pipeline Incident	**Environment Impact:**	
Status Code:		**Property Damage:**	
Tank Status:	Pipeline Damage Reason Est	**Service Interrupt:**	
Task No:		**Enforce Policy:**	
Spills Action Centre:		**Public Relation:**	
Fuel Type:		**Pipeline System:**	
Fuel Occurrence Tp:		**PSIG:**	
Date of Occurrence:		**Attribute Category:**	
Occurrence Start Dt:		**Regulator Location:**	
Depth:		**Method Details:**	
Customer Acct Name:	ENBRIDGE GAS INC		
Incident Address:	972 GZOWSKI ST,,FERGUS,ON,N1M 3W2,CA		
Operation Type:			
Pipeline Type:			
Regulator Type:			
Summary:			
Reported By:			
Affiliation:			
Occurrence Desc:			
Damage Reason:			
Notes:			

17	1 of 2	ENE/220.3	429.9 / 2.05	Wellington Perforated Sheet & Plate 151 Gregson Court Fergus ON N1M 2W8		GEN

Generator No:	ON7938812	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Jul 2020	**Phone No Admin:**	
PO Box No:	PO Box 157	**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class:	253 L
Waste Class Desc:	Emulsified oils
Waste Class:	252 L
Waste Class Desc:	Waste crankcase oils and lubricants

17	2 of 2	ENE/220.3	429.9 / 2.05	Wellington Perforated Sheet & Plate 151 Gregson Court Fergus ON N1M 2W8		GEN

Generator No:	ON7938812	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Nov 2021	**Phone No Admin:**	
PO Box No:	PO Box 157	**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class:	253 L

Waste Class Desc: Emulsified oils

Waste Class: 252 L
Waste Class Desc: Waste crankcase oils and lubricants

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

18	1 of 19	E/225.2	429.9 / 2.08	Walinga Inc. 938 Glengarry Crescent Centre Wellington County of Wellington TOWNSHIP OF CENTRE WELLINGTON ON	EBR

EBR Registry No: 010-2798
Ministry Ref No: 6567-7BASXQ
Notice Type: Instrument Decision
Notice Stage:
Notice Date: September 14, 2009
Proposal Date: February 21, 2008
Year: 2008
Instrument Type: (EPA s. 9) - Approval for discharge into the natural environment other than water (i.e. Air)
Off Instrument Name:
Posted By:
Company Name: Walinga Inc.
Site Address:
Location Other:
Proponent Name:
Proponent Address: 938 Glengarry Crescent, Fergus Ontario, Canada N1H 6J2
Comment Period:
URL:

Decision Posted:
Exception Posted:
Section:
Act 1:
Act 2:
Site Location Map:

Site Location Details:

938 Glengarry Crescent Centre Wellington County of Wellington TOWNSHIP OF CENTRE WELLINGTON

18	2 of 19	E/225.2	429.9 / 2.08	Walinga Incorporated 938 Glengarry Cres. Fergus ON N1M 2W8	GEN

Generator No: ON5679117
SIC Code: 333110
SIC Description: Agricultural Implement Manufacturing
Approval Years: 07,08
PO Box No:
Country:

Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

18	3 of 19	E/225.2	429.9 / 2.08	Walinga Inc. 938 Glengarry Cres Centre Wellington ON	CA

Certificate #: 9422-7UGRW8
Application Year: 2009
Issue Date: 9/7/2009
Approval Type: Air
Status: Approved

Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

18	4 of 19	E/225.2	429.9 / 2.08	Walinga Incorporated 938 Glengarry Cres. Fergus ON	GEN

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	
SIC Description:	Agricultural Implement Manufacturing	**Choice of Contact:**	
Approval Years:	2009	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

18	5 of 19	E/225.2	429.9 / 2.08	938 Glengarry Crescent Fergus ON	EHS

Order No:	20120224001	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Custom Report	**Client Prov/State:**	ON
Report Date:	3/1/2012 8:43:01 AM	**Search Radius (km):**	0.25
Date Received:	2/24/2012 8:38:58 AM	**X:**	-80.382101
Previous Site Name:		**Y:**	43.723453
Lot/Building Size:			
Additional Info Ordered:			

18	6 of 19	E/225.2	429.9 / 2.08	Walinga Incorporated 938 Glengarry Cres. Fergus ON	GEN

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	
SIC Description:	Agricultural Implement Manufacturing	**Choice of Contact:**	
Approval Years:	2010	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

18	7 of 19	E/225.2	429.9 / 2.08	Walinga Incorporated 938 Glengarry Cres. Fergus ON	GEN

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	

SIC Description:	Agricultural Implement Manufacturing	***Choice of Contact:***	
Approval Years:	2011	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:		***MHSW Facility:***	

Detail(s)

Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES

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18 | ***8 of 19*** | ***E/225.2*** | ***429.9 / 2.08*** | ***Walinga Incorporated***
938 Glengarry Cres.
Fergus ON N1M 2W8 | ***GEN***

Generator No:	ON5679117	***Status:***	
SIC Code:	333110	***Co Admin:***	
SIC Description:	Agricultural Implement Manufacturing	***Choice of Contact:***	
Approval Years:	2012	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:		***MHSW Facility:***	

Detail(s)

Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES

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18 | ***9 of 19*** | ***E/225.2*** | ***429.9 / 2.08*** | ***Walinga Incorporated***
938 Glengarry Cres.
Fergus ON | ***GEN***

Generator No:	ON5679117	***Status:***	
SIC Code:	333110	***Co Admin:***	
SIC Description:	AGRICULTURAL IMPLEMENT MANUFACTURING	***Choice of Contact:***	
Approval Years:	2013	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:		***MHSW Facility:***	

Detail(s)

Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES

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18 | ***10 of 19*** | ***E/225.2*** | ***429.9 / 2.08*** | ***Walinga Inc.***
938 Glengarry Cres
Centre Wellington ON N1H 6J2 | ***ECA***

Approval No:	9422-7UGRW8	***MOE District:***	
Approval Date:	2009-09-07	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	
SWP Area Name:		***Geometry Y:***	
Approval Type:	ECA-AIR		
Project Type:	AIR		
Business Name:	Walinga Inc.		
Address:	938 Glengarry Cres		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/6567-7BASXQ-14.pdf		
PDF Site Location:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

18 | **11 of 19** | **E/225.2** | **429.9 / 2.08** | **Walinga Incorporated**
938 Glengarry Cres.
Fergus ON N1M 2W8 | **GEN**

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	Christine J VanEerde
SIC Description:	AGRICULTURAL IMPLEMENT MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2016	**Phone No Admin:**	519-824-8520 Ext.254
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

Waste Class: 254
Waste Class Desc: TRANSFER STATION OILS WASTES

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18 | **12 of 19** | **E/225.2** | **429.9 / 2.08** | **Walinga Incorporated**
938 Glengarry Cres.
Fergus ON N1M 2W8 | **GEN**

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	Christine J VanEerde
SIC Description:	AGRICULTURAL IMPLEMENT MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2015	**Phone No Admin:**	519-824-8520 Ext.254
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 254
Waste Class Desc: TRANSFER STATION OILS WASTES

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

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18 | **13 of 19** | **E/225.2** | **429.9 / 2.08** | **Walinga Incorporated**
938 Glengarry Cres.
Fergus ON N1M 2W8 | **GEN**

Generator No:	ON5679117	**Status:**	
SIC Code:	333110	**Co Admin:**	Christine J VanEerde
SIC Description:	AGRICULTURAL IMPLEMENT MANUFACTURING	**Choice of Contact:**	CO_ADMIN
Approval Years:	2014	**Phone No Admin:**	519-824-8520 Ext.254
PO Box No:		**Contam. Facility:**	No
Country:	Canada	**MHSW Facility:**	No

Detail(s)

Waste Class: 254
Waste Class Desc: TRANSFER STATION OILS WASTES

Waste Class: 145
Waste Class Desc: PAINT/PIGMENT/COATING RESIDUES

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
18	14 of 19	E/225.2	429.9 / 2.08	**Walinga Incorporated Pneumatics Division** **938 Glengarry Cres.** **Fergus ON N1M 2W8**	GEN

Generator No:	ON5679117	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Dec 2018	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class:	145 H
Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	212 L
Waste Class Desc:	Aliphatic solvents and residues
Waste Class:	213 I
Waste Class Desc:	Petroleum distillates
Waste Class:	251 L
Waste Class Desc:	Waste oils/sludges (petroleum based)
Waste Class:	254 I
Waste Class Desc:	Oily water/waste oil from waste transfer/processing sites
Waste Class:	254 L
Waste Class Desc:	Oily water/waste oil from waste transfer/processing sites

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
18	15 of 19	E/225.2	429.9 / 2.08	**WALINGA INC** **938 Glengarry CRES** **Fergus ON N1M 2W7**	EASR

Approval No:	R-010-8110129765	**MOE District:**	Guelph
Status:	REGISTERED	**Municipality:**	Fergus
Date:	2017-04-28	**Latitude:**	43.72388889
Record Type:	EASR	**Longitude:**	-80.38222222
Link Source:	MOFA	**Geometry X:**	
Project Type:	Air Emissions	**Geometry Y:**	
Full Address:			
Approval Type:	EASR-Air Emissions		
SWP Area Name:	Grand River		
PDF URL:			
PDF Site Location:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
18	16 of 19	E/225.2	429.9 / 2.08	**Union Gas Limited** **938 Glengarry Crescent** **Centre Wellington ON**	SPL

Ref No:	3687-AVPHAU	**Discharger Report:**	
Site No:	NA	**Material Group:**	
Incident Dt:	2018/02/05	**Health/Env Conseq:**	2 - Minor Environment
Year:		**Client Type:**	Corporation
Incident Cause:		**Sector Type:**	Miscellaneous Industrial
Incident Event:	Leak/Break	**Agency Involved:**	
Contaminant Code:	35	**Nearest Watercourse:**	
Contaminant Name:	NATURAL GAS (METHANE)	**Site Address:**	938 Glengarry Crescent
Contaminant Limit 1:		**Site District Office:**	Guelph
Contam Limit Freq 1:		**Site Postal Code:**	

Contaminant UN No 1:	1075	**Site Region:**	West Central
Environment Impact:		**Site Municipality:**	Centre Wellington
Nature of Impact:		**Site Lot:**	
Receiving Medium:		**Site Conc:**	
Receiving Env:	Air	**Northing:**	4841446
MOE Response:	No	**Easting:**	549710.44
Dt MOE Arvl on Scn:		**Site Geo Ref Accu:**	
MOE Reported Dt:	2018/02/05	**Site Map Datum:**	
Dt Document Closed:	2018/02/17	**SAC Action Class:**	TSSA - Fuel Safety Branch - Hydrocarbon Fuel Release/Spill
Incident Reason:	Operator/Human Error	**Source Type:**	Valve/Fitting/Piping
Site Name:	Site of meter set strike<UNOFFICIAL>		
Site County/District:	County of Wellington		
Site Geo Ref Meth:			
Incident Summary:	TSSA FSB; meter set dmgd by snow plow; made safe		
Contaminant Qty:	0 other - see incident description		

18	17 of 19	E/225.2	429.9 / 2.08	**Walinga Incorporated Pneumatics Division** **938 Glengarry Cres.** **Fergus ON N1M 2W8**	GEN

Generator No:	ON5679117	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Jul 2020	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Waste Class: 254 L
Waste Class Desc: Oily water/waste oil from waste transfer/processing sites

Waste Class: 145 H
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 254 I
Waste Class Desc: Oily water/waste oil from waste transfer/processing sites

Waste Class: 212 L
Waste Class Desc: Aliphatic solvents and residues

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

18	18 of 19	E/225.2	429.9 / 2.08	**Walinga Incorporated Pneumatics Division** **938 Glengarry Cres.** **Fergus ON N1M 2W8**	GEN

Generator No:	ON5679117	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Nov 2021	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class: 212 L

Waste Class Desc: Aliphatic solvents and residues

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

Waste Class: 254 I
Waste Class Desc: Oily water/waste oil from waste transfer/processing sites

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Waste Class: 254 L
Waste Class Desc: Oily water/waste oil from waste transfer/processing sites

Waste Class: 145 H
Waste Class Desc: Wastes from the use of pigments, coatings and paints

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18	19 of 19	E/225.2	429.9 / 2.08	Walinga Incorporated Pneumatics Division 938 Glengarry Cres. Fergus ON N1M 2W8	GEN

Generator No: ON5679117
SIC Code:
SIC Description:
Approval Years: As of Feb 2022
PO Box No:
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 145 H
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

19	1 of 26	ESE/227.1	429.9 / 2.05	EHV WEIDMANN IND. LTD. 930 GARTSHORE STREET FERGUS TOWN ON	CA

Certificate #: 8-2106-89-
Application Year: 89
Issue Date: 6/15/1989
Approval Type: Industrial air
Status: Nullity, letter of concurrence issued
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description: BAGHOUSE DUST COLLECTOR
Contaminants:
Emission Control:

19	2 of 26	ESE/227.1	429.9 / 2.05	The Gund Company Canada 930 Gartshore St Fergus ON N1M 2W7	SCT

Established: 01-JUN-82

Plant Size (ft²): 55000
Employment:

--Details--

Description: All Other Plastic Product Manufacturing
SIC/NAICS Code: 326198

Description: All Other Converted Paper Product Manufacturing
SIC/NAICS Code: 322299

Description: All Other Non-Metallic Mineral Product Manufacturing
SIC/NAICS Code: 327990

Description: Polystyrene Foam Product Manufacturing
SIC/NAICS Code: 326140

Description: Urethane and Other Foam Product (except Polystyrene) Manufacturing
SIC/NAICS Code: 326150

Description: Semiconductor and Other Electronic Component Manufacturing
SIC/NAICS Code: 334410

Description: Wiring Device Manufacturing
SIC/NAICS Code: 335930

Description: Power, Distribution and Specialty Transformers Manufacturing
SIC/NAICS Code: 335311

Description: All Other Non-Metallic Mineral Product Manufacturing
SIC/NAICS Code: 327990

Description: Other Specialty-Line Building Supplies Wholesaler-Distributors
SIC/NAICS Code: 416390

Description: Electrical Wiring and Construction Supplies Wholesaler-Distributors
SIC/NAICS Code: 416110

Description: Other Paper and Disposable Plastic Product Wholesaler-Distributors
SIC/NAICS Code: 418220

Description: Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing
SIC/NAICS Code: 334220

Description: Electronic Components, Navigational and Communications Equipment and Supplies Wholesaler-Distributors
SIC/NAICS Code: 417320

Description: Industrial Machinery, Equipment and Supplies Wholesaler-Distributors
SIC/NAICS Code: 417230

Description: Switchgear and Switchboard, and Relay and Industrial Control Apparatus Manufacturing
SIC/NAICS Code: 335315

19	3 of 26	ESE/227.1	429.9 / 2.05	930 Garthshore St. Fergus ON N1M 2W7	EHS

Order No: 20011030010
Status: C
Report Type: Complete Report
Report Date: 11/6/01
Date Received: 10/30/01
Previous Site Name:
Lot/Building Size:
Additional Info Ordered:

Nearest Intersection:
Municipality: Wellington
Client Prov/State: IN
Search Radius (km): 0.25
X: -80.382817
Y: 43.721192

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

19	4 of 26	ESE/227.1	429.9 / 2.05	EHV WEIDMANN IND. LTD. 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	0000	**Co Admin:**	
SIC Description:	*** NOT DEFINED ***	**Choice of Contact:**	
Approval Years:	88,89	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	241
Waste Class Desc:	HALOGENATED SOLVENTS

19	5 of 26	ESE/227.1	429.9 / 2.05	WEIDMANN INDUSTRIES, LP. 14-694 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	3371	**Co Admin:**	
SIC Description:	ELECT. TRANSFORMER	**Choice of Contact:**	
Approval Years:	92,93,95,96	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	241
Waste Class Desc:	HALOGENATED SOLVENTS
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	211
Waste Class Desc:	AROMATIC SOLVENTS
Waste Class:	212
Waste Class Desc:	ALIPHATIC SOLVENTS
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

19	6 of 26	ESE/227.1	429.9 / 2.05	EHV WEIDMANN INDUSTRIES LTD. 14-694 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	3371	**Co Admin:**	
SIC Description:	ELECT. TRANSFORMER	**Choice of Contact:**	
Approval Years:	94	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class: 212
Waste Class Desc: ALIPHATIC SOLVENTS

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

Waste Class: 211
Waste Class Desc: AROMATIC SOLVENTS

Waste Class: 213
Waste Class Desc: PETROLEUM DISTILLATES

19	7 of 26	ESE/227.1	429.9 / 2.05	WEIDMANN INDUSTRIES, LP 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No: ON1128500
SIC Code: 3371
SIC Description: ELECT. TRANSFORMER
Approval Years: 97,98,99,00,01,02,03,04,05,06
PO Box No:
Country:

Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 213
Waste Class Desc: PETROLEUM DISTILLATES

Waste Class: 241
Waste Class Desc: HALOGENATED SOLVENTS

Waste Class: 252
Waste Class Desc: WASTE OILS & LUBRICANTS

Waste Class: 211
Waste Class Desc: AROMATIC SOLVENTS

Waste Class: 212
Waste Class Desc: ALIPHATIC SOLVENTS

19	8 of 26	ESE/227.1	429.9 / 2.05	EHV WEIDMANN INDUSTRIES 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No: ON2253800
SIC Code: 9999
SIC Description: OTHER SERVICES
Approval Years: 97,98,99,00,01
PO Box No:
Country:

Status:
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 232
Waste Class Desc: POLYMERIC RESINS

19	9 of 26	ESE/227.1	429.9 / 2.05	930 Gartshore Street Fergus ON	EHS

Order No:	20041029002	**Nearest Intersection:**	
Status:	C	**Municipality:**	
Report Type:	Complete Report	**Client Prov/State:**	OH
Report Date:	11/8/04	**Search Radius (km):**	0.5
Date Received:	10/29/04	**X:**	-80.382669
Previous Site Name:		**Y:**	43.721315
Lot/Building Size:			
Additional Info Ordered:			

19	10 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	All Other Miscellaneous Manufacturing	**Choice of Contact:**	
Approval Years:	07,08	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	211
Waste Class Desc:	AROMATIC SOLVENTS
Waste Class:	212
Waste Class Desc:	ALIPHATIC SOLVENTS
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	241
Waste Class Desc:	HALOGENATED SOLVENTS
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES

19	11 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	All Other Miscellaneous Manufacturing	**Choice of Contact:**	
Approval Years:	2009	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

19	12 of 26	ESE/227.1	429.9 / 2.05	930 Gartshore St Fergus ON N1M	EHS

Order No:	20120430001	**Nearest Intersection:**	
Status:	C	**Municipality:**	Centre Wellington, Wellington County
Report Type:	Standard Report	**Client Prov/State:**	ON
Report Date:	5/8/2012 7:52:48 AM	**Search Radius (km):**	0.25
Date Received:	4/30/2012 7:51:10 AM	**X:**	-80.3822
Previous Site Name:		**Y:**	43.72193
Lot/Building Size:	9.5 acres		
Additional Info Ordered:	City Directory		

19	13 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	All Other Miscellaneous Manufacturing	**Choice of Contact:**	
Approval Years:	2010	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

19	14 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	All Other Miscellaneous Manufacturing	**Choice of Contact:**	
Approval Years:	2011	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES

19	15 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	All Other Miscellaneous Manufacturing	**Choice of Contact:**	
Approval Years:	2012	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

19	16 of 26	ESE/227.1	429.9 / 2.05	**TGC Canada, LLC** **930 GARTSHORE STREET** **FERGUS ON**	GEN

Generator No:	ON1128500	**Status:**	
SIC Code:	339990	**Co Admin:**	
SIC Description:	ALL OTHER MISCELLANEOUS MANUFACTURING	**Choice of Contact:**	
Approval Years:	2013	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES
Waste Class:	232
Waste Class Desc:	POLYMERIC RESINS
Waste Class:	113
Waste Class Desc:	ACID WASTE - OTHER METALS
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

19	17 of 26	ESE/227.1	429.9 / 2.05	**The Gund Company Canada ULC** **930 Gartshore Street Centre Wellington County of Wellington N1M 2W7 TOWNSHIP OF CENTRE WELLINGTON** **ON**	EBR

EBR Registry No:	012-8009	**Decision Posted:**	
Ministry Ref No:	0997-AAXPP6	**Exception Posted:**	
Notice Type:	Instrument Proposal	**Section:**	
Notice Stage:		**Act 1:**	
Notice Date:	June 28, 2016	**Act 2:**	
Proposal Date:	June 28, 2016	**Site Location Map:**	

Year:	2016
Instrument Type:	(EPA Part II.1-air) - Environmental Compliance Approval (project type: air)
Off Instrument Name:	
Posted By:	
Company Name:	The Gund Company Canada ULC
Site Address:	
Location Other:	
Proponent Name:	
Proponent Address:	930 Gartshore Street, Centre Wellington Ontario, Canada N1M 2W7
Comment Period:	
URL:	

Site Location Details:

930 Gartshore Street Centre Wellington County of Wellington N1M 2W7 TOWNSHIP OF CENTRE WELLINGTON

19	18 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	***Status:***	
SIC Code:	339990	***Co Admin:***	
SIC Description:	ALL OTHER MISCELLANEOUS MANUFACTURING	***Choice of Contact:***	CO_OFFICIAL
Approval Years:	2016	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	No
Country:	Canada	***MHSW Facility:***	No

Detail(s)

Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	113
Waste Class Desc:	ACID WASTE - OTHER METALS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES
Waste Class:	148
Waste Class Desc:	INORGANIC LABORATORY CHEMICALS
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	232
Waste Class Desc:	POLYMERIC RESINS
Waste Class:	263
Waste Class Desc:	ORGANIC LABORATORY CHEMICALS
Waste Class:	212
Waste Class Desc:	ALIPHATIC SOLVENTS

19	19 of 26	ESE/227.1	429.9 / 2.05	TGC Canada, LLC 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	***Status:***	
SIC Code:	339990	***Co Admin:***	
SIC Description:	ALL OTHER MISCELLANEOUS MANUFACTURING	***Choice of Contact:***	CO_OFFICIAL
Approval Years:	2015	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	No
Country:	Canada	***MHSW Facility:***	No

Detail(s)

Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	232
Waste Class Desc:	POLYMERIC RESINS
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	113
Waste Class Desc:	ACID WASTE - OTHER METALS
Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES

19	***20 of 26***	***ESE/227.1***	***429.9 / 2.05***	***TGC Canada, LLC*** ***930 GARTSHORE STREET*** ***FERGUS ON N1M 2W7***	***GEN***

Generator No:	ON1128500	***Status:***	
SIC Code:	339990	***Co Admin:***	
SIC Description:	ALL OTHER MISCELLANEOUS MANUFACTURING	***Choice of Contact:***	CO_OFFICIAL
Approval Years:	2014	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	No
Country:	Canada	***MHSW Facility:***	No

Detail(s)

Waste Class:	145
Waste Class Desc:	PAINT/PIGMENT/COATING RESIDUES
Waste Class:	113
Waste Class Desc:	ACID WASTE - OTHER METALS
Waste Class:	331
Waste Class Desc:	WASTE COMPRESSED GASES
Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS
Waste Class:	232
Waste Class Desc:	POLYMERIC RESINS
Waste Class:	213
Waste Class Desc:	PETROLEUM DISTILLATES

19	***21 of 26***	***ESE/227.1***	***429.9 / 2.05***	***The Gund Company Canada ULC*** ***930 GARTSHORE STREET***	***GEN***

FERGUS ON N1M 2W4

Generator No:	ON1128500	***Status:***	Registered
SIC Code:		***Co Admin:***	
SIC Description:		***Choice of Contact:***	
Approval Years:	As of Dec 2018	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:	Canada	***MHSW Facility:***	

Detail(s)

Waste Class:	113 C
Waste Class Desc:	Acid solutions - containing other metals and non-metals
Waste Class:	145 H
Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	145 I
Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	145 L
Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	148 C
Waste Class Desc:	Misc. wastes and inorganic chemicals
Waste Class:	212 L
Waste Class Desc:	Aliphatic solvents and residues
Waste Class:	213 I
Waste Class Desc:	Petroleum distillates
Waste Class:	213 L
Waste Class Desc:	Petroleum distillates
Waste Class:	232 I
Waste Class Desc:	Polymeric resins
Waste Class:	252 L
Waste Class Desc:	Waste crankcase oils and lubricants
Waste Class:	263 B
Waste Class Desc:	Misc. waste organic chemicals
Waste Class:	331 I
Waste Class Desc:	Waste compressed gases including cylinders

19	***22 of 26***	***ESE/227.1***	***429.9 / 2.05***	***The Gund Company Canada ULC*** ***930 Gartshore St*** ***Centre Wellington ON N1M 2W7***	***ECA***

Approval No:	7065-AT5JQK	***MOE District:***	
Approval Date:	2018-03-27	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	
SWP Area Name:		***Geometry Y:***	
Approval Type:	ECA-AIR		
Project Type:	AIR		
Business Name:	The Gund Company Canada ULC		
Address:	930 Gartshore St		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/0997-AAXPP6-14.pdf		

PDF Site Location:

19	23 of 26	ESE/227.1	429.9 / 2.05	**The Gund Company Canada ULC** **930 GARTSHORE STREET** **FERGUS ON N1M 2W4**	GEN

Generator No:	ON1128500	***Status:***	Registered
SIC Code:		***Co Admin:***	
SIC Description:		***Choice of Contact:***	
Approval Years:	As of Jul 2020	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:	Canada	***MHSW Facility:***	

Detail(s)

Waste Class: 232 I
Waste Class Desc: Polymeric resins

Waste Class: 331 I
Waste Class Desc: Waste compressed gases including cylinders

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 213 L
Waste Class Desc: Petroleum distillates

Waste Class: 145 L
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 148 C
Waste Class Desc: Misc. wastes and inorganic chemicals

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

Waste Class: 145 I
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 113 C
Waste Class Desc: Acid solutions - containing other metals and non-metals

Waste Class: 252 L
Waste Class Desc: Waste crankcase oils and lubricants

Waste Class: 145 H
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 232 L
Waste Class Desc: Polymeric resins

Waste Class: 212 L
Waste Class Desc: Aliphatic solvents and residues

Waste Class: 263 I
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 146 T
Waste Class Desc: Other specified inorganic sludges, slurries or solids

19	24 of 26	ESE/227.1	429.9 / 2.05	**The Gund Company Canada ULC** **930 GARTSHORE STREET**	GEN

FERGUS ON N1M 2W4

Generator No:	ON1128500	***Status:***	Registered
SIC Code:		***Co Admin:***	
SIC Description:		***Choice of Contact:***	
Approval Years:	As of Nov 2021	***Phone No Admin:***	
PO Box No:		***Contam. Facility:***	
Country:	Canada	***MHSW Facility:***	

Detail(s)

Waste Class: 331 I
Waste Class Desc: Waste compressed gases including cylinders

Waste Class: 268 L
Waste Class Desc: Amines

Waste Class: 113 C
Waste Class Desc: Acid solutions - containing other metals and non-metals

Waste Class: 232 L
Waste Class Desc: Polymeric resins

Waste Class: 212 L
Waste Class Desc: Aliphatic solvents and residues

Waste Class: 252 L
Waste Class Desc: Waste crankcase oils and lubricants

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 232 I
Waste Class Desc: Polymeric resins

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

Waste Class: 263 I
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 148 C
Waste Class Desc: Misc. wastes and inorganic chemicals

Waste Class: 145 I
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 268 C
Waste Class Desc: Amines

Waste Class: 145 L
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 146 T
Waste Class Desc: Other specified inorganic sludges, slurries or solids

Waste Class: 145 H
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 213 L
Waste Class Desc: Petroleum distillates

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
19	25 of 26	ESE/227.1	429.9 / 2.05	THE GUND COMPANY CANADA ULC 930 Gartshore ST Fergus ON N1M 2W7	EASR

Approval No:	R-010-2112904664	**MOE District:**	Guelph
Status:	REGISTERED	**Municipality:**	Fergus
Date:	2021-02-04	**Latitude:**	43.72166667
Record Type:	EASR	**Longitude:**	-80.3825
Link Source:	MOFA	**Geometry X:**	
Project Type:	Air Emissions	**Geometry Y:**	
Full Address:			
Approval Type:	EASR-Air Emissions		
SWP Area Name:	Grand River		
PDF URL:			
PDF Site Location:			

19	26 of 26	ESE/227.1	429.9 / 2.05	The Gund Company Canada ULC 930 GARTSHORE STREET FERGUS ON N1M 2W7	GEN

Generator No:	ON1128500	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Feb 2022	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class: 145 I
Waste Class Desc: Wastes from the use of pigments, coatings and paints

Waste Class: 263 I
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 213 I
Waste Class Desc: Petroleum distillates

Waste Class: 263 B
Waste Class Desc: Misc. waste organic chemicals

Waste Class: 252 L
Waste Class Desc: Waste crankcase oils and lubricants

Waste Class: 331 I
Waste Class Desc: Waste compressed gases including cylinders

Waste Class: 268 L
Waste Class Desc: Amines

Waste Class: 113 C
Waste Class Desc: Acid solutions - containing other metals and non-metals

Waste Class: 232 I
Waste Class Desc: Polymeric resins

Waste Class: 268 C
Waste Class Desc: Amines

Waste Class: 148 C
Waste Class Desc: Misc. wastes and inorganic chemicals

Waste Class: 145 L

Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	232 L
Waste Class Desc:	Polymeric resins
Waste Class:	145 H
Waste Class Desc:	Wastes from the use of pigments, coatings and paints
Waste Class:	212 L
Waste Class Desc:	Aliphatic solvents and residues
Waste Class:	146 T
Waste Class Desc:	Other specified inorganic sludges, slurries or solids
Waste Class:	213 L
Waste Class Desc:	Petroleum distillates

20 | **1 of 1** | **ENE/229.6** | **429.9 / 2.05** | **The Corporation of the Township of Centre Wellington**
131 Gregson Court, Fergus
Centre Wellington ON | **SPL**

Ref No:	6627-AQQSQ5	**Discharger Report:**	
Site No:	NA	**Material Group:**	
Incident Dt:	8/30/2017	**Health/Env Conseq:**	2 - Minor Environment
Year:		**Client Type:**	Municipal Government
Incident Cause:		**Sector Type:**	Unknown / N/A
Incident Event:	Leak/Break	**Agency Involved:**	
Contaminant Code:	35	**Nearest Watercourse:**	
Contaminant Name:	NATURAL GAS (METHANE)	**Site Address:**	131 Gregson Court, Fergus
Contaminant Limit 1:		**Site District Office:**	Guelph
Contam Limit Freq 1:		**Site Postal Code:**	
Contaminant UN No 1:	1075	**Site Region:**	West Central
Environment Impact:		**Site Municipality:**	Centre Wellington
Nature of Impact:		**Site Lot:**	
Receiving Medium:		**Site Conc:**	
Receiving Env:	Air	**Northing:**	4841454.2
MOE Response:	No	**Easting:**	549635.19
Dt MOE Arvl on Scn:		**Site Geo Ref Accu:**	
MOE Reported Dt:	8/30/2017	**Site Map Datum:**	
Dt Document Closed:	9/6/2017	**SAC Action Class:**	TSSA - Fuel Safety Branch - Hydrocarbon Fuel Release/Spill
Incident Reason:	Operator/Human Error	**Source Type:**	Pipeline/Components
Site Name:	Commercial building<UNOFFICIAL>		
Site County/District:	County of Wellington		
Site Geo Ref Meth:			
Incident Summary:	TSSA FSB; 2-inch pl IP gas main by township; made safe		
Contaminant Qty:	0 other - see incident description		

21 | **1 of 1** | **NW/260.6** | **422.9 / -4.95** | **FERGUS ON** | **WWIS**

Well ID:	7315535	**Flowing (Y/N):**	
Construction Date:		**Flow Rate:**	
Use 1st:		**Data Entry Status:**	
Use 2nd:	Monitoring	**Data Src:**	
Final Well Status:	Abandoned-Other	**Date Received:**	30-Jul-2018 00:00:00
Water Type:		**Selected Flag:**	TRUE
Casing Material:		**Abandonment Rec:**	Yes
Audit No:	Z293106	**Contractor:**	7238
Tag:	A130084	**Form Version:**	7
Constructn Method:		**Owner:**	
Elevation (m):		**County:**	WELLINGTON

Elevatn Reliabilty:		***Lot:***	
Depth to Bedrock:		***Concession:***	
Well Depth:		***Concession Name:***	
Overburden/Bedrock:		***Easting NAD83:***	
Pump Rate:		***Northing NAD83:***	
Static Water Level:		***Zone:***	
Clear/Cloudy:		***UTM Reliability:***	
Municipality:	FERGUS TOWN		
Site Info:			

PDF URL (Map):

Additional Detail(s) (Map)

Well Completed Date:	2018/06/25
Year Completed:	2018
Depth (m):	
Latitude:	43.7269503374694
Longitude:	-80.3905460557138
Path:	

Bore Hole Information

Bore Hole ID:	1007228769	***Elevation:***	
DP2BR:		***Elevrc:***	
Spatial Status:		***Zone:***	17
Code OB:		***East83:***	549086.00
Code OB Desc:		***North83:***	4841727.00
Open Hole:		***Org CS:***	UTM83
Cluster Kind:		***UTMRC:***	4
Date Completed:	25-Jun-2018 00:00:00	***UTMRC Desc:***	margin of error : 30 m - 100 m
Remarks:		***Location Method:***	wwr
Elevrc Desc:			
Location Source Date:			
Improvement Location Source:			
Improvement Location Method:			
Source Revision Comment:			
Supplier Comment:			

Overburden and Bedrock Materials Interval

Formation ID:	1007417848
Layer:	
Color:	
General Color:	
Mat1:	
Most Common Material:	
Mat2:	
Mat2 Desc:	
Mat3:	
Mat3 Desc:	
Formation Top Depth:	
Formation End Depth:	
Formation End Depth UOM:	ft

Annular Space/Abandonment Sealing Record

Plug ID:	1007417855
Layer:	1
Plug From:	0.0

Plug To: 66.5
Plug Depth UOM: ft

Method of Construction & Well Use

Method Construction ID: 1007417854
Method Construction Code:
Method Construction:
Other Method Construction:

Pipe Information

Pipe ID: 1007417847
Casing No: 0
Comment:
Alt Name:

Construction Record - Casing

Casing ID: 1007417851
Layer:
Material:
Open Hole or Material:
Depth From:
Depth To:
Casing Diameter:
Casing Diameter UOM: inch
Casing Depth UOM: ft

Construction Record - Screen

Screen ID: 1007417852
Layer:
Slot:
Screen Top Depth:
Screen End Depth:
Screen Material:
Screen Depth UOM: ft
Screen Diameter UOM: inch
Screen Diameter:

Water Details

Water ID: 1007417850
Layer:
Kind Code:
Kind:
Water Found Depth:
Water Found Depth UOM: ft

Hole Diameter

Hole ID: 1007417849
Diameter:
Depth From:
Depth To:
Hole Depth UOM: ft
Hole Diameter UOM: inch

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Links

Bore Hole ID:	1007228769	**Tag No:**	A130084
Depth M:		**Contractor:**	7238
Year Completed:	2018	**Path:**	731\7315535.pdf
Well Completed Dt:	2018/06/25	**Latitude:**	43.7269503374694
Audit No:	Z293106	**Longitude:**	-80.3905460557138

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22 | **1 of 1** | **ENE/265.0** | **429.9 / 2.05** | **Wellington Perforated Sheet & Plate**
151 Gregson Court
Fergus ON N1M 2W8 | **GEN**

Generator No:	ON7938812	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Feb 2022	**Phone No Admin:**	
PO Box No:	PO Box 157	**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class: 252 L
Waste Class Desc: Waste crankcase oils and lubricants

Waste Class: 253 L
Waste Class Desc: Emulsified oils

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

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23 | **1 of 4** | **ESE/271.1** | **428.6 / 0.80** | **ELECTRALOGICS INCORPORATED**
905 GARTSHORE ST
FERGUS ON N1M | **SCT**

Established: 1982
Plant Size (ft²): 0
Employment: 15

--Details--
Description: Computer and Peripheral Equipment Manufacturing
SIC/NAICS Code: 334110

Description: Semiconductor and Other Electronic Component Manufacturing
SIC/NAICS Code: 334410

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23 | **2 of 4** | **ESE/271.1** | **428.6 / 0.80** | **ELECTRALOGICS INCORPORATED**
905 GARTSHORE ST
FERGUS ON N1M 2W8 | **SCT**

Established: 1982
Plant Size (ft²): 0
Employment: 14

--Details--
Description: SEMICONDUCTORS AND RELATED DEVICES
SIC/NAICS Code: 3674

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
23	3 of 4	ESE/271.1	428.6 / 0.80	The Wellington Advertiser 905 Gartfore St Fergus ON N1M 2W8	SCT

Established: 1968
Plant Size (ft²): 3000
Employment: 30

--Details--
Description: Newspaper Publishers
SIC/NAICS Code: 511110

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
23	4 of 4	ESE/271.1	428.6 / 0.80	The Wellington Advertiser 905 Gartshore St Fergus ON N1M 2W8	SCT

Established: 01-JUL-68
Plant Size (ft²): 9000
Employment:

--Details--
Description: Newspaper Publishers
SIC/NAICS Code: 511110

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
24	1 of 3	E/284.9	429.9 / 2.05	CSN Hutten Collision Centre CSN Hutten Collision Centre 943 Glengarry Crescent Fergus ON N1M2W7	GEN

Generator No: ON3440690
SIC Code:
SIC Description:
Approval Years: As of Jul 2020
PO Box No: 52
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
24	2 of 3	E/284.9	429.9 / 2.05	CSN Hutten Collision Centre CSN Hutten Collision Centre 943 Glengarry Crescent Fergus ON N1M2W7	GEN

Generator No: ON3440690
SIC Code:
SIC Description:
Approval Years: As of Nov 2021
PO Box No: 52
Country: Canada

Status: Registered
Co Admin:
Choice of Contact:
Phone No Admin:
Contam. Facility:
MHSW Facility:

Detail(s)

Waste Class: 251 L
Waste Class Desc: Waste oils/sludges (petroleum based)

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
24	3 of 3	E/284.9	429.9 / 2.05	CSN Hutten Collision Centre CSN Hutten Collision Centre 943 Glengarry Crescent Fergus ON N1M2W7	GEN

Generator No:	ON3440690	**Status:**	Registered
SIC Code:		**Co Admin:**	
SIC Description:		**Choice of Contact:**	
Approval Years:	As of Feb 2022	**Phone No Admin:**	
PO Box No:	52	**Contam. Facility:**	
Country:	Canada	**MHSW Facility:**	

Detail(s)

Waste Class:	251 L
Waste Class Desc:	Waste oils/sludges (petroleum based)

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
25	1 of 1	S/291.3	425.9 / -1.95	35 PEGLAR CRES FERGUS ON N1M 3T3	PES

Detail Licence No:		**Operator Box:**	
Licence No:	L-240-5081616872	**Operator Class:**	
Status:	Active	**Operator No:**	
Approval Date:	December, 20 2021	**Operator Type:**	
Report Source:	PEST-Operator	**Oper Area Code:**	
Licence Type:	Operator	**Oper Phone No:**	
Licence Type Code:		**Operator Ext:**	
Licence Class:		**Operator Lot:**	
Licence Control:		**Oper Concession:**	
Latitude:	43.71833333	**Operator Region:**	
Longitude:	-80.38611111	**Operator District:**	
Lot:		**Operator County:**	
Concession:		**Op Municipality:**	
Region:		**Post Office Box:**	
District:		**MOE District:**	Guelph
County:		**SWP Area Name:**	Grand River
Trade Name:			
PDF URL:	http://www.accessenvironment.ene.gov.on.ca/AEWeb/ae/ViewDocument.action?documentRefID=2547054		
PDF Site Location:			

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB
26	1 of 1	SSE/296.3	425.9 / -1.95	37 Peglar Cres, Fergus Centre Wellington ON	SPL

Ref No:	0600-8KZR2Q	**Discharger Report:**	
Site No:		**Material Group:**	
Incident Dt:	8/23/2011	**Health/Env Conseq:**	
Year:		**Client Type:**	
Incident Cause:		**Sector Type:**	
Incident Event:		**Agency Involved:**	
Contaminant Code:		**Nearest Watercourse:**	
Contaminant Name:		**Site Address:**	37 Peglar Cres, Fergus
Contaminant Limit 1:		**Site District Office:**	
Contam Limit Freq 1:		**Site Postal Code:**	
Contaminant UN No 1:		**Site Region:**	
Environment Impact:		**Site Municipality:**	Centre Wellington
Nature of Impact:		**Site Lot:**	
Receiving Medium:		**Site Conc:**	
Receiving Env:		**Northing:**	
MOE Response:	No Field Response	**Easting:**	
Dt MOE Arvl on Scn:		**Site Geo Ref Accu:**	
MOE Reported Dt:	8/23/2011	**Site Map Datum:**	

Map Key	Number of Records	Direction/ Distance (m)	Elev/Diff (m)	Site	DB

Dt Document Closed:	9/26/2011	**SAC Action Class:**	Primary Assessment of Spills
Incident Reason:		**Source Type:**	
Site Name:	RESIDENCE:<UNOFFICIAL>		
Site County/District:			
Site Geo Ref Meth:			
Incident Summary:	Fergus: fertilizer to CB, 10L		
Contaminant Qty:			

27	1 of 6	ESE/299.6	429.9 / 2.05	THISTLETOWN MOTOR FREIGHT LTD. 509 DICKSON ROAD FERGUS ON N1M 2W7	GEN

Generator No:	ON2464101	**Status:**	
SIC Code:	3311	**Co Admin:**	
SIC Description:	SMALL ELECT. APPL.	**Choice of Contact:**	
Approval Years:	99,00,01,03,04	**Phone No Admin:**	
PO Box No:		**Contam. Facility:**	
Country:		**MHSW Facility:**	

Detail(s)

Waste Class:	252
Waste Class Desc:	WASTE OILS & LUBRICANTS

27	2 of 6	ESE/299.6	429.9 / 2.05	JENI MOBILE WASH LTD 509 DICKSON DR FERGUS ON N1M2W7	PES

Detail Licence No:		**Operator Box:**	100
Licence No:		**Operator Class:**	
Status:		**Operator No:**	
Approval Date:		**Operator Type:**	Operator
Report Source:		**Oper Area Code:**	
Licence Type:		**Oper Phone No:**	
Licence Type Code:		**Operator Ext:**	
Licence Class:		**Operator Lot:**	
Licence Control:		**Oper Concession:**	
Latitude:		**Operator Region:**	
Longitude:		**Operator District:**	
Lot:		**Operator County:**	
Concession:		**Op Municipality:**	
Region:		**Post Office Box:**	
District:		**MOE District:**	
County:		**SWP Area Name:**	
Trade Name:			
PDF URL:			
PDF Site Location:			

27	3 of 6	ESE/299.6	429.9 / 2.05	Remelt Environmental Technologies Inc. 509 Dickson Dr Wellington North ON	CA

Certificate #:	3319-7U6RG6
Application Year:	2010
Issue Date:	6/30/2010
Approval Type:	Air
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	

Client Postal Code:
Project Description:
Contaminants:
Emission Control:

27	4 of 6	ESE/299.6	429.9 / 2.05	JENI MOBILE WASH LTD BOX 100, 509 DICKSON DR FERGUS ON N1M 2W7	PES

Detail Licence No:		**Operator Box:**	
Licence No:		**Operator Class:**	
Status:		**Operator No:**	
Approval Date:		**Operator Type:**	
Report Source:		**Oper Area Code:**	
Licence Type:	Vendor	**Oper Phone No:**	
Licence Type Code:		**Operator Ext:**	
Licence Class:		**Operator Lot:**	
Licence Control:		**Oper Concession:**	
Latitude:		**Operator Region:**	
Longitude:		**Operator District:**	
Lot:		**Operator County:**	
Concession:		**Op Municipality:**	
Region:		**Post Office Box:**	
District:		**MOE District:**	
County:		**SWP Area Name:**	
Trade Name:			
PDF URL:			
PDF Site Location:			

27	5 of 6	ESE/299.6	429.9 / 2.05	JENI MOBILE WASH LTD 509 DICKSON DR FERGUS ON N1M 2W7	PES

Detail Licence No:		**Operator Box:**	100
Licence No:		**Operator Class:**	
Status:		**Operator No:**	
Approval Date:		**Operator Type:**	
Report Source:		**Oper Area Code:**	
Licence Type:	Operator	**Oper Phone No:**	
Licence Type Code:		**Operator Ext:**	
Licence Class:		**Operator Lot:**	
Licence Control:		**Oper Concession:**	
Latitude:		**Operator Region:**	
Longitude:		**Operator District:**	
Lot:		**Operator County:**	
Concession:		**Op Municipality:**	
Region:		**Post Office Box:**	
District:		**MOE District:**	
County:		**SWP Area Name:**	
Trade Name:			
PDF URL:			
PDF Site Location:			

27	6 of 6	ESE/299.6	429.9 / 2.05	Remelt Environmental Technologies Inc. 509 Dickson Dr Wellington North ON N1M 3E2	ECA

Approval No:	3319-7U6RG6	**MOE District:**	Guelph
Approval Date:	2010-06-30	**City:**	
Status:	Approved	**Longitude:**	-80.37475

Record Type:	ECA	***Latitude:***	43.705173
Link Source:	IDS	***Geometry X:***	
SWP Area Name:	Grand River	***Geometry Y:***	
Approval Type:	ECA-AIR		
Project Type:	AIR		
Business Name:	Remelt Environmental Technologies Inc.		
Address:	509 Dickson Dr		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/4755-7PFLF2-14.pdf		
PDF Site Location:			

Unplottable Summary

Total: 12 Unplottable sites

DB	Company Name/Site Name	Address	City	Postal
CA	FERGUS TOWN N.E. INDUSTRIAL PARK	GLENGARRY CRESCENT	FERGUS TOWN ON	
CA	FERGUS TOWN STERLING RD.	DICKSON DR.	FERGUS TOWN ON	
CA	1255769 ONTARIO INC., THE RYAN GROUP	GORDON ST./GIBBONS DR.,FERGUS	CENTRE WELLINGTON TWP. ON	
CA	P.U.C. FERGUS TOWN	GARTSHORE ST.	FERGUS TOWN ON	
CA	P.U.C. FERGUS TOWN	GARTSHORE STREET	FERGUS TOWN ON	
CA	FERGUS TOWN STERLING RD.	DICKSON DR.	FERGUS TOWN ON	
CA	1255769 ONTARIO INC., THE RYAN GROUP	GIBBONS DR./LOGAN PLACE,FERGUS	CENTRE WELLINGTON TWP. ON	
CA	FERGUS TOWN N.E. INDUSTRIAL PARK	GLENGARRY CRES.	FERGUS TOWN ON	
CA	The Corporation of the Township of Centre Wellington	Gartshore Street and New Industrial Road	Centre Wellington ON	
ECA	The Corporation of the Township of Centre Wellington	Gartshore Street and New Industrial Road	Centre Wellington ON	N0B 1S0
ECA	The Corporation of the Township of Centre Wellington	Gregson Crt	Centre Wellington ON	N0B 1S0
SCT	WALSER FURNITURE CO. LTD	RR 3	FERGUS ON	N1M 2W4

Unplottable Report

Site: ***FERGUS TOWN N.E. INDUSTRIAL PARK***
GLENGARRY CRESCENT FERGUS TOWN ON

Database: ***CA***

Certificate #:	3-1320-89-
Application Year:	89
Issue Date:	8/8/1989
Approval Type:	Municipal sewage
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***FERGUS TOWN STERLING RD.***
DICKSON DR. FERGUS TOWN ON

Database: ***CA***

Certificate #:	3-0825-88-
Application Year:	88
Issue Date:	6/22/1988
Approval Type:	Municipal sewage
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***1255769 ONTARIO INC., THE RYAN GROUP***
GORDON ST./GIBBONS DR.,FERGUS CENTRE WELLINGTON TWP. ON

Database: ***CA***

Certificate #:	7-0748-99-
Application Year:	99
Issue Date:	11/10/1999
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***P.U.C. FERGUS TOWN***
GARTSHORE ST. FERGUS TOWN ON

Database: ***CA***

Certificate #:	7-1056-88-

Application Year: 88
Issue Date: 8/25/1988
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***P.U.C. FERGUS TOWN***
GARTSHORE STREET FERGUS TOWN ON

Database: ***CA***

Certificate #: 7-1110-88-
Application Year: 88
Issue Date: 8/10/1988
Approval Type: Municipal water
Status: Cancelled
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***FERGUS TOWN STERLING RD.***
DICKSON DR. FERGUS TOWN ON

Database: ***CA***

Certificate #: 7-0718-88-
Application Year: 88
Issue Date: 6/22/1988
Approval Type: Municipal water
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***1255769 ONTARIO INC., THE RYAN GROUP***
GIBBONS DR./LOGAN PLACE,FERGUS CENTRE WELLINGTON TWP. ON

Database: ***CA***

Certificate #: 3-1087-99-
Application Year: 99
Issue Date: 11/10/1999
Approval Type: Municipal sewage
Status: Approved
Application Type:
Client Name:
Client Address:
Client City:
Client Postal Code:
Project Description:
Contaminants:
Emission Control:

Site: ***FERGUS TOWN N.E. INDUSTRIAL PARK***
GLENGARRY CRES. FERGUS TOWN ON

Database: ***CA***

Certificate #:	7-1107-89-
Application Year:	89
Issue Date:	8/8/1989
Approval Type:	Municipal water
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***The Corporation of the Township of Centre Wellington***
Gartshore Street and New Industrial Road Centre Wellington ON

Database: ***CA***

Certificate #:	5157-6XJR4F
Application Year:	2007
Issue Date:	1/21/2007
Approval Type:	Municipal and Private Sewage Works
Status:	Approved
Application Type:	
Client Name:	
Client Address:	
Client City:	
Client Postal Code:	
Project Description:	
Contaminants:	
Emission Control:	

Site: ***The Corporation of the Township of Centre Wellington***
Gartshore Street and New Industrial Road Centre Wellington ON N0B 1S0

Database: ***ECA***

Approval No:	5157-6XJR4F	***MOE District:***	
Approval Date:	2007-01-21	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	
SWP Area Name:		***Geometry Y:***	
Approval Type:	ECA-MUNICIPAL AND PRIVATE SEWAGE WORKS		
Project Type:	MUNICIPAL AND PRIVATE SEWAGE WORKS		
Business Name:	The Corporation of the Township of Centre Wellington		
Address:	Gartshore Street and New Industrial Road		
Full Address:			
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/1296-6WGNNE-14.pdf		
PDF Site Location:			

Site: ***The Corporation of the Township of Centre Wellington***
Gregson Crt Centre Wellington ON N0B 1S0

Database: ***ECA***

Approval No:	4545-AMUSBR	***MOE District:***	
Approval Date:	2018-01-19	***City:***	
Status:	Approved	***Longitude:***	
Record Type:	ECA	***Latitude:***	
Link Source:	IDS	***Geometry X:***	
SWP Area Name:		***Geometry Y:***	
Approval Type:	ECA-INDUSTRIAL SEWAGE WORKS		
Project Type:	INDUSTRIAL SEWAGE WORKS		

Business Name:	The Corporation of the Township of Centre Wellington
Address:	Gregson Crt
Full Address:	
Full PDF Link:	https://www.accessenvironment.ene.gov.on.ca/instruments/9883-AKUQNJ-14.pdf
PDF Site Location:	

Site: ***WALSER FURNITURE CO. LTD***
RR 3 FERGUS ON N1M 2W4

Database: ***SCT***

Established:	1927
Plant Size (ft²):	1500
Employment:	1

--Details--

Description:	WOOD HOUSEHOLD FURNITURE, EXCEPT UPHOLSTERED
SIC/NAICS Code:	2511

Appendix: Database Descriptions

Environmental Risk Information Services (ERIS) can search the following databases. The extent of historical information varies with each database and current information is determined by what is publicly available to ERIS at the time of update. ***Note:*** *Databases denoted with " * " indicates that the database will no longer be updated. See the individual database description for more information.*

Abandoned Aggregate Inventory: Provincial AAGR

The MAAP Program maintains a database of abandoned pits and quarries. Please note that the database is only referenced by lot and concession and city/town location. The database provides information regarding the location, type, size, land use, status and general comments.*

Government Publication Date: Sept 2002*

Aggregate Inventory: Provincial AGR

The Ontario Ministry of Natural Resources maintains a database of all active pits and quarries. The database provides information regarding the registered owner/operator, location name, operation type, approval type, and maximum annual tonnage.

Government Publication Date: Up to Nov 2021

Abandoned Mine Information System: Provincial AMIS

The Abandoned Mines Information System contains data on known abandoned and inactive mines located on both Crown and privately held lands. The information was provided by the Ministry of Northern Development and Mines (MNDM), with the following disclaimer: "the database provided has been compiled from various sources, and the Ministry of Northern Development and Mines makes no representation and takes no responsibility that such information is accurate, current or complete". Reported information includes official mine name, status, background information, mine start/end date, primary commodity, mine features, hazards and remediation.

Government Publication Date: 1800-Mar 2022

Anderson's Waste Disposal Sites: Private ANDR

The information provided in this database was collected by examining various historical documents which aimed to characterize the likely position of former waste disposal sites from 1860 to present. The research initiative behind the creation of this database was to identify those sites that are missing from the Ontario MOE Waste Disposal Site Inventory, as well as to provide revisions and corrections to the positions and descriptions of sites currently listed in the MOE inventory. In addition to historic waste disposal facilities, the database also identifies certain auto wreckers and scrap yards that have been extrapolated from documentary sources. Please note that the data is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1860s-Present

Aboveground Storage Tanks: Provincial AST

Historical listing of aboveground storage tanks made available by the Department of Natural Resources and Forestry. Includes tanks used to hold water or petroleum. This dataset has been retired as of September 25, 2014 and will no longer be updated.

Government Publication Date: May 31, 2014

Automobile Wrecking & Supplies: Private AUWR

This database provides an inventory of known locations that are involved in the scrap metal, automobile wrecking/recycling, and automobile parts & supplies industry. Information is provided on the company name, location and business type.

Government Publication Date: 1999-Sep 30, 2021

Borehole: Provincial BORE

A borehole is the generalized term for any narrow shaft drilled in the ground, either vertically or horizontally. The information here includes geotechnical investigations or environmental site assessments, mineral exploration, or as a pilot hole for installing piers or underground utilities. Information is from many sources such as the Ministry of Transportation (MTO) boreholes from engineering reports and projects from the 1950 to 1990's in Southern Ontario. Boreholes from the Ontario Geological Survey (OGS) including The Urban Geology Analysis Information System (UGAIS) and the York Peel Durham Toronto (YPDT) database of the Conservation Authority Moraine Coalition. This database will include fields such as location, stratigraphy, depth, elevation, year drilled, etc. For all water well data or oil and gas well data for Ontario please refer to WWIS and OOGW.

Government Publication Date: 1875-Jul 2018

Certificates of Approval: Provincial CA

This database contains the following types of approvals: Air & Noise, Industrial Sewage, Municipal & Private Sewage, Waste Management Systems and Renewable Energy Approvals. The MOE in Ontario states that any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste, must have a Certificate of Approval before it can operate lawfully. Fields include approval number, business name, address, approval date, approval type and status. This database will no longer be updated, as CofA's have been replaced by either Environmental Activity and Sector Registry (EASR) or Environmental Compliance Approval (ECA). Please refer to those individual databases for any information after Oct.31, 2011.

Government Publication Date: 1985-Oct 30, 2011*

Dry Cleaning Facilities: Federal CDRY

List of dry cleaning facilities made available by Environment and Climate Change Canada. Environment and Climate Change Canada's Tetrachloroethylene (Use in Dry Cleaning and Reporting Requirements) Regulations (SOR/2003-79) are intended to reduce releases of tetrachloroethylene to the environment from dry cleaning facilities.

Government Publication Date: Jan 2004-Dec 2019

Commercial Fuel Oil Tanks: Provincial CFOT

Locations of commercial underground fuel oil tanks. This is not a comprehensive or complete inventory of commercial fuel tanks in the province; this listing is a copy of records of registered commercial underground fuel oil tanks obtained under Access to Public Information.
Note that the following types of tanks do not require registration: waste oil tanks in apartments, office buildings, residences, etc.; aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Chemical Manufacturers and Distributors: Private CHEM

This database includes information from both a one time study conducted in 1992 and private source and is a listing of facilities that manufacture or distribute chemicals. The production of these chemical substances may involve one or more chemical reactions and/or chemical separation processes (i.e. fractionation, solvent extraction, crystallization, etc.).

Government Publication Date: 1999-Jan 31, 2020

Chemical Register: Private CHM

This database includes a listing of locations of facilities within the Province or Territory that either manufacture and/or distributes chemicals.

Government Publication Date: 1999-Sep 30, 2021

Compressed Natural Gas Stations: Private CNG

Canada has a network of public access compressed natural gas (CNG) refuelling stations. These stations dispense natural gas in compressed form at 3,000 pounds per square inch (psi), the pressure which is allowed within the current Canadian codes and standards. The majority of natural gas refuelling is located at existing retail gasoline that have a separate refuelling island for natural gas. This list of stations is made available by the Canadian Natural Gas Vehicle Alliance.

Government Publication Date: Dec 2012 -Apr 2022

Inventory of Coal Gasification Plants and Coal Tar Sites: Provincial COAL

This inventory includes both the "Inventory of Coal Gasification Plant Waste Sites in Ontario-April 1987" and the Inventory of Industrial Sites Producing or Using Coal Tar and Related Tars in Ontario-November 1988) collected by the MOE. It identifies industrial sites that produced and continue to produce or use coal tar and other related tars. Detailed information is available and includes: facility type, size, land use, information on adjoining properties, soil condition, site operators/occupants, site description, potential environmental impacts and historic maps available. This was a one-time inventory.*

Government Publication Date: Apr 1987 and Nov 1988*

Compliance and Convictions: Provincial CONV

This database summarizes the fines and convictions handed down by the Ontario courts beginning in 1989. Companies and individuals named here have been found guilty of environmental offenses in Ontario courts of law.

Government Publication Date: 1989-Mar 2022

Certificates of Property Use: Provincial CPU

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all CPU's on the registry such as (EPA s. 168.6) - Certificate of Property Use.

Government Publication Date: 1994 - Jun 30, 2022

Drill Hole Database: Provincial DRL

The Ontario Drill Hole Database contains information on more than 113,000 percussion, overburden, sonic and diamond drill holes from assessment files on record with the department of Mines and Minerals. Please note that limited data is available for southern Ontario, as it was the last area to be completed. The database was created when surveys submitted to the Ministry were converted in the Assessment File Research Image Database (AFRI) project. However, the degree of accuracy (coordinates) as to the exact location of drill holes is dependent upon the source document submitted to the MNDM. Levels of accuracy used to locate holes are: centering on the mining claim; a sketch of the mining claim; a 1:50,000 map; a detailed company map; or from submitted a "Report of Work".

Government Publication Date: 1886 - Sep 2020

Delisted Fuel Tanks: Provincial DTNK

List of fuel storage tank sites that were once found in - and have since been removed from - the list of fuel storage tanks made available by the regulatory agency under Access to Public Information.

Government Publication Date: Feb 28, 2022

Environmental Activity and Sector Registry: Provincial EASR

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. The EASR allows businesses to register certain activities with the ministry, rather than apply for an approval. The registry is available for common systems and processes, to which preset rules of operation can be applied. The EASR is currently available for: heating systems, standby power systems and automotive refinishing. Businesses whose activities aren't subject to the EASR may apply for an ECA (Environmental Compliance Approval), Please see our ECA database.

Government Publication Date: Oct 2011- Apr 30, 2022

Environmental Registry: Provincial EBR

The Environmental Registry lists proposals, decisions and exceptions regarding policies, Acts, instruments, or regulations that could significantly affect the environment. Through the Registry, thirteen provincial ministries notify the public of upcoming proposals and invite their comments. For example, if a local business is requesting a permit, license, or certificate of approval to release substances into the air or water; these are notified on the registry. Data includes: Approval for discharge into the natural environment other than water (i.e. Air) - EPA s. 9, Approval for sewage works - OWRA s. 53(1), and EPA s. 27 - Approval for a waste disposal site. For information regarding Permit to Take Water (PTTW), Certificate of Property Use (CPU) and (ORD) Orders please refer to those individual databases.

Government Publication Date: 1994 - Jun 30, 2022

Environmental Compliance Approval: Provincial ECA

On October 31, 2011, a smarter, faster environmental approvals system came into effect in Ontario. In the past, a business had to apply for multiple approvals (known as certificates of approval) for individual processes and pieces of equipment. Today, a business either registers itself, or applies for a single approval, depending on the types of activities it conducts. Businesses whose activities aren't subject to the EASR may apply for an ECA. A single ECA addresses all of a business's emissions, discharges and wastes. Separate approvals for air, noise and waste are no longer required. This database will also include Renewable Energy Approvals. For certificates of approval prior to Nov 1st, 2011, please refer to the CA database. For all Waste Disposal Sites please refer to the WDS database.

Government Publication Date: Oct 2011- Apr 30, 2022

Environmental Effects Monitoring: Federal EEM

The Environmental Effects Monitoring program assesses the effects of effluent from industrial or other sources on fish, fish habitat and human usage of fisheries resources. Since 1992, pulp and paper mills have been required to conduct EEM studies under the Pulp and Paper Effluent Regulations. This database provides information on the mill name, geographical location and sub-lethal toxicity data.

Government Publication Date: 1992-2007*

ERIS Historical Searches: Private EHS

ERIS has compiled a database of all environmental risk reports completed since March 1999. Available fields for this database include: site location, date of report, type of report, and search radius. As per all other databases, the ERIS database can be referenced on both the map and "Statistical Profile" page.

Government Publication Date: 1999-Mar 31, 2022

Environmental Issues Inventory System: Federal EIIS

The Environmental Issues Inventory System was developed through the implementation of the Environmental Issues and Remediation Plan. This plan was established to determine the location and severity of contaminated sites on inhabited First Nation reserves, and where necessary, to remediate those that posed a risk to health and safety; and to prevent future environmental problems. The EIIS provides information on the reserve under investigation, inventory number, name of site, environmental issue, site action (Remediation, Site Assessment), and date investigation completed.

Government Publication Date: 1992-2001*

Emergency Management Historical Event: Provincial EMHE

List of locations of historical occurrences of emergency events, including those assigned to the Ministry of Natural Resources by Order-In-Council (OIC) under the Emergency Management and Civil Protection Act, as well as events where MNR provided requested emergency response assistance. Many of these events will have involved community evacuations, significant structural loss, and/or involvement of MNR emergency response staff. These events fall into one of ten (10) type categories: Dam Failure; Drought / Low Water; Erosion; Flood; Forest Fire; Soil and Bedrock Instability; Petroleum Resource Center Event, EMO Requested Assistance, Continuity of Operations Event, Other Requested Assistance. EMHE record details are reproduced by ERIS under License with the Ontario Ministry of Natural Resources © Queen's Printer for Ontario, 2017.

Government Publication Date: Dec 31, 2016

Environmental Penalty Annual Report: Provincial EPAR

This database contains data from Ontario's annual environmental penalty report published by the Ministry of the Environment and Climate Change. These reports provide information on environmental penalties for land or water violations issued to companies in one of the nine industrial sectors covered by the Municipal Industrial Strategy for Abatement (MISA) regulations.

Government Publication Date: Jan 1, 2011 - Dec 31, 2021

List of Expired Fuels Safety Facilities: Provincial EXP

List of facilities and tanks for which there was once a fuel registration. This is not a comprehensive or complete inventory of expired tanks/tank facilities in the province; this listing is a copy of previously registered tanks and facilities obtained under Access to Public Information. Includes private fuel outlets, bulk plants, fuel oil tanks, gasoline stations, marinas, propane filling stations, liquid fuel tanks, piping systems, etc; includes tanks which have been removed from the ground.
Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Federal Convictions: Federal FCON

Environment Canada maintains a database referred to as the "Environmental Registry" that details prosecutions under the Canadian Environmental Protection Act (CEPA) and the Fisheries Act (FA). Information is provided on the company name, location, charge date, offence and penalty.

Government Publication Date: 1988-Jun 2007*

Contaminated Sites on Federal Land: Federal FCS

The Federal Contaminated Sites Inventory includes information on known federal contaminated sites under the custodianship of departments, agencies and consolidated Crown corporations as well as those that are being or have been investigated to determine whether they have contamination arising from past use that could pose a risk to human health or the environment. The inventory also includes non-federal contaminated sites for which the Government of Canada has accepted some or all financial responsibility. It does not include sites where contamination has been caused by, and which are under the control of, enterprise Crown corporations, private individuals, firms or other levels of government. Includes fire training sites and sites at which Per- and Polyfluoroalkyl Substances (PFAS) are a concern.

Government Publication Date: Jun 2000-Apr 2022

Fisheries & Oceans Fuel Tanks: Federal FOFT

Fisheries & Oceans Canada maintains an inventory of aboveground & underground fuel storage tanks located on Fisheries & Oceans property or controlled by DFO. Our inventory provides information on the site name, location, tank owner, tank operator, facility type, storage tank location, tank contents & capacity, and date of tank installation.

Government Publication Date: 1964-Sep 2019

Federal Identification Registry for Storage Tank Systems (FIRSTS): Federal FRST

A list of federally regulated Storage tanks from the Federal Identification Registry for Storage Tank Systems (FIRSTS). FIRSTS is Environment and Climate Change Canada's database of storage tank systems subject to the Storage Tank for Petroleum Products and Allied Petroleum Products Regulations. The main objective of the Regulations is to prevent soil and groundwater contamination from storage tank systems located on federal and aboriginal lands. Storage tank systems that do not have a valid identification number displayed in a readily visible location on or near the storage tank system may be refused product delivery.

Government Publication Date: May 31, 2018

Fuel Storage Tank: Provincial FST

List of registered private and retail fuel storage tanks. This is not a comprehensive or complete inventory of private and retail fuel storage tanks in the province; this listing is a copy of registered private and retail fuel storage tanks, obtained under Access to Public Information.
Notes: registration was not required for private fuel underground/aboveground storage tanks prior to January 1990, nor for furnace oil tanks prior to May 1, 2002; registration is not required for waste oil tanks in apartments, office buildings, residences, etc., or aboveground gas or diesel tanks. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Fuel Storage Tank - Historic: Provincial FSTH

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks. Public records of private fuel storage tanks are only available since the registration became effective in September 1989. This information is now collected by the Technical Standards and Safety Authority.

Government Publication Date: Pre-Jan 2010*

Ontario Regulation 347 Waste Generators Summary: Provincial GEN

Regulation 347 of the Ontario EPA defines a waste generation site as any site, equipment and/or operation involved in the production, collection, handling and/or storage of regulated wastes. A generator of regulated waste is required to register the waste generation site and each waste produced, collected, handled, or stored at the site. This database contains the registration number, company name and address of registered generators including the types of hazardous wastes generated. It includes data on waste generating facilities such as: drycleaners, waste treatment and disposal facilities, machine shops, electric power distribution etc. This information is a summary of all years from 1986 including the most currently available data. Some records may contain, within the company name, the phrase "See & Use..." followed by a series of letters and numbers. This occurs when one company is amalgamated with or taken over by another registered company. The number listed as "See & Use", refers to the new ownership and the other identification number refers to the original ownership. This phrase serves as a link between the 2 companies until operations have been fully transferred.

Government Publication Date: 1986-Feb 28, 2022

Greenhouse Gas Emissions from Large Facilities: Federal GHG

List of greenhouse gas emissions from large facilities made available by Environment Canada. Greenhouse gas emissions in kilotonnes of carbon dioxide equivalents (kt CO2 eq).

Government Publication Date: 2013-Dec 2019

TSSA Historic Incidents: Provincial HINC

List of historic incidences of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen recorded by the TSSA in their previous incident tracking system. The TSSA's Fuels Safety Program administers the Technical Standards & Safety Act 2000, providing fuel-related safety services associated with the safe transportation, storage, handling and use of fuels such as gasoline, diesel, propane, natural gas and hydrogen. Under this Act, the TSSA regulates fuel suppliers, storage facilities, transport trucks, pipelines, contractors and equipment or appliances that use fuels. Records are not verified for accuracy or completeness. This is not a comprehensive or complete inventory of historical fuel spills and leaks in the province. This listing is a copy of the data captured at one moment in time and is hence limited by the record date provided here.

Government Publication Date: 2006-June 2009*

Indian & Northern Affairs Fuel Tanks: Federal IAFT

The Department of Indian & Northern Affairs Canada (INAC) maintains an inventory of aboveground & underground fuel storage tanks located on both federal and crown land. Our inventory provides information on the reserve name, location, facility type, site/facility name, tank type, material & ID number, tank contents & capacity, and date of tank installation.

Government Publication Date: 1950-Aug 2003*

Fuel Oil Spills and Leaks: Provincial INC

Listing of spills and leaks of diesel, fuel oil, gasoline, natural gas, propane, and hydrogen reported to the Spills Action Centre (SAC). This is not a comprehensive or complete inventory of fuel-related leaks, spills, and incidents in the province; this listing in a copy of incidents reported to the SAC, obtained under Access to Public Information. Includes incidents from fuel-related hazards such as spills, fires, and explosions. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Landfill Inventory Management Ontario: Provincial LIMO

The Landfill Inventory Management Ontario (LIMO) database is updated every year, as the Ministry of the Environment, Conservation and Parks compiles new and updated information. Includes small and large landfills currently operating as well as those which are closed and historic. Operators of larger landfills provide landfill information for the previous operating year to the ministry for LIMO including: estimated amount of total waste received, landfill capacity, estimated total remaining landfill capacity, fill rates, engineering designs, reporting and monitoring details, size of location, service area, approved waste types, leachate of site treatment, contaminant attenuation zone and more. The small landfills include information such as site owner, site location and certificate of approval # and status.

Government Publication Date: Mar 21, 2022

Canadian Mine Locations: Private MINE

This information is collected from the Canadian & American Mines Handbook. The Mines database is a national database that provides over 290 listings on mines (listed as public companies) dealing primarily with precious metals and hard rocks. Listed are mines that are currently in operation, closed, suspended, or are still being developed (advanced projects). Their locations are provided as geographic coordinates (x, y and/or longitude, latitude). As of 2002, data pertaining to Canadian smelters and refineries has been appended to this database.

Government Publication Date: 1998-2009*

Mineral Occurrences: Provincial MNR

In the early 70's, the Ministry of Northern Development and Mines created an inventory of approximately 19,000 mineral occurrences in Ontario, in regard to metallic and industrial minerals, as well as some information on building stones and aggregate deposits. Please note that the "Horizontal Positional Accuracy" is approximately +/- 200 m. Many reference elements for each record were derived from field sketches using pace or chain/tape measurements against claim posts or topographic features in the area. The primary limiting factor for the level of positional accuracy is the scale of the source material. The testing of horizontal accuracy of the source materials was accomplished by comparing the plan metric (X and Y) coordinates of that point with the coordinates of the same point as defined from a source of higher accuracy.

Government Publication Date: 1846-Feb 2022

National Analysis of Trends in Emergencies System (NATES): Federal NATE

In 1974 Environment Canada established the National Analysis of Trends in Emergencies System (NATES) database, for the voluntary reporting of significant spill incidents. The data was to be used to assist in directing the work of the emergencies program. NATES ran from 1974 to 1994. Extensive information is available within this database including company names, place where the spill occurred, date of spill, cause, reason and source of spill, damage incurred, and amount, concentration, and volume of materials released.

Government Publication Date: 1974-1994*

Non-Compliance Reports: Provincial NCPL

The Ministry of the Environment provides information about non-compliant discharges of contaminants to air and water that exceed legal allowable limits, from regulated industrial and municipal facilities. A reported non-compliance failure may be in regard to a Control Order, Certificate of Approval, Sectoral Regulation or specific regulation/act.

Government Publication Date: Dec 31, 2020

National Defense & Canadian Forces Fuel Tanks: Federal NDFT

The Department of National Defense and the Canadian Forces maintains an inventory of all aboveground & underground fuel storage tanks located on DND lands. Our inventory provides information on the base name, location, tank type & capacity, tank contents, tank class, date of tank installation, date tank last used, and status of tank as of May 2001. This database will no longer be updated due to the new National Security protocols which have prohibited any release of this database.

Government Publication Date: Up to May 2001*

National Defense & Canadian Forces Spills: Federal NDSP

The Department of National Defense and the Canadian Forces maintains an inventory of spills to land and water. All spill sites have been classified under the "Transportation of Dangerous Goods Act - 1992". Our inventory provides information on the facility name, location, spill ID #, spill date, type of spill, as well as the quantity of substance spilled & recovered.

Government Publication Date: Mar 1999-Apr 2018

National Defence & Canadian Forces Waste Disposal Sites: Federal NDWD

The Department of National Defence and the Canadian Forces maintains an inventory of waste disposal sites located on DND lands. Where available, our inventory provides information on the base name, location, type of waste received, area of site, depth of site, year site opened/closed and status.

Government Publication Date: 2001-Apr 2007*

National Energy Board Pipeline Incidents: Federal NEBI

Locations of pipeline incidents from 2008 to present, made available by the Canada Energy Regulator (CER) - previously the National Energy Board (NEB). Includes incidents reported under the Onshore Pipeline Regulations and the Processing Plant Regulations related to pipelines under federal jurisdiction, does not include incident data related to pipelines under provincial or territorial jurisdiction.

Government Publication Date: 2008-Jun 30, 2021

National Energy Board Wells: Federal NEBP

The NEBW database contains information on onshore & offshore oil and gas wells that are outside provincial jurisdiction(s) and are thereby regulated by the National Energy Board. Data is provided regarding the operator, well name, well ID No./UWI, status, classification, well depth, spud and release date.

Government Publication Date: 1920-Feb 2003*

National Environmental Emergencies System (NEES): Federal NEES

In 2000, the Emergencies program implemented NEES, a reporting system for spills of hazardous substances. For the most part, this system only captured data from the Atlantic Provinces, some from Quebec and Ontario and a portion from British Columbia. Data for Alberta, Saskatchewan, Manitoba and the Territories was not captured. However, NEES is also a repository for previous Environment Canada spill datasets. NEES is composed of the historic datasets ' or Trends ' which dates from approximately 1974 to present. NEES Trends is a compilation of historic databases, which were merged and includes data from NATES (National Analysis of Trends in Emergencies System), ARTS (Atlantic Regional Trends System), and NEES. In 2001, the Emergencies Program determined that variations in reporting regimes and requirements between federal and provincial agencies made national spill reporting and trend analysis difficult to achieve. As a consequence, the department has focused efforts on capturing data on spills of substances which fall under its legislative authority only (CEPA and FA). As such, the NEES database will be decommissioned in December 2004.

Government Publication Date: 1974-2003*

National PCB Inventory: Federal NPCB

Environment Canada's National PCB inventory includes information on in-use PCB containing equipment in Canada including federal, provincial and private facilities. Federal out-of-service PCB containing equipment and PCB waste owned by the federal government or by federally regulated industries such as airlines, railway companies, broadcasting companies, telephone and telecommunications companies, pipeline companies, etc. are also listed. Although it is not Environment Canada's mandate to collect data on non-federal PCB waste, the National PCB inventory includes some information on provincial and private PCB waste and storage sites. Some addresses provided may be Head Office addresses and are not necessarily the location of where the waste is being used or stored.

Government Publication Date: 1988-2008*

National Pollutant Release Inventory: Federal NPRI

Environment Canada has defined the National Pollutant Release Inventory ("NPRI") as a federal government initiative designed to collect comprehensive national data regarding releases to air, water, or land, and waste transfers for recycling for more than 300 listed substances.

Government Publication Date: 1993-May 2017

Oil and Gas Wells: Private OGWE

The Nickle's Energy Group (publisher of the Daily Oil Bulletin) collects information on drilling activity including operator and well statistics. The well information database includes name, location, class, status and depth. The main Nickle's database is updated on a daily basis, however, this database is updated on a monthly basis. More information is available at www.nickles.com.

Government Publication Date: 1988-May 31, 2022

Ontario Oil and Gas Wells: Provincial OOGW

In 1998, the MNR handed over to the Ontario Oil, Gas and Salt Resources Corporation, the responsibility of maintaining a database of oil and gas wells drilled in Ontario. The OGSR Library has over 20,000+ wells in their database. Information available for all wells in the ERIS database include well owner/operator, location, permit issue date, and well cap date, license No., status, depth and the primary target (rock unit) of the well being drilled. All geology/stratigraphy table information, plus all water table information is also provide for each well record.

Government Publication Date: 1800-Jan 2021

Inventory of PCB Storage Sites: Provincial OPCB

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of PCB storage sites within the province. Ontario Regulation 11/82 (Waste Management - PCB) and Regulation 347 (Generator Waste Management) under the Ontario EPA requires the registration of inactive PCB storage equipment and/or disposal sites of PCB waste with the Ontario Ministry of Environment. This database contains information on: 1) waste quantities; 2) major and minor sites storing liquid or solid waste; and 3) a waste storage inventory.

Government Publication Date: 1987-Oct 2004; 2012-Dec 2013

Orders: Provincial ORD

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all Orders on the registry such as (EPA s. 17) - Order for remedial work, (EPA s. 18) - Order for preventative measures, (EPA s. 43) - Order for removal of waste and restoration of site, (EPA s. 44) - Order for conformity with Act for waste disposal sites, (EPA s. 136) - Order for performance of environmental measures.

Government Publication Date: 1994 - Jun 30, 2022

Canadian Pulp and Paper: Private PAP

This information is part of the Pulp and Paper Canada Directory. The Directory provides a comprehensive listing of the locations of pulp and paper mills and the products that they produce.

Government Publication Date: 1999, 2002, 2004, 2005, 2009-2014

Parks Canada Fuel Storage Tanks: Federal PCFT

Canadian Heritage maintains an inventory of known fuel storage tanks operated by Parks Canada, in both National Parks and at National Historic Sites. The database details information on site name, location, tank install/removal date, capacity, fuel type, facility type, tank design and owner/operator.

Government Publication Date: 1920-Jan 2005*

Pesticide Register: Provincial PES

The Ontario Ministry of the Environment and Climate Change maintains a database of licensed operators and vendors of registered pesticides.

Government Publication Date: Oct 2011- Apr 30, 2022

Pipeline Incidents: Provincial PINC

List of pipeline incidents (strikes, leaks, spills). This is not a comprehensive or complete inventory of pipeline incidents in the province; this listing in an historical copy of records previously obtained under Access to Public Information. Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2021

Private and Retail Fuel Storage Tanks: Provincial PRT

The Fuels Safety Branch of the Ontario Ministry of Consumer and Commercial Relations maintained a database of all registered private fuel storage tanks and licensed retail fuel outlets. This database includes an inventory of locations that have gasoline, oil, waste oil, natural gas and/or propane storage tanks on their property. The MCCR no longer collects this information. This information is now collected by the Technical Standards and Safety Authority (TSSA).

Government Publication Date: 1989-1996*

Permit to Take Water: Provincial PTTW

This is a subset taken from Ontario's Environmental Registry (EBR) database. It will include all PTTW's on the registry such as OWRA s. 34 - Permit to take water.

Government Publication Date: 1994 - Jun 30, 2022

Ontario Regulation 347 Waste Receivers Summary: Provincial REC

Part V of the Ontario Environmental Protection Act ("EPA") regulates the disposal of regulated waste through an operating waste management system or a waste disposal site operated or used pursuant to the terms and conditions of a Certificate of Approval or a Provisional Certificate of Approval. Regulation 347 of the Ontario EPA defines a waste receiving site as any site or facility to which waste is transferred by a waste carrier. A receiver of regulated waste is required to register the waste receiving facility. This database represents registered receivers of regulated wastes, identified by registration number, company name and address, and includes receivers of waste such as: landfills, incinerators, transfer stations, PCB storage sites, sludge farms and water pollution control plants. This information is a summary of all years from 1986 including the most currently available data.

Government Publication Date: 1986-1990, 1992-2019

Record of Site Condition: Provincial RSC

The Record of Site Condition (RSC) is part of the Ministry of the Environment's Brownfields Environmental Site Registry. Protection from environmental cleanup orders for property owners is contingent upon documentation known as a record of site condition (RSC) being filed in the Environmental Site Registry. In order to file an RSC, the property must have been properly assessed and shown to meet the soil, sediment and groundwater standards appropriate for the use (such as residential) proposed to take place on the property. The Record of Site Condition Regulation (O. Reg. 153/04) details requirements related to site assessment and clean up.
RSCs filed after July 1, 2011 will also be included as part of the new (O.Reg. 511/09).

Government Publication Date: 1997-Sept 2001, Oct 2004-May 2022

Retail Fuel Storage Tanks: Private RST

This database includes an inventory of retail fuel outlet locations (including marinas) that have on their property gasoline, oil, waste oil, natural gas and / or propane storage tanks.

Government Publication Date: 1999-Sep 30, 2021

Scott's Manufacturing Directory: Private SCT

Scott's Directories is a data bank containing information on over 200,000 manufacturers across Canada. Even though Scott's listings are voluntary, it is the most comprehensive database of Canadian manufacturers available. Information concerning a company's address, plant size, and main products are included in this database.

Government Publication Date: 1992-Mar 2011*

Ontario Spills: Provincial SPL

List of spills and incidents made available the Ministry of the Environment, Conservation and Parks. This database identifies information such as location (approximate), type and quantity of contaminant, date of spill, environmental impact, cause, nature of impact, etc. Information from 1988-2002 was part of the ORIS (Occurrence Reporting Information System). The SAC (Spills Action Centre) handles all spills reported in Ontario. Regulations for spills in Ontario are part of the MOE's Environmental Protection Act, Part X. The Ministry of the Environment, Conservation and Parks cites the coronavirus pandemic as an explanation for delays in releasing data pursuant to requests.

Government Publication Date: 1988-Sep 2020; Dec 2020-Mar 2021

Wastewater Discharger Registration Database: Provincial SRDS

Information under this heading is combination of the following 2 programs. The Municipal/Industrial Strategy for Abatement (MISA) division of the Ontario Ministry of Environment maintained a database of all direct dischargers of toxic pollutants within nine sectors including: Electric Power Generation; Mining; Petroleum Refining; Organic Chemicals; Inorganic Chemicals; Pulp & Paper; Metal Casting; Iron & Steel; and Quarries. All sampling information is now collected and stored within the Sample Result Data Store (SRDS).

Government Publication Date: 1990-Dec 31, 2020

Anderson's Storage Tanks: Private TANK

The information provided in this database was collected by examining various historical documents, which identified the location of former storage tanks, containing substances such as fuel, water, gas, oil, and other various types of miscellaneous products. Information is available in regard to business operating at tank site, tank location, permit year, permit & installation type, no. of tanks installed & configuration and tank capacity. Data contained within this database pertains only to the city of Toronto and is not warranted to be complete, exhaustive or authoritative. The information was collected for research purposes only.

Government Publication Date: 1915-1953*

Transport Canada Fuel Storage Tanks: Federal TCFT

List of fuel storage tanks currently or previously owned or operated by Transport Canada. This inventory also includes tanks on The Pickering Lands, which refers to 7,530 hectares (18,600 acres) of land in Pickering, Markham, and Uxbridge owned by the Government of Canada since 1972; properties on this land has been leased by the government since 1975, and falls under the Site Management Policy of Transport Canada, but is administered by Public Works and Government Services Canada. This inventory provides information on the site name, location, tank age, capacity and fuel type.

Government Publication Date: 1970 - Dec 2020

Variances for Abandonment of Underground Storage Tanks: Provincial VAR

Listing of variances granted for storage tank abandonment. This is not a comprehensive or complete inventory of tank abandonment variances in the province; this listing is a copy of tank abandonment variance records previously obtained under Access to Public Information. In Ontario, registered underground storage tanks must be removed within two years of disuse; if removal of a tank is not feasible, an application may be sought for a variance from this code requirement.
Records are not verified for accuracy or completeness.

Government Publication Date: Feb 28, 2022

Waste Disposal Sites - MOE CA Inventory: Provincial WDS

The Ontario Ministry of Environment, Waste Management Branch, maintains an inventory of known open (active or inactive) and closed disposal sites in the Province of Ontario. Active sites maintain a Certificate of Approval, are approved to receive and are receiving waste. Inactive sites maintain Certificate(s) of Approval but are not receiving waste. Closed sites are not receiving waste. The data contained within this database was compiled from the MOE's Certificate of Approval database. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number. All new Environmental Compliance Approvals handed out after Oct 31, 2011 for Waste Disposal Sites will still be found in this database.

Government Publication Date: Oct 2011- Apr 30, 2022

Waste Disposal Sites - MOE 1991 Historical Approval Inventory: Provincial WDSH

In June 1991, the Ontario Ministry of Environment, Waste Management Branch, published the "June 1991 Waste Disposal Site Inventory", of all known active and closed waste disposal sites as of October 30st, 1990. For each "active" site as of October 31st 1990, information is provided on site location, site/CA number, waste type, site status and site classification. For each "closed" site as of October 31st 1990, information is provided on site location, site/CA number, closure date and site classification. Locations of these sites may be cross-referenced to the Anderson database described under ERIS's Private Source Database section, by the CA number.

Government Publication Date: Up to Oct 1990*

Water Well Information System: Provincial WWIS

This database describes locations and characteristics of water wells found within Ontario in accordance with Regulation 903. It includes such information as coordinates, construction date, well depth, primary and secondary use, pump rate, static water level, well status, etc. Also included are detailed stratigraphy information, approximate depth to bedrock and the approximate depth to the water table.

Government Publication Date: Jan 31, 2022

Definitions

Database Descriptions: This section provides a detailed explanation for each database including: source, information available, time coverage, and acronyms used. They are listed in alphabetic order.

Detail Report: This is the section of the report which provides the most detail for each individual record. Records are summarized by location, starting with the project property followed by records in closest proximity.

Distance: The distance value is the distance between plotted points, not necessarily the distance between the sites' boundaries. All values are an approximation.

Direction: The direction value is the compass direction of the site in respect to the project property and/or center point of the report.

Elevation: The elevation value is taken from the location at which the records for the site address have been plotted. All values are an approximation. Source: Google Elevation API.

Executive Summary: This portion of the report is divided into 3 sections:

'Report Summary'- Displays a chart indicating how many records fall on the project property and, within the report search radii.

'Site Report Summary'-Project Property'- This section lists all the records which fall on the project property. For more details, see the 'Detail Report' section.

'Site Report Summary-Surrounding Properties'- This section summarizes all records on adjacent properties, listing them in order of proximity from the project property. For more details, see the 'Detail Report' section.

Map Key: The map key number is assigned according to closest proximity from the project property. Map Key numbers always start at #1. The project property will always have a map key of '1' if records are available. If there is a number in brackets beside the main number, this will indicate the number of records on that specific property. If there is no number in brackets, there is only one record for that property.

The symbol and colour used indicates 'elevation': the red inverted triangle will dictate 'ERIS Sites with Lower Elevation', the yellow triangle will dictate 'ERIS Sites with Higher Elevation' and the orange square will dictate 'ERIS Sites with Same Elevation.'

Unplottables: These are records that could not be mapped due to various reasons, including limited geographic information. These records may or may not be in your study area, and are included as reference.

Appendix C – MECP and TSSA Records

Ministry of the Environment, Conservation and Parks

Access and Privacy Office

12th Floor
40 St. Clair Avenue West
Toronto ON M4V 1M2
Tel: (416) 314-4075

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Bureau de l'accès à l'information et de la protection de la vie privée

12e étage
40, avenue St. Clair ouest
Toronto ON M4V 1M2
Tél. : (416) 314-4075

Ontario

September 19, 2022

Cindy Luu
JLP Services Inc.
405 York Road
Guelph, Ontario N1E 3H3
cindy.luu@jlpservices.ca

Dear Cindy Luu:

RE: MECP FOI A-2022-05341, Your Reference #: G4599 – Record Release Letter

This letter is further to your request made pursuant to the Freedom of Information and Protection of Privacy Act (the Act) relating to 965 Gartshore Street, Fergus.

Attached is a copy of the records.

If you have any questions, please contact Sylwia Rynkiewicz at 437-995-1618 or sylwia.rynkiewicz@ontario.ca.

Yours truly,

for

Ryan Gunn
Manager (A), Access and Privacy Office

Attachment

Ontario

Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs

INCIDENT REPORT

Reference Number:	6651-BRPNNY	**Module Type:**	Other
Status:	Closed	**File Storage Number:**	SPILLS ACTION CENTRE
Program:	Air	**Activity:**	Notifications

Caller or PO Reporting/Receiving Information

First Name:	**Last Name:**
Jack	Chen
Name of Company:	
Union Gas	

MAILING ADDRESS			
Civic Address:		**Unit Identifier:**	
Delivery Designator:		**Delivery Identifier:**	
Municipality/ Unorganized Twp:	**County/District:**	**Province/State:**	**Postal Code:**
		Ontario	
Postal Station:		**Country:**	Canada
Telephone Number:	**Extension:**	**Other Number:**	**Email Address:**
519-885-7401	5067401	**Fax**	

Date Reported to MOE:	2020/07/20	**Time Reported to MOE:**	13:37

Date of Incident:	2020/07/20	**Time of Incident:**	09:43
Incident Date Confirmation:	Actual		

Client(s)

Client Details
Enbridge Gas Distribution Inc. Mailing Address: 2225 Sheppard Ave 17th Floor, Toronto, Ontario, Canada, M2J 5C2 Physical Address: 2225 Sheppard Ave 17th Floor, Toronto, City, Ontario, Canada, M2J 5C2 Telephone: (416)495-5253, FAX: (416)498-2980, email: terence.vanhalderen@enbridge.com

Client #: 2880-4LNPD8, Client Type: Corporation, NAICS: 221210
Additional Address Info: 17th Floor

Site(s)

Site Details
965 Gartshort Street, Fergus/Central Wellington<UNOFFICIAL> Address: Lot: , Part: , 965 Gartshort Street, Fergus/Central Wellington, Centre Wellington, Township, County of Wellington District Office: Guelph

Incident Summary:
TSSA FSB: 1 1/4" pl IP service damage, made safe

Initial Incident Description (as reported):
Created: Haiden McDonald (Spills Action Centre) - 2020/07/20 01:37:31 PM
Caller to SAC(hm) reporting that there was a 1 1/4" plastic IP residential service line damage located at 965 Gartshort Street, Fergus/Centre Wellington. Caller says that Aecon was drilling for fibre when they damaged the line. Excess flow valve was triggered and stopped release prior to arrival. Caller says locates were present and only 1 service impacted. No emergency services, injuries, evacuations or media attention. Call received: 09:43 On site: 10:04 Made safe: 10:04 Repairs complete Contractor Information Aecon 20 Carlson Street, Toronto Foreman: Dan Burton 519-648-2413 Operator: Paul Beraskin 13:52 SAC(hm) emailed report to TSSA.

SAC Action Class:	TSSA - Fuel Safety Program Notifications
Non-Standard Procedure:	No

Incident Description:
Last update: Haiden McDonald (Spills Action Centre) - 2020/07/20 01:44 PM
-

Incident Description Continuation:

Incident Update:

Was there an MOE field response?	No
Were there samples collected / analyzed at any time?	No
Known or Suspected Health / Environmental Consequence at the Time of Incident	
Health / Environmental Consequence:	2 - Minor Environment

Has a Water Body been impacted?	No
Receiving Environment:	Air
Incident Event:	Leak/Break
Incident Reason:	Operator/Human Error
MOE/Other Agencies Involved:	Province - MOE-District Office, Provincial Agency - Technical Standards & Safety Authority
Was there a discharge / emission / spill of a contaminant to the environment?	
Yes	

Contaminants Table

Contaminant Name	Description	Code	UN#	Limit	Quantity	[units]	[freq]
NATURAL GAS (METHANE)		35	1075				

Environmental Compliance Reporting (ECR)

Is this an air emission (measured or modelled) or wastewater (sewage) discharge exceedance that will become part of the Environmental Compliance Report? **(legislation, certificate of approval, order, or guideline)**
No

Voluntary / Mandatory Abatement

Was there Non-Compliance/Non-Conformance Identified?	◯ Yes ◯ No

Voluntary / Mandatory Compliance Items

Type	Parent RefNo	Work Summary (may be truncated)	Date	AttainList

Waste / EGR Information

Waste / EGR Information entries:

Document Related Information

Cross Reference:	(doc link)	**Task Link:**	5312-BRPNWW
Originating Document:		**Created by:**	Haiden McDonald
Date Created:	2020/07/20	**Date Completed:**	2020/08/08
Office Receiving Incident Report:	Spills Action Centre	**Incident Info Received By:**	Haiden McDonald
Bring Forward Date:		**Bring Forward Reason:**	

Signatures

Provincial Officer:

Name:	**Haiden McDonald**
Badge No:	
Work Unit:	
District/Area Office:	**Spills Action Centre**
Date:	**2020/07/20**
Signature:	

Water Inspector:

Name:	**Theresa Ip**
Work Unit:	
District/Area Office:	
Date:	**2020/08/08**
Signature:	Theresa Ip

From: Public Information Services
Sent: Monday, July 11, 2022 2:33 PM
To: Cindy Luu
Subject: RE: Preliminary Search Request

Please refrain from sending documents to head office. The Public Information (PI) team works remotely, mailing in applications will lengthen the overall processing time.

NO RECORD FOUND IN CURRENT DATABASE

Hello,

Thank you for your request for confirmation of public information. TSSA has performed a preliminary search of TSSA's current database.

- We confirm that there are no records in our current database of any fuel storage tanks at the subject address(es).

This is not a confirmation that there are no records in the archives. For a further search in our archives, please submit an application for release of public information (PI Form) through TSSA's new Service Prepayment Portal. The associated fee must be paid via credit card (Visa or MasterCard) through a secure site.

Please follow the steps below to access the new application(s) and Service Prepayment Portal:

1. Click Release of Public Information - TSSA and click "need a copy of a document";
2. Select the appropriate application, download it and complete it in full; and
3. Proceed to page 3 of the application and click the link TSSA Service Prepayment Portal under payment options (the link will take you the secure site to pay for the release via credit card).

Accessing the Service Prepayment Portal:

1. Select new or existing customer (*if you are an existing customer, you will need your account # & postal code to access your account);
2. Select the program area: AD (Amusement Devices), BPV (Boilers and Pressure Vessels), ED (Elevating Devices), FS (Fuels Services), OE (Operating Engineers) or SKI (Ski Lifts) and click continue;
3. Enter the application form number (obtained from bottom left corner of application form) and click continue;
   When selecting the application form number from the drop-down menu, please make sure you select the application that begins with "PI" (i.e. PI-FS, PI-BPV etc.);
4. Complete the primary contact information section;
5. Complete the fees section;
6. Upload your completed application; and
7. Upload supporting documents (if required) and click continue.

Once all steps have been successfully completed, you will receive your receipt via email.
Questions? Please contact TSSA's Public Information Release team at publicinformationservices@tssa.org.

Although TSSA believes the information provided pursuant to your request is accurate, please note that TSSA does not warrant this information in any way whatsoever.

Kind Regards,
Sherees

Public Information Agent
Facilities and Business Services
345 Carlingview Drive
Toronto, Ontario M9W 6N9
Tel: +1-416-734-6222 | Fax: +1-416-734-3568 | E-Mail: publicinformationservices@tssa.org
www.tssa.org

From: Cindy Luu <cindy.luu@jlpservices.ca>
Sent: July 11, 2022 12:38 PM
To: Public Information Services <publicinformationservices@tssa.org>
Subject: Preliminary Search Request

> **[CAUTION]:** This email originated outside the organisation.
> Please do not click links or open attachments unless you recognise the source of this email and know the content is safe.

Hello,

I would like to request a preliminary search to determine if there are any records for petroleum operations including records for underground storage tanks, products stored, upgrades, decommissioning, and any compliance issues that you may have on file for the following municipal address in Fergus:

- 965 Gartshore Street, Fergus, Ontario

Thanks,

Cindy Luu, B.Sc.
Environmental Scientist
Environmental Services | JLP Services Inc.

519-763-3101 | 226-201-0533
cindy.luu@jlpservices.ca
www.jlpservices.ca
405 York Road, Guelph, Ontario, N1E 3H3

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Appendix D – Aerial Photographs and Satellite Images

HISTORICAL AERIALS

Project Property:	965 Gartshore St, Fergus 965 Gartshore St Fergus ON N1M 2W4
Project No:	G4599
Requested By:	JLP Services Inc.
Order No:	22071101248
Date Completed:	July 14, 2022

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

Decade	Year	Image Scale	Source
1920	Not Available		
1940	Not Available		
1960	1964	20000	NAPL
1980	1980	50000	NAPL
2000	Not Available		

Aerial Maps included in this report are produced by the sources listed above and are to be used for research purposes including a phase I report. Maps are not to be resold as commercial property. No warranty of Accuracy or Liability for ERIS: The information contained in this report has been produced by ERIS Information Inc.(in the US) and ERIS Information Limited Partnership (in Canada), both doing business and ERIS Information Limited Partnership (in Canada), both doing business as 'ERIS', using aerial photos listed in above sources. The maps contained in this report does not purport to be and does not constitute a guarantee of the accuracy of the information contained herein. Although ERIS has endeavored to present you with information that is accurate, ERIS disclaims, any and all liability for any errors, omissions, or inaccuracies in such information and data, whether attributable to inadvertence, negligence or otherwise, and for any consequences arising therefrom. Liability on the part of ERIS is limited to the monetary value paid for this report.

0 0.125 0.25 0.5 Kilometers

Order Number: 22071101248

Year: 1964
Source: NAPL
Map Scale: 1: 10000
Comments:

0 0.125 0.25 0.5 Kilometers

Order Number: 22071101248

Year: 1980
Source: NAPL
Map Scale: 1: 10000
Comments:

Appendix E – City Directories

ERIS
ENVIRONMENTAL RISK INFORMATION SERVICES

CITY DIRECTORY

Project Property:	*965 Gartshore Street, Fergus, Ontario*
Report Type:	*City Directory*
Order No:	*22071101248*
Information Source:	*No Source*
Date Completed:	*19/07/2022*

Environmental Risk Information Services
A division of Glacier Media Inc.
1.866.517.5204 | info@erisinfo.com | erisinfo.com

City Directory Information Source
No Source

PROJECT NUMBER: 22071101248	
Site Address:	965 Gartshore Street, Fergus, Ontario
Year:	
Site Listing:	-Address Not Listed
Adjacent Properties:	
Gartshore Street (900-1100)	-Street Not Listed
Glengarry Crescent (920-960)	-Street Not Listed
Gibbons Drive (95-140)	-Street Not Listed
Gordon Street (391-501 Odd)	-Street Not Listed
Gzowski Street (All)	-Street Not Listed
Harper Crescent (All)	-Street Not Listed
Dickson Drive (501-509 Odd)	-Street Not Listed

Peglar Crescent (35-65)	-Street Not Listed

-All listings for businesses were listed as they are in the city directory.

-Listings that are residential are listed as “residential” with the number of tenants. The name of the residential tenant is not listed in the above city directory.

*****Fergus, Ontario is not listed within the city directory archives*****

Appendix F – Fire Insurance Plans

enviroscan

An SCM Company

175 Commerce Valley Drive W
Markham, Ontario L3T 7Z3

T: 905-882-6300
W: www.optaintel.ca

Report Completed By:

Swati

Site Address:

43.723322 80.386585 965 Gartshore StFergus

Project No:

22071101248

Opta Order ID:

111851

Requested by:

Eleanor Goolab
ERIS

Date Completed:

7/18/2022 9:02:57 AM

Project Name: 965 Gartshore St Fergus

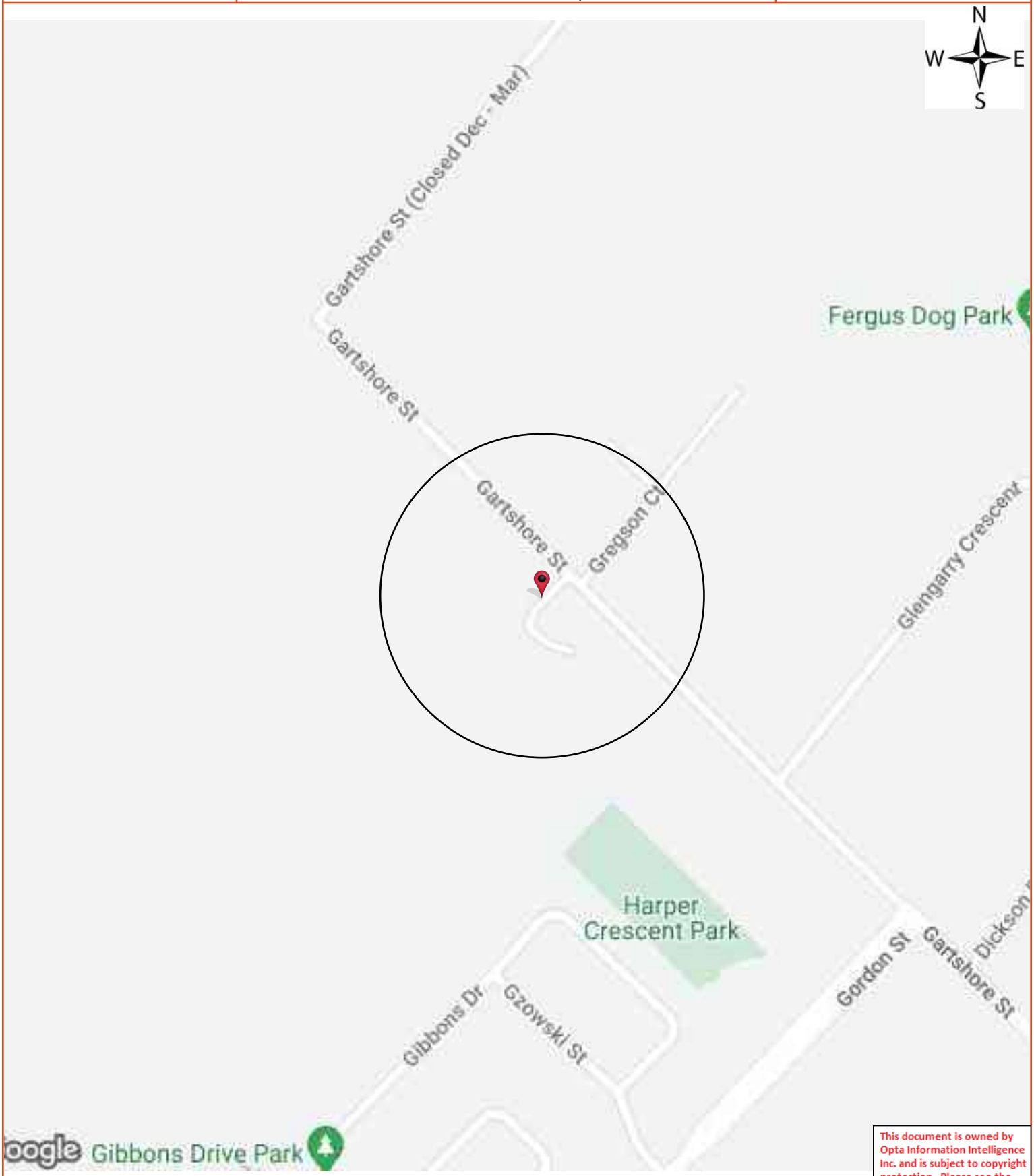
Project #: 22071101248
P.O. #: G4599

ENVIROSCAN Report

Search Area: 43.723322 80.386585 965 Gartshore StFergus

Requested by:
Eleanor Goolab
Date Completed: 07/18/2022 09:02:57

enviroscan
OPTA INFORMATION INTELLIGENCE



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Opta Historical Environmental Services Enviroscan ™ Terms and Conditions

Report

The documents (hereinafter referred to as the "Documents") to be released as part of the report (hereinafter referred to as the "Report") to be delivered to the purchaser as set out above are documents in Opta's records relating to the described property (hereinafter referred to as the "Property"). Opta makes no representations or warranties respecting the Documents whatsoever, including, without limitation, with respect to the completeness, accuracy or usefulness of the Documents, and does not represent or warrant that these are the only plans and reports prepared in association with the Property or in Opta's possession at the time of Report delivery to the purchaser. The Documents are current as of the date(s) indicated on them. Interpretation of the Documents, if any, is by inference based upon the information which is apparent and obvious on the face of the Documents only. Opta does not represent, warrant or guarantee that interpretations other than those referred to do not exist from other sources. The Report will be prepared for use by the purchaser of the services as shown above hereof only.

Disclaimer

Opta disclaims responsibility for any losses or damages of any kind whatsoever, whether consequential or other, however caused, incurred or suffered, arising directly or indirectly as a result of the services (which services include, but are not limited to, the preparation of the Report provided hereunder), including but not limited to, any losses or damages arising directly or indirectly from any breach of contract, fundamental or otherwise, from reliance on Opta Reports or from any tortious acts or omissions of Opta's agents, employees or representatives.

Entire Agreement

The parties hereto acknowledge and agree to be bound by the terms and conditions hereof. The request form constitutes the entire agreement between the parties pertaining to the subject matter hereof and supersedes all prior and contemporaneous agreements, negotiations and discussions, whether oral or written, and there are no representations or warranties, or other agreements between the parties in connection with the subject matter hereof except as specifically set forth herein. No supplement, modification, waiver, or termination of the request shall be binding, unless confirmed in writing by the parties hereto.

Governing Document

In the event of any conflicts or inconsistencies between the provisions hereof and the Reports, the rights and obligations of the parties shall be deemed to be governed by the request form, which shall be the paramount document.

Law

This agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein.

Project Name: 965 Gartshore St Fergus

Project #: 22071101248
P.O. #: G4599

ENVIROSCAN Report

No Records Found

Requested by:
Eleanor Goolab
Date Completed: 07/18/2022 09:02:57

OPTA INFORMATION INTELLIGENCE

No Records Found

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N
W E
S

Appendix G – Site Photographs

Photograph 1: View of Site and several on-site structures, facing west (October 24, 2022).

Photograph 2: View of wood framed barn, temporary Quonset hut on the left and slab on grade building on the right, facing west (October 24, 2022).

Photograph 3: Interior view of the wooden framed barn (October 24, 2022).

Photograph 4: Rear view of wooden framed barn and concrete silo (October 24, 2022).

Photograph 5: Rear view of slab on grade storage building and steel grain bins (October 24, 2022).

Photograph 6: Interior view of Quonset hut (October 24, 2022).

Photograph 7: View of residential dwelling located on the eastern portion of the site, south of the wooden framed barn (December 15, 2022).

Photograph 8: View of detached storage garage, located between the residential dwelling and barn structures (December 15, 2022).

Photograph 9: View of agricultural lands located on the north, west and south of Site (December 15, 2022).

Photograph 10: View of site entrance, facing east (October 24, 2022).

Photograph 11: View of adjacent land uses (commercial/light industrial) to the east of the subject property (December 15, 2022).

Photograph 12: View of adjacent land uses (commercial/light industrial) to the east of the subject property (December 15, 2022).

Appendix H – Chain of Title

* CERTIFIED IN ACCORDANCE WITH THE LAND TITLES ACT * SUBJECT TO RESERVATIONS IN CROWN GRANT *

PROPERTY DESCRIPTION: PART LOT 17 CON 16 NICHOL; PART LOT 18 CON 16 NICHOL AS IN MS41591 (1STLY) EXCEPT PT 1 61R4667 AND PT 1 61R9322; TOWNSHIP OF CENTRE WELLINGTON

PROPERTY REMARKS:

ESTATE/QUALIFIER:
FEE SIMPLE
LT CONVERSION QUALIFIED

RECENTLY:
DIVISION FROM 71129-0033

PIN CREATION DATE:
2003/05/22

OWNERS' NAMES	CAPACITY	SHARE
2156598 ONTARIO LIMITED	TCOM	10%
REC FARMS INC.	TCOM	90%

REG. NUM.	DATE	INSTRUMENT TYPE	AMOUNT	PARTIES FROM	PARTIES TO	CERT/ CHKD
*** PRINTOUT INCLUDES ALL DOCUMENT TYPES (DELETED INSTRUMENTS NOT INCLUDED) **						
**SUBJECT, ON FIRST REGISTRATION UNDER THE LAND TITLES ACT, TO:						
** SUBSECTION 44(1) OF THE LAND TITLES ACT, EXCEPT PARAGRAPH 11, PARAGRAPH 14, PROVINCIAL SUCCESSION DUTIES *						
** AND ESCHEATS OR FORFEITURE TO THE CROWN.						
** THE RIGHTS OF ANY PERSON WHO WOULD, BUT FOR THE LAND TITLES ACT, BE ENTITLED TO THE LAND OR ANY PART OF						
** IT THROUGH LENGTH OF ADVERSE POSSESSION, PRESCRIPTION, MISDESCRIPTION OR BOUNDARIES SETTLED BY						
** CONVENTION.						
** ANY LEASE TO WHICH THE SUBSECTION 70(2) OF THE REGISTRY ACT APPLIES.						
**DATE OF CONVERSION TO LAND TITLES: 2001/03/26 **						
NOTE: THIS PROPERTY WAS RETIRED ON 2022/01/25. THIS PROPERTY IS NOW DIVIDED INTO THE FOLLOWING PROPERTIES: 71129-0508 TO 71129-0509						
MS18288	1961/01/18	BYLAW				C
WC564171	2019/03/28	TRANSFER	$280,000	REC FARMS INC.	2156598 ONTARIO LIMITED REC FARMS INC.	C
	REMARKS: PLANNING ACT STATEMENTS.					
WC605577	2020/07/29	CHARGE	$175,000	REC FARMS INC.	OLYMPIA TRUST COMPANY	C
WC630333	2021/04/14	CHARGE	$4,000,000	REC FARMS INC.	CANADIAN IMPERIAL BANK OF COMMERCE	C
WC630334	2021/04/14	POSTPONEMENT		OLYMPIA TRUST COMPANY	CANADIAN IMPERIAL BANK OF COMMERCE	C
	REMARKS: WC605577 TO WC630333					
61R22127	2021/11/29	PLAN REFERENCE				C
	REMARKS: WC655559.					

NOTE: ADJOINING PROPERTIES SHOULD BE INVESTIGATED TO ASCERTAIN DESCRIPTIVE INCONSISTENCIES, IF ANY, WITH DESCRIPTION REPRESENTED FOR THIS PROPERTY.
NOTE: ENSURE THAT YOUR PRINTOUT STATES THE TOTAL NUMBER OF PAGES AND THAT YOU HAVE PICKED THEM ALL UP.

* CERTIFIED IN ACCORDANCE WITH THE LAND TITLES ACT * SUBJECT TO RESERVATIONS IN CROWN GRANT *

REG. NUM.	DATE	INSTRUMENT TYPE	AMOUNT	PARTIES FROM	PARTIES TO	CERT/ CHKD
WC655916	2021/11/30	DISCH OF CHARGE		OLYMPIA TRUST COMPANY		C
	REMARKS: WC605577. PARTS 1 AND 2, 61R22127					
WC656095	2021/12/01	TRANSFER	$3,950,000	2156598 ONTARIO LIMITED REC FARMS INC.	THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON	C
	REMARKS: PLANNING ACT STATEMENTS.					
WC656096	2021/12/01	DISCH OF CHARGE		CANADIAN IMPERIAL BANK OF COMMERCE		C
	REMARKS: WC630333.					
WC656097	2021/12/01	DISCH OF CHARGE		OLYMPIA TRUST COMPANY		C
	REMARKS: WC605577.					

* CERTIFIED IN ACCORDANCE WITH THE LAND TITLES ACT * SUBJECT TO RESERVATIONS IN CROWN GRANT *

PROPERTY DESCRIPTION: PART LOTS 17 AND 18, CON 16, NICHOL, PARTS 1 AND 2 ON PLAN 61R-22127; TOWNSHIP OF CENTRE WELLINGTON

PROPERTY REMARKS:

ESTATE/QUALIFIER:
FEE SIMPLE
LT CONVERSION QUALIFIED

RECENTLY:
DIVISION FROM 71129-0284

PIN CREATION DATE:
2022/01/25

OWNERS' NAMES
THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON

CAPACITY SHARE
ROWN

REG. NUM.	DATE	INSTRUMENT TYPE	AMOUNT	PARTIES FROM	PARTIES TO	CERT/ CHKD
** PRINTOUT INCLUDES ALL DOCUMENT TYPES (DELETED INSTRUMENTS NOT INCLUDED) **						
**SUBJECT, ON FIRST REGISTRATION UNDER THE LAND TITLES ACT, TO:						
** SUBSECTION 44(1) OF THE LAND TITLES ACT, EXCEPT PARAGRAPH 11, PARAGRAPH 14, PROVINCIAL SUCCESSION DUTIES *						
** AND ESCHEATS OR FORFEITURE TO THE CROWN.						
** THE RIGHTS OF ANY PERSON WHO WOULD, BUT FOR THE LAND TITLES ACT, BE ENTITLED TO THE LAND OR ANY PART OF						
** IT THROUGH LENGTH OF ADVERSE POSSESSION, PRESCRIPTION, MISDESCRIPTION OR BOUNDARIES SETTLED BY						
** CONVENTION.						
** ANY LEASE TO WHICH THE SUBSECTION 70(2) OF THE REGISTRY ACT APPLIES.						
**DATE OF CONVERSION TO LAND TITLES: 2001/03/26 **						
MS18288	1961/01/18	BYLAW				C
61R22127	2021/11/29	PLAN REFERENCE				C
	REMARKS: WC655559.					
WC656095	2021/12/01	TRANSFER	$3,950,000	2156598 ONTARIO LIMITED REC FARMS INC.	THE CORPORATION OF THE TOWNSHIP OF CENTRE WELLINGTON	C
	REMARKS: PLANNING ACT STATEMENTS.					

MEMORANDUM

Project Name:	Proposal #21-22, Site Development, Operations Centre - 965 Gartshore Street, Fergus, Ontario	**Project Number:**	G4566-22-9
		Date:	December 30, 2022
		From:	Cindy Luu, B.Sc. Ajay Jayalath, M.Sc., MBA, P.Geo., QP
To:	Township of Centre Wellington 1 MacDonald Square, Elora, ON N0B 1S0 Tel: (519) 846-9691 Fax: (519) 846-2074		
c/o:	HT Lam, Principal Senior Landscape Architect R.J. Burnside & Associates Ltd. HT.Lam@rjburnside.com Tel: 1-800-265-9662		

RE: Sampling and Analysis Plan
965 Gartshore Street, Fergus, Ontario

1. Introduction

JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Ltd. ("Client") to conduct Excess Soil Management Program (sampling and reporting activities) for the proposed site development of a Township Operations Centre located in Fergus, Ontario, herein referred to as the "Site" and "Project Area".

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed and disposed of in a safe and sustainable manner. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, additional sampling and reporting will be required when detailed development plans and excess soil volumes are available.

JLP conducted an Assessment of Past Uses (APU) for the Project Area in December 2022, which should be read in conjunction with this Sampling and Analysis Plan (SAP). This SAP was completed in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

The SAP was developed to investigate any Potentially Contaminating Activities (PCAs) and Areas of Potential Environmental Concern (APECs) highlighted in the APU. It is to be noted that groundwater sampling is outside the scope of this excess soil investigation.

2. Assessment of Past Uses

JLP conducted an Assessment of Past Uses (APU) for the Project Area in December 2022. A summary of the APECs and associated PCAs are summarized in Table 2.1 below and shown on Figure 3 as attached.

Table 2.1: Areas of Potential Environmental Concern

APEC	Location	APEC Dimension	PCA	Location of PCA	Contaminant of Concern
APEC #1	Entire Project Area	20 acres	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site historical pesticide use	OCPs Metals
APEC #2	Central Farm Portion	2 acres	PCA (Other)- De-icing activities	De-icing of asphalt/gravel roadway to the farm area	EC/SAR
APEC #3	Southern Portion of Site	5 acres	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	950 Gartshore Street - adjacent property to the east	VOCs
			#33 - Metal Treatment, Coating, Plating and Finishing #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks	935 Gartshore Steet - adjacent property to the east	Metals & HFM VOCs PHCs F1 to F4 & BTEX
			PCA #33 - Metal Treatment, Coating, Plating and Finishing	151 Gregson Court - upgradient from Subject Site	Metals & HFM VOCs PHC & BTEX
			PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	938 Glengarry Crescent - upgradient from Subject Site	Metals VOCs PHC & BTEX

Notes:
APEC: Area of Potential Environmental Concern
PCA: Potentially Contaminating Activity
PHCs F1 to F4: Petroleum Hydrocarbons Fractions F1 to F4
BTEX: Benzene, Toluene, Ethylbenzene and Xylenes
VOCs: Volatile Organic Compounds
EC: Electrical Conductivity
SAR: Sodium Adsorption Ratio
OCPs: Organochlorine Pesticides
PAH: Polycyclic Aromatic Hydrocarbons
HFM: Hydride Forming Metals

3. Sampling and Analysis Plan

At the time of the fieldwork and reporting phases, the estimated volume of excess soil to be generated during reconstruction activities on-Site is unknown. Given the scope of work prescribed within the Request for Proposal (RFP) #21-22 "Consulting Services, Site Development- Operations Centre", four (4) samples were collected throughout the Project Area for Petroleum Hydrocarbons (PHCs) fractions F1 to F4, including benzene, toluene, ethylbenzene and xylenes (BTEX), Organochlorine Pesticides (OCPs), metals and hydride forming metals, pH, electrical conductivity (EC) and sodium adsorption ratio (SAR). One (1) duplicate sample for each parameter was obtained and analyzed for quality control purposes.

It is to be noted that the scope of work for the excess soil program was prescribed within the RFP #21-22 "Consulting Services, Site Development- Operations Centre". The subsurface investigation program was completed for Geotechnical Investigation completed by JLP and Hydrogeological Investigation completed by R.J. Burnside & Associates Limited. Thus, additional sampling and reporting as per the Sampling and Analysis Plan prepared by JLP will be required when development plans and excess soil volumes are available.

JLP should be retained to ensure that the sampling and analysis plan meets the requirements of O.Reg. 406/19 during the construction activities. The proposed soil samples will be collected using a CME- track mounted drill rig with a split spoon sampler. Private and public locate clearances will be completed prior to the drilling activities. Soil Samples will be collected at regular intervals for field screening purposes and visual/olfactory observations, including evidence of impacts. A hydrocarbon surveyor will be used to measure total organic content. Selected soil samples based on field screening will be collected and submitted for laboratory analysis.

It is to be noted that the minimum number of soil samples required to comply with O.Reg. 406/19 is outlined in the MECP document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS). The sampling requirements are summarized in the Table 3.1 below.

Table 3.1: Excess Soil Sampling Frequency

Volume Threshold	Minimum Number of Samples	Minimum Number of Samples for Leachate Analysis*
≤350 m^3 to <600 m^3	≥ 3 samples	≥ 3 samples
>600 m^3 to <10,000 m^3	≥ 1 sample for each additional 200 m^3 within threshold limits	≥ 3 samples + 10% of Bulk Soil Samples collected
>10,000 m^3 to <40,000 m^3	≥ 1 sample for each additional 450 m^3 within threshold limits	
>40,000 m^3	≥ 1 sample for each additional 2,000 m^3 within threshold limits	

Notes:
*Soil sample parameters that are below Table 1: Full Depth Background Site Condition Standards, leaching of contaminants are not anticipated and leachate analysis is not required.

Table 3.2: Sampling Requirements and Planned Sampling (in RFP #21-22)

Parameters	Total Samples Required	Samples Prescribed in RFP #21-22 and completed by JLP	Additional Samples Required in future
Metals & Inorganics	9	5	4
Petroleum Hydrocarbons Fractions F1 to F4	7	5	2
Volatile Organic Compounds	3	0	3
Organochlorinated Pesticides	7	5	2
Notes: Leachate sampling requirements are pending the soil sample results compared to Table 1: Full Depth Background Site Condition Standard.			

Details regarding boreholes, sampling depths, and sampling parameters are outlined in Appendix B.

4. Field Sampling and Additional Precautions

- Boreholes will be advanced using a track-mounted drill rig using a split spoon sampler.
- Samples will be collected and inspected (visual/olfactory) and screened using a hydrocarbon surveyor. One worst case soil sample will be collected for each parameter from each of the boreholes for laboratory analysis. The soil samples selected for laboratory analysis were immediately placed into laboratory prepared glass jars, labelled, and stored in a cooler with ice at less than 10˚C.
- It is to be noted that samples will only be collected within the excavated depth. In the event of notable contamination, deeper delineation samples will be retrieved on placed on hold- pending Client's approval for analysis.
- Washing/decontamination split spoons/trowels using alconox and disposable gloves for each new soil sample are some precautions that may be taken in the field to minimize cross-contamination.

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5. Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

JLP Services Inc.

Cindy Luu, B.Sc
P.Geo., QP.
Environmental Scientist

Ajay Jayalath, M.Sc., MBA,

Senior Environmental Scientist

Alexander Lee, M.Sc. (Eng.), P.Eng., QP
Senior Consultant, Partner

Figures

Legend:

Project Area

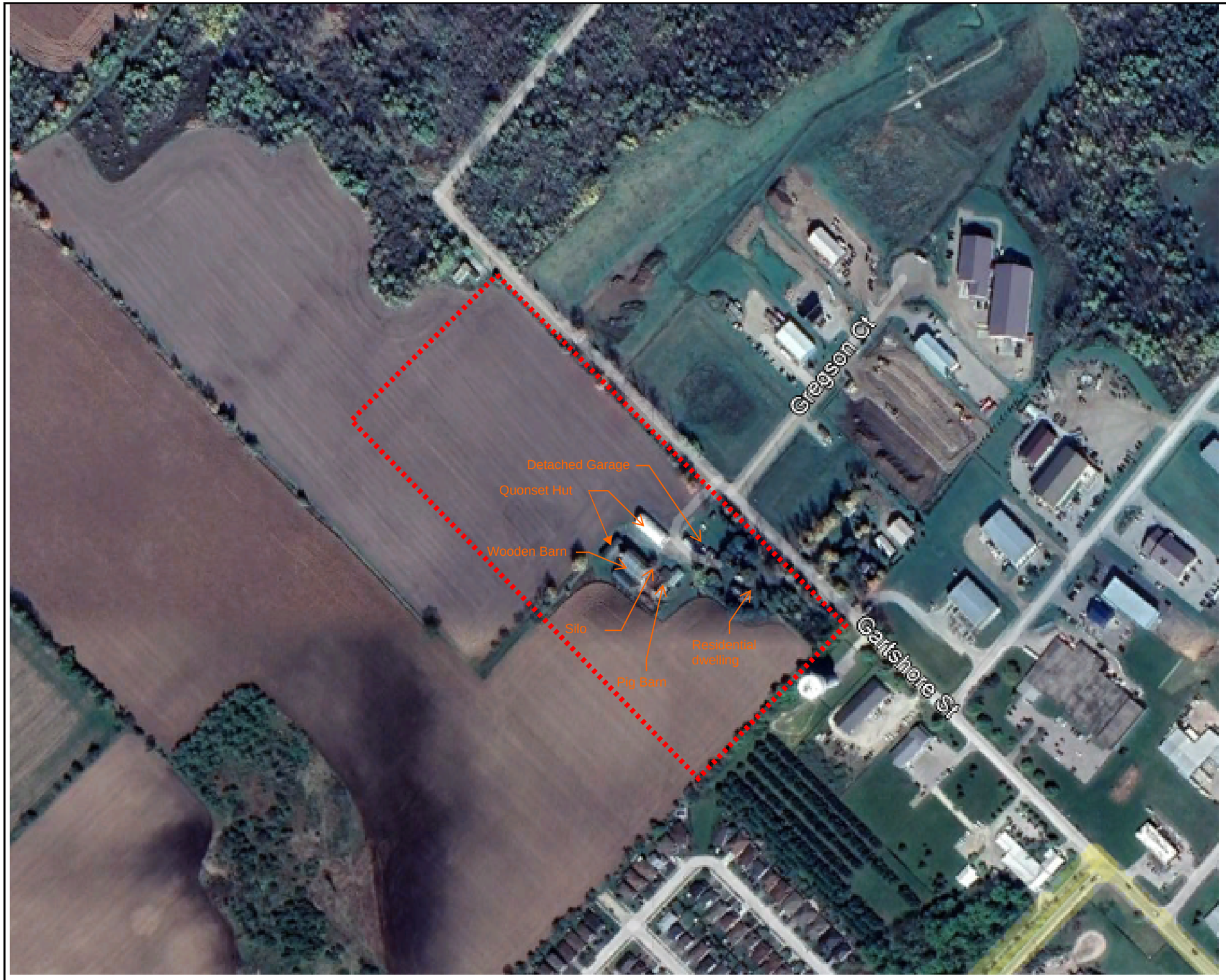
Study Area

N
Project North

JLP
Geotechnical & Environmental Consultants

Site and Surrounding Area Land Use Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 2
Source: Google Maps	Scale: N.T.S.	



Legend

Project Area

N
Project North

JLP
Geotechnical & Environmental Consultants

Site Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 1
Source: Google Maps	Scale: N.T.S.	

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1	Entire Project Area	PCA #40	20 acres	Organochlorine Pesticides, Metals
APEC #2	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHC & BTEX
		PCA #39		Metals & HFM, VOCs
		PCA #33		Metals & HFM, VOCs, PHC & BTEX
		PCA #57		Metals, VOCs, PHC & BTEX

Legend:

Project Area

Areas of Potential Concern (APECs)

APEC 1- Entire Site Area

APEC 2 - Central Farm Portion

APEC 3 - Southern Portion of Site

Potentially Contaminating Activities (PCAs)

PCA Location

PCA	Description	Contributing to APECs at Site
PCA 1	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes (On-Site)
PCA 2	PCA (Other)- De-icing activities	Yes (On-Site)
PCA 3	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes (potential groundwater migration)
PCA 4	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 5	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)
PCA 6	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 7	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes (potential groundwater migration)
PCA 8	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)

N
Project North

JLP
Geotechnical & Environmental Consultants

Potentially Contaminating Activities
965 Gartshore Street,
Fergus, Ontario

Date: Aug. 3, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 3
Source: Google Maps	Scale: N.T.S.	

Appendix A – Limitations and Use of Report

REPORT TERMS AND CONDITIONS

NOTICE: THE FOLLOWING PROVISIONS SET FORTH IMPORTANT QUALIFICATIONS AND LIMITATIONS ON THE FINDINGS AND RECOMMENDATIONS IN THE REPORT AS WELL AS THE USE OF, AND RELIANCE ON, THE REPORT.

1. **DEFINITIONS**. The following capitalized terms have the following meanings:

   (a) "**Additional Investigations**" means investigations that JLP has indicated to the Client should be undertaken to take into account any Out-of-Scope Requirements, but that are not otherwise specifically within the scope of investigations conducted for the purpose of the Report.

   (b) "**Applicable Laws**" means and includes without limitation all applicable provincial laws, regulations, guidelines, policies, standards, protocols, and objectives administered by the Ministry of the Environment and Climate Change or any other duly-constituted governmental authority, all as in force as of the date of the Report.

   (c) "**Client**" means the Client as referred to in the Report.

   (d) "**Client Information**" means the information, representations, and instructions provided by the Client, the Client's representatives, and/or others and upon which the Report is based, in whole or in part.

   (e) "**Findings**" means the evaluations and conclusions set forth in the Report.

   (f) "**JLP**" means JLP Services Inc.

   (g) "**Out-of-Scope Requirements**" means special concerns or requirements of the Client in respect of the subject matter of the Report.

   (h) "**Recommendations**" mean the findings and recommendations referred to in the Report, taking into account any Out-of-Scope Requirements that were disclosed to JLP prior to the date of the Report.

   (i) "**Report**" means the report to which these Terms and Conditions are attached and form part.

   (j) "**Report Documents**" means the underlying documents, records, data, and files, in any medium whatsoever, generated in connection with the preparation of the Report, including without limitation, the instructions and objectives communicated to JLP by the Client, communications between JLP and the Client, and other reports, proposals, or documents prepared by JLP for the Client in connection with the Site.

   (k) "**Site**" means the site in respect of which the Report was prepared.

   (l) "**Site Conditions**" means Site conditions known as a result of, or reasonably imputed by, the investigations that were undertaken as of the date of the Report.

2. **BASIS OF REPORT**. The Report is based on the Site Conditions. Any changes to the Site Conditions after the date of the Report that could or will affect the Site Conditions may or will have a corresponding effect on the Recommendations. The Report does not take into account any (a) Additional Investigations that were not undertaken, or (b) Out-of-Scope Requirements that were not communicated prior to completion of the investigations that were been undertaken as of the date of the Report. Where recommended field services are referred to, they are the minimum services necessary to determine compliance of construction with Applicable Laws, generally accepted industry-standard practices, and the Recommendations.

3. **RELIANCE & USE**. The Report has been prepared only for the Site and the related design, development, building, or building assessment objectives identified by the Client. The Findings and Recommendations are based on the Site Conditions and the Client Information. In preparing the Report, JLP has relied upon the Client Information and disclaims any responsibility for any inaccuracy, misstatement, omission, unintentional misrepresentation, or other deficiency contained in the Report as a result of such reliance. Unless specifically stated otherwise, the applicability and reliability of the Findings and the Recommendations expressed in the Report are only valid to the extent that (a) there has been no material change to or variation from any of the Client Information, (b) the Client Information contains no untrue statement of a material fact, or (c) the Client Information omits no statement of a material fact necessary in order to make the Client Information not misleading.

   The Report and the Findings and Recommendations are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the prior written consent of JLP, which may be arbitrarily withheld or conditioned.

   RELIANCE UPON THE REPORT OR ANY OF THE DETERMINATIONS MADE HEREIN BY A THIRD PARTY WITHOUT JLP'S CONSENT IS PROHIBITED AND JLP MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY IN FAVOUR OF ANY THIRD PARTY WITH RESPECT TO THE REPORT WHATSOEVER. JLP FULLY DISCLAIMS, AND WILL HAVE NO LIABILITY FOR, ANY LOSS, DAMAGES, OR EXPENSES WHICH ANY THIRD PARTY MAY INCUR OR SUFFER AS A RESULT OF THE USE OF OR RELIANCE ON THIE REPORT WHERE JLP HAS NOT EXPRESSLY AUTHORIZED SAME. ANY THIRD PARTY WHO RELIES ON THE REPORT TO ANY EXTENT DOES SO AT SUCH PARTY'S OWN RISK AND COMPLETELY WAIVES ANY AND ALL CLAIMS AGAINST JLP IN CONNECTION WITH THE REPORT, REGARDLESS OF THE THEORY OF LAW (WHETHER IN CONTRACT, TORT, OR ANY THEORY OF LAW COMING INTO EXISTENCE HEREAFTER).

4. **STANDARD OF CARE**. The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances. No other warranty, expressed or implied, is made or intended in the Report. It is intended that the Findings and Recommendations are meant to assist in reducing the Client's risk associated with environmental impairment at the Site. The Report should not be considered risk mitigation.

5. **ENTIRE REPORT**. The Report also includes the Report Documents. In order to properly understand the Findings and Recommendations, reference must be made to the Report in its entirety. JLP is not responsible for use by any party of a part of the Report only.

6. **GOVERNING FORMAT**. Notwithstanding that JLP may have submitted an electronic version of the Report or any document forming part of the Report, only the signed and sealed physical copy of the Report shall be deemed to be the original and in the event of any dispute or discrepancy, the physical copy shall govern. JLP makes no representation about the compatibility of its electronic or digital file format with the Client's current or future software and/or hardware systems. The documents described herein are JLP's instruments of professional service and shall not be altered without the written consent of JLP.

7. **GENERAL LIMITATIONS**.

   (a) Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

   (b) The Report contains no opinion or determination as to any matters governed by laws other than the laws of the Province of Ontario and the federal laws of Canada applicable therein as of the date hereof.

   (c) During any future development of the Site, conditions not observed during JLP's investigations may become apparent. If this occurs, JLP should be contacted to assess the situation and whether there is a need for additional testing.

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Appendix B – Sampling and Analysis Plan

Excess Soil Management

Sampling and Analysis Plan

APEC	Borehole	Sample Number	Soil Analysis				Depth	
			Metals & Inorganics	Organochlorinated Pesticides	Petroleum Hydrocarbons	Volatile Organic Compounds	From (m)	To (m)
APEC 1 (Entire Site)	BH2	SS1	x	x			grade	0.6
	BH2	SS2			x		0.8	1.4
	BH3	SS1	x	x			grade	0.6
	BH3	SS2			x		0.8	1.4
	BH5	SS1	x	x			grade	0.6
	BH5	SS2			x		0.8	1.4
	BH6	SS1	x	x			grade	0.6
	BH6	SS2			x		0.8	1.4
APEC 2 (Central Farm Portion)	BH6	SS1	x				grade	0.6
	Required (BHX)	SS1	x				grade	0.6
	Required (BHY)	SS1	x				grade	0.6
APEC 3 (Southern Portion of Site)	BH5	SS1	x	x			grae	0.6
	BH5	SS2			x	x	0.8	1.4
	Required	SS1	x	x			grade	0.6
	Required	SS2			x	x	0.8	1.4
	Required	SS1	x	x			grade	0.6
	Required	SS2			x	x	0.8	1.4
Quality Control Samples	BH201 (Duplicate of BH2)	SS1	x	x			grade	0.6
	BH201 (Duplicate of BH2)	SS2			x	x	0.8	1.4
		Sub-Total:	5	5	5	0		
		Additionally Required	4	2	2	3		
		Total Samples Collected:	5	*for each parameter*				

Notes:

*This Sampling and Analysis Plan outlines the scope of work prescribed within the RFP #21-22 "Consulting Services, Site Development- Operations Centre".

Highlighted cells indicate additional sampling (outside of sampling prescribed in RFP #21-22) required to investigate PCAs and APECs identified in the APU.

Additional or alternative samples will be analyzed based on field observations (staining, odour and/or high vapour readings, etc.).

Deeper delineation samples may be obtained for future analysis- pending client approval.

Required Samples for unknown cubic metres	
1 sample per 200 cubes to 10,000	unknown
Total minimum needed	unknown

JLP

Geotechnical & Environmental Consultants

Excess Soil Characterization Report

965 Gartshore Street
Fergus, Ontario

Client:
Township of Centre Wellington c/o R.J. Burnside & Associates Ltd

Attention: HT Lam, Principal, Senior Landscape Architect

Type of Document:
Final Report

Project Number:
G4599-22-6

Project Name:
Proposal #21-22
Site Development, Operations Centre

JLP Services Inc.
Geotechnical and Environmental Consultants
405 York Road,
Guelph, ON
N1E 3H3

Date Submitted:
December 30, 2022

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Executive Summary

The executive summary is a brief synopsis of the report and should not be read in lieu of reading the report in its entirety. JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Limited ("Client") to conduct Excess Soil Management sampling and reporting activities for the proposed site development of a Township Operations Centre located at 965 Gartshore Street, in Fergus, Ontario, herein referred to as the "Site" and/or "Project Area".

The Site is to be redeveloped in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed and disposed of in a safe and sustainable manner. The volume of soil to be generated during the construction activities and excavation depths of the proposed structures are unknown during the excess soil fieldwork and reporting phases. It is to be noted that the scope of work for the excess soil program was prescribed within the Request for Proposal (RFP) #21-22 "Consulting Services, Site Development-Operations Centre". The subsurface investigation program was completed for Geotechnical Investigation completed by JLP and Hydrogeological Investigation completed by R.J. Burnside & Associates Limited. Thus, additional sampling and reporting will be required when development plans, excavation depths and excess soil volumes are available.

The objective of the Soil Characterization Program was to evaluate the soil conditions at the Project Area. It is understood that a Record of Site Condition (RSC) is not required at this time, based on the continued use of the property for agricultural purposes. The soil investigation included the advancement of nine (9) boreholes, which were completed on October 27, 2022.

The soil samples were submitted to the accredited laboratory for analysis of Petroleum Hydrocarbons (PHCs) fractions F1 to F4, including benzene, toluene, ethylbenzene and xylenes (BTEX), Organochlorine Pesticides (OCPs), metals and hydride forming metals, pH, electrical conductivity (EC) and sodium adsorption ratio (SAR).

Although, a temporary suspension has been placed on O.Reg. 406/19 until January 1, 2023, this Excess Soil Characterization Report was completed in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

It is noted that the proposed site development is to take place post January 1, 2023, where and when O.Reg. 406/19 may be in effect.

The soil analytical results were compared to Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use. The soil samples were within Table 2.1 standards for all parameters analyzed.

The soil analytical results were also compared to Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/Community property use. The soil samples were within Table 1 standards for all parameters analyzed.

As the soil samples are below Table 1: Full Depth Background Site Condition Standards, leaching of contaminants are not anticipated and leachate analysis was not completed.

Based on the findings of this report we provide the following recommendations:

- Additional soil sampling must be completed to adhere to the Sampling and Analysis Plan based on excavation depths and excess soil volumes;
- Soil Characterization Report must be updated with the additional soil sampling program and associated chemical analysis; and,
- JLP staff should be present on Site during excess soil excavation and exportation to inspect the materials for environmental concerns and collect samples for laboratory analysis as required.

1.0 Introduction

JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Ltd. ("Client") to conduct Excess Soil Management Program (sampling and reporting activities) for the proposed site development of an Township Operations Centre located in Fergus, Ontario, herein referred to as the "Site" and "Project Area".

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed and disposed of. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, additional sampling and reporting will be required when development plans and excess soil volumes are available.

This Excess Soil Characterization Report documents the quality of soil in the Project Area in relation to Areas of Potential Environmental Concerns (APECs) identified during the Assessment of Past Uses (APU) Report (JLP Services Inc., December 2022). The soil characterization process was conducted to ensure that the excess soil being generated during the proposed site development can be shipped off-Site to an appropriate destination site for beneficial reuse and/or disposal facility.

Although, a temporary suspension has been placed on O.Reg. 406/19 until January 1, 2023, this Excess Soil Characterization Report was completed in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

It is noted that the proposed site development is to take place post January 1, 2023, where and when O.Reg. 406/19 may be in effect.

2.0 Historical Information

2.1 Current and Past Uses

The Site was first developed before 1964 based on the National Air Photo Library as an agricultural property. However, based on the interviews, the Site was first developed in the early 1900's as a farm.

2.2 Historical Environmental Investigations and Reports

Historical environmental investigations and reports were unavailable and were not provided to JLP for review.

3.0 Description of Project

The Site is located approximately 800 metres northeast from Ontario Highway 6, as shown on Figure 1 and 2. The Site measures approximately 8 hectares (20 acres) in area. At the time of the investigation, the Site was a non-operational agricultural farm.

At the time of the investigation, the Site was owned by the Township of Centre Wellington. The Township of Centre Wellington has reportedly owned the Site since 2021.

The current PIN for the Site is 71129-0509 (LT). The Site was also listed under the PIN 71129-0284, which is now inactive.

The approximate Universal Transverse Mercator (UTM) coordinates for the site centroid are NAD83 17- 4841291N 549328E. The UTM coordinates were based on Global Positioning System (GPS) measurements obtained from Google Earth.

Figure 1 and 2 shows a detailed area of the Site.

3.1 Contact Information

Contact information for R.J. Burnside & Associates Ltd. are as follows:

- HT Lam
  Principal Senior Landscape Architect
  HT.Lam@rjburnside.com
  1-800-265-9662

3.2 Project Leader

Contact information for the Project Leader are as follows:

- Township of Centre Wellington
  1 MacDonald Square,
  Elora, ON N0B 1S0
  Tel: (519) 846-9691, Fax: (519) 846-2074

3.3 Qualified Person

The qualified person (QP) for the Site is Mr. Ajay Jayalath, M.Sc., MBA, P.Geo. Mr. Jayalath is a Partner with JLP Services Inc. and has over 15 years of experience in the environmental consulting industry. He is a Licensed Professional Geoscientist (3675) with Professional Geoscientists Ontario (PGO) and is a Qualified Person as defined by O.Reg. 153/04 and O.Reg. 406/19 under the Environmental Protection Act, R.S.O. 1990, c. E.19.

Contact information for Mr. Jayalath is provided below:

Mr. Ajay Jayalath, M.Sc., MBA, P.Geo.
JLP Services Inc.
405 York Road,
Guelph, Ontario, N1E 3H3
Tel: (519)-763-3101
Email: ajay.jayalath@jlpservices.ca

3.4 Potentially Contaminating Activities

Potential environmental concerns were evaluated based on the importation of fill of unknown quality. The following "Potentially Contaminating Activities" (PCA) were identified:

Table 3.4.1: Summarizing PCAs

PCA (PCA Location)	Description	Contributing to APECs at Site	Details
PCA 1 (On-Site)	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes	Use of pesticides on fields on-Site, as well as the fields located west of the Site.
PCA 2 (On-Site)	PCA (Other)- De-icing activities	Yes	De-icing of asphalt/gravel roadway to the farm area.
PCA 3 Off-Site (950 Gartshore	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes	At adjacent property to the east. Potential groundwater contamination would migrate westerly.

Street)			
PCA 4 Off-Site (935 Gartshore Steet)	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes	At adjacent property to the east. Potential groundwater migration to Subject Site.
PCA 5 Off-Site (940 Gartshore Street)	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No	At adjacent property to the east. Site is cross gradient to Subject Site. De-minimis.
PCA 6 Off-Site (151 Gregson Court)	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes	PCA upgradient from Subject Site. Potential groundwater migration to Subject Site.
PCA 7 Off-Site (938 Glengarry Crescent)	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes	PCA upgradient from Subject Site. Potential groundwater migration to Subject Site.
PCA 8 Off-Site (930 Gartshore Street)	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No	At adjacent property to the east. Site is cross gradient to Subject Site. De-minimis.

The aforementioned PCAs are shown on Figure 4. The aforementioned PCAs were derived within the Assessment of Past Uses Report prepared by JLP (December, 2022).

3.5 Areas of Potential Environmental Concern

Based on the identified PCA, the following Area of Potential Environmental Concern (APECs) are present within the Project Area:

- APEC #1 Entire Project area – pesticide/herbicide use for on-Site farm
- APEC #2 Central Farm Portion of Project Area - de-icing of asphalt/gravel roadway to the farm area.
- APEC #3 Southern Portion of Project Area - light industrial land uses observed to the east of Project Area

Table 3.5.1: Summarizing APECs

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1 (on-Site)	Entire Project Area	PCA #40	20 acres	Organochlorine Pesticides Metals
APEC #2 (on-Site)	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3 (on-Site)	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHC & BTEX
		PCA #39		Metals & HFM VOCs
		PCA #33		Metals & HFM

				VOCs PHC & BTEX
		PCA #57		Metals VOCs PHC & BTEX

The aforementioned APECs are shown on Figure 4.

3.6 Sampling and Analysis Plan

A Sampling and Analysis Plan (SAP) was prepared based on the requirements of O.Reg 406/19. The purpose of the SAP was to ensure that identified APECs are adequately assessed through the collection of appropriate soil samples for laboratory analysis.

The minimum number of soil samples required for excess soil characterization is outlined in the Soil Rules and includes

- A minimum of 3 soil samples shall be analyzed if less than 600 m^3 of soil will be excavated;
- If more than 600 m^3 of soil will be excavated, at least one soil sample shall be analyzed for each 200 m^3 of soil for the first 10,000 m^3; and,
- At least one soil sample shall be analyzed for each additional 450 m^3 after the first 10,000 m^3 of soil to be excavated.
- A minimum of 3 soil samples shall be analyzed if more than 600 m^3 and less than 10,000 m^3 of soil will be excavated.
- A minimum of 3 samples plus 10% of bulk soil samples collected if more than 600 m^3 and less than 40,000 m^3 of soil will be excavated.

Given the scope of work prescribed within the Request for Proposal (RFP) #21-22 "Consulting Services, Site Development-Operations Centre", four (4) samples were collected throughout the Project Area for Petroleum Hydrocarbons (PHCs) fractions F1 to F4, including benzene, toluene, ethylbenzene and xylenes (BTEX), Organochlorine Pesticides (OCPs), metals and hydride forming metals, pH, electrical conductivity (EC) and sodium adsorption ratio (SAR). One (1) duplicate sample was taken for quality control purposes.

It is to be noted that the scope of work for the excess soil program was prescribed within the RFP #21-22 "Consulting Services, Site Development- Operations Centre". The subsurface investigation program was completed for Geotechnical Investigation completed by JLP and Hydrogeological Investigation completed by R.J. Burnside & Associates Limited. Thus, additional sampling and reporting as per the Sampling and Analysis Plan prepared by JLP will be required when development plans and excess soil volumes are available. It is to be noted that industry standard for generally accepted practices note that soil samples/testing is adequate for a period of two years.

4.0 Investigative Method

4.1 General

The following sections provides a description of all investigative methods used over the course of the excess soil characterization work including the associated field work. All methods outlined were performed in accordance with JLP's standard operating procedures (SOPs) under the direct supervision of a QP.

4.2 Drilling and Excavating

The borehole investigation was conducted on November 25 to 27, 2022. Pontil Drilling (Pontil) was contracted by JLP to advance nine (9) boreholes (BH1-S/D through BH7-S/D) within the Project Area. The boreholes were advanced to a maximum

depth of 25.3 mbgs using a CME-55 drill rig required with a split spoon sampling system. Samples were collected every 0.6 metres. Bedrock was not encountered during this investigation.

The borehole locations are shown on Figure 3.

4.3 Soil Sampling

Soil samples were collected and examined for geological characteristics and physical evidence of chemical impact. Two worst-case soil samples were selected from boreholes BH2, BH3, BH5 and BH6 and were submitted for laboratory analysis. The soil samples selected for laboratory analysis were immediately placed into laboratory prepared glass jars, labelled, and stored in a cooler with ice at less than 10˚C. Field duplicate samples were collected from BH2, for QA/QC purposes (discussed in Section 4.6).

The soil analytical program is shown on Figure 4 and further detailed in Appendix B.

4.4 Field Screening Methods

Field screening for petroleum vapour concentrations were conducted on the soil samples collected during the borehole investigation and were measured using an RKI Instruments Eagle 2 and Gastec GV0100S, where there was sufficient recovery. This instrument is designed to detect and measure concentrations of combustible gas in the atmosphere. It is equipped with two ranges of measurement, reading concentrations in parts per million by volume (ppmv) or in percentage lower explosive limit (LEL).

Measured petroleum vapours were non-detectable (<25 ppm) to 165 ppm in all soil samples where there was sufficient recovery to perform vapour measurements. Sample selection for laboratory analysis was determined based on visual observation, odour, and petroleum vapour readings from the RKI Eagle 2.

Furthermore, there were no signs of environmental concern, stains and/or odours observed during the fieldwork program. There were no significant environmental concerns identified in any of the boreholes and/or soil samples. Soil in the Project Area was comprised of topsoil underlain by sandy silt till and native silty sand.

4.5 Analytical Testing

Representative soil samples were collected in laboratory supplied containers and submitted to ALS Laboratories (ALS), an accredited laboratory located in Waterloo, Ontario. ALS performed the work following formal written methods and procedures. These methods include all the minimum requirements as specified in the document entitled *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act* (as amended).

Representative soil samples were collected in laboratory supplied containers and submitted for analysis of the following contaminants of concern:

- Metals and Hydride Forming Metals (4 samples);
- Other Regulated Parameters (4 samples);
- Petroleum Hydrocarbons (PHC) fractions F1 to F4 (4 samples);
- Organochlorine Pesticides (4 samples);

Notes:

- Duplicate samples are not in the sample count above.
- Samples collected for analysis of PHC fraction F1 and BTEX compounds were collected using a hermetic sampling device and placed in vials containing pre-measured volumes of methanol preservatives.

4.6 Quality Assurance and Quality Control Measures

Soil samples were collected, preserved, and handled in accordance with the sampling and analysis plan (Appendix B). Soil samples selected for laboratory analysis were immediately placed into laboratory prepared glass jars, bottles and/or vials, labeled, and stored in a cooler with ice at less than 10˚C. All sample containers were labeled with the sample identification number, sample date and type and project number.

Where sampling for trace organics, it was ensured that bare hand or latex glove did not come into contact with the soil as it was being placed into the laboratory sample container. Soil sampling equipment used for the collection of trace organics was cleaned using soap and water, followed by a water rinse and a methanol rinse between sampling locations.

Field duplicate samples were collected from each medium being sampled, so that at least one field duplicate sample was submitted for laboratory analysis for every ten samples submitted for laboratory analysis. Two field duplicate samples (BH201 SS1 and BH201 SS2) were collected for soil and analyzed for the same parameters as the original samples (BH2 SS1 and BH2 SS2).

All field instruments are calibrated on a daily basis, prior to use, as described in Section 4.4.

There were no deviations from the quality assurance and quality control measures as set out in the sampling and analysis plan.

5.0 Review and Evaluation of Results

5.1 Regional Geology

The Site is located in the physiographic region known as the Horseshoe Moraines with glaciofluvial outwash deposits (Chapman and Putnam, 1984). According to the Ontario Geological Survey map of the area, the surficial geology consists of sandy glaciofluvial deposits (river deposits and delta topset facies) on the northern boundaries of the Site. The southern boundaries of the Site consist of Stone-poor, sandy silt to silty sand-textured till on Paleozoic terrain (Ontario Geological Survey, 2010). Bedrock was not encountered during this investigation.

According to the Ontario Geological Survey map of the area, the underlying geology is comprised of the Guelph Formation. Bedrock at the Site consists of Lower Silurian: sandstone, shale, dolostone and siltstone (Ontario Geological Survey, 2011).

5.2 Site Specific Geology

Based on the borehole drilling program, the surficial soils within the Project Area consist of topsoil to a depth of 0.2 to 0.3 mbgs. The soil underlying the topsoil consist of native silty sand to a depth of 4.5 to 7.3 mbgs, underlain by sandy silt till. At borehole BH1 to BH4, a layer of sandy silt till was found between the topsoil and native silty sand. Bedrock was not encountered during this investigation. No debris or signs of environmental concern and/or impairment were noted in the topsoil and native soils.

5.3 Soil Quality

A total of 9 boreholes were advanced throughout the Project Area. A total of 5 samples (including 1 duplicate sample) were collected from the Project Area from depths ranging from 0.2 to 1.4 mbgs and submitted for laboratory analysis. Samples were collected from boreholes BH2, BH3, BH5 and BH6.

The soil analytical results were compared to Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use. The soil samples were within Table 2.1 standards for all parameters analyzed.

Soil Analytical results are summarized in Tables 1 through 3.

Copies of Laboratory Certificates of Analysis are presented in Appendix D.

5.4 Leachate Analysis

The soil analytical results were compared to Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/Community property use. The soil samples were within Table 1 standards for all parameters. As the soil samples are below background levels, leaching of contaminants are not anticipated and leachate analysis was not required.

5.5 Quality Assurance and Quality Control Results

Soil sampling was performed by qualified field staff with experience in intrusive field investigation techniques under the guidance of the QP. Soil samples were collected in accordance with JLP's standard operating procedures which have been developed using best practices and in accordance with Ontario Regulation 153/04.

It is to be noted that the following QA/QC procedures were adhered to during the intrusive field work program to ensure reliability and accuracy of the soil samples collected:

- Samples were placed in appropriate lab jars and/or vials in accordance with require laboratory tests. In accordance with MECP requirements, all soil samples tested for VOCs and PHC fractions F1 were collected with a hermetic sampling device and preserved in methanol;
- Samples were adequately logged on the chain of custody and the correct sample ID and required chemical analysis were noted and performed; and,
- Duplicate samples were collected at a frequency of 10% per parameter group analyzed.

5.5.1 Relative Percent Difference

In order to ensure the data quality objectives and sampling integrity, Relative Percent Difference (RPD) was calculated between each soil sample and its duplicate sample. RPD was calculated by taking the absolute difference between two results as a percentage of the average result.

RPD was calculated using the following formula:

$$RPD = \left(\frac{(x_1 - x_2)}{(x_1 + x_2)/100}\right)100$$

Where: RPD = Relative Percent Difference
x_1 = Primary Sample
x_2 = Duplicate Sample

RPDs can only be calculated if the concentration of both the duplicate sample and the original sample are above the analytical reporting detection limit (RDL).

The MECP document titled "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" dated July 2011, describes the data quality objectives in relation to RPD values. RPD values of less than or equal to 40% for soil samples indicates acceptable data quality.

A review of the PRD calculated value for the original and duplicate soil sample were reported within the acceptable 40% range.

Based on the abovementioned data, data quality and integrity objectives were met. The RPD calculations are provided in Tables 6 through 8.

6.0 Conclusions

The findings of the Excess Soil Characterization Report are as follows:

- The Project Area was first developed for agricultural use in the early 1900s.
- The Project Area was vacant and undeveloped prior to being developed as a farm.
- Potentially Contaminating Activities were identified in the project area:
  - PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles
  - PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks
  - PCA #33 - Metal Treatment, Coating, Plating and Finishing
  - PCA #39 - Paints Manufacturing, Processing and Bulk Storage
  - PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications
  - PCA (Other)- De-icing activities of roads and sidewalks for public and vehicular safety.
  - PCA #51 - Solvent Manufacturing, Processing and Bulk Storage
  - PCA #57 - Vehicles and Associated Parts Manufacturing
- Areas of Potential Environmental Concern (APEC) were identified within the Project Area.
- Contaminants of potential concern in the APECs are associated with agricultural pesticide storage and use on-Site and off-Site commercial and/or light-industrial properties to the east and southeast of the Site.
- A total of 9 boreholes were advanced within the Project Area for soil characterization purposes.
- A total of 8 samples (including 2 field duplicates) were collected from the Project Area and submitted for laboratory analysis of Metals, Hydride-Forming Metals, Other Regulated Parameters, Petroleum Hydrocarbons including BTEX and Organochlorinated Pesticides;
- The analytical results indicate that all soil samples met Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use;
- The scope of work for the excess soil program was prescribed within the Request for Proposal (RFP) #21-22 “Consulting Services, Site Development- Operations Centre”. Thus, additional sampling and reporting will be required when detailed development plans and excess soil volumes are available;
- Additional soil sampling must be completed to adhere to the Sampling and Analysis Plan based on excavation depths and excess soil volumes;
- Soil Characterization Report must be updated with the additional soil sampling and chemical analysis;
- Requirement for Project Registration with the Resource Productivity & Recovery Authority should be considered- if necessary;
- JLP staff should be present on Site during excess soil excavation and exportation to inspect the materials for environmental concerns and collect samples for laboratory analysis as required.

7.0 Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

JLP Services Inc.

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Environmental Scientist

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- JLP Services Inc. Assessment of Past Uses – 965 Gartshore Street, Fergus, Ontario. December 2022.
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- Ontario Geological Survey 2011. 1: 250,000 scale. Bedrock geology of Ontario; Ontario Geological Survey, Miscellaneous Release – Data 126 – Revision 1.
- Ontario Ministry of Environmental, Conservation and Parks, Rules for Soil Management and Excess Soil Quality Standards, 2020.
- Ontario Regulation 153/04 (as amended). Environmental Protection Act. March 2021.
- Ontario Regulation 406/19. Onsite and Excess Soil management. December 2019.

Tables

Table 1: Soil Chemical Analysis - Petroleum Hydrocarbon Parameters (PHCs)

965 Gartshore Street, Fergus, Ontario

G4599-22-6

Sample I.D.	Units	DL	**Borehole** BH2 SS2	**Borehole** BH201 SS2 (duplicate of BH2 SS2)	**Borehole** BH3 SS2	**Borehole** BH5 SS2	**Borehole** BH6 SS2	Criteria
Date of Sample Collection			27/Oct/22	27/Oct/22	27/Oct/22	25/Oct/22	25/Oct/22	
Date of Sample Analysis			Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	
Certificate of Analysis Number			WT2220348	WT2220348	WT2220348	WT2220348	WT2220348	
Laboratory I.D.			WT2220348-004	WT2220348-006	WT2220348-008	WT2220348-002	WT2220348-010	
Soil Type			SANDY SILT	SANDY SILT	SANDY SILT	SILTY SAND	SILTY SAND	
Depth (m)			0.8 to 1.4	0.8 to 1.4	0.8 to 1.4	0.8 to 1.4	0.8 to 1.4	
Field Vapour Reading			ND	ND	ND	ND	ND	Table 2.1: Agri
F1 (C6-C10)	ug/g	5	<5.0	<5.0	<5.0	<5.0	<5.0	17
F2 (C10-C16)	ug/g	10	<10	<10	<10	<10	<10	10
F3 (C16-C34)	ug/g	50	<50	<50	<50	<50	<50	240
F4 (C34-C50)	ug/g	50	<50	<50	<50	<50	<50	2800
Benzene	ug/g	0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.02
Ethylbenzene	ug/g	0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.05
Toluene	ug/g	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.2
Xylenes (Total)	ug/g	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.091

NOTES:

"NV"- No Value

"NM" - Not Measured

"DL" - Detection Limit

"ND" - Non-Detectable (<25 ppm)

Bold & Yellow - Exceedance of Table 2.1 Criteria

Criteria: O.Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use

Table 2: Soil Chemical Analysis - Organochlorine Pesticides (OCPs) Parameters

965 Gartshore Street, Fergus, Ontario

G4599-22-6

Sample I.D.	Units	DL	**Borehole** BH2 SS1	**Borehole** BH201 SS1 (duplicate of BH2 SS1)	**Borehole** BH3 SS1	**Borehole** BH5 SS1	**Borehole** BH6 SS1	Criteria
Date of Sample Collection			27/Oct/22	27/Oct/22	27/Oct/22	25/Oct/22	25/Oct/22	
Date of Sample Analysis			Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	
Certificate of Analysis Number			WT2220348	WT2220348	WT2220348	WT2220348	WT2220348	
Laboratory I.D.			WT2220348-003	WT2220348-005	WT2220348-007	WT2220348-001	WT2220348-009	
Soil Type			SANDY SILT	SANDY SILT	SANDY SILT	SILTY SAND	SILTY SAND	
Depth (m)			0.3 to 0.6	0.3 to 0.6	0.2 to 0.6	0.2 to 0.6	0.2 to 0.6	Table 2.1: Agri
DDD, total	µg/g	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	3.3
DDE, total	µg/g	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.26
DDT, total	µg/g	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.078
aldrin	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05
chlordane, total	µg/g	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.05
dieldrin	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05
endosulfan, total	µg/g	0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.04
endrin	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.04
heptachlor	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.072
heptachlor epoxide	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.05
hexachlorobenzene	µg/g	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.034
hexachlorobutadiene	µg/g	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01
hexachlorocyclohexane, gamma-	µg/g	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01
hexachloroethane	µg/g	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.01
methoxychlor	µg/g	0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.24

NOTES:

"NV"- No Value

"NM" - Not Measured

"DL" - Detection Limit

Bold & Yellow - Exceedance of Table 2.1 Criteria

Criteria: O.Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use

Table 3: Soil Chemical Analysis - Metals, Hydride Forming Metals and Other Regulated Parameters

965 Gartshore Street, Fergus, Ontario

G4599-22-6

Sample I.D.	Units	DL	**Borehole**	**Borehole**	**Borehole**	**Borehole**	**Borehole**	Criteria
			BH2 SS1	BH201 SS1 (duplicate of BH2 SS1)	BH3 SS1	BH5 SS2	BH6 SS1	
Date of Sample Collection			27/Oct/22	27/Oct/22	27/Oct/22	25/Oct/22	25/Oct/22	
Date of Sample Analysis			Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	Nov 6 to 24, 2022	
Certificate of Analysis Number			WT2220348	WT2220348	WT2220348	WT2220348	WT2220348	
Laboratory I.D.			WT2220348-003	WT2220348-005	WT2220348-007	WT2220348-002	WT2220348-009	
Soil Type			SANDY SILT	SANDY SILT	SANDY SILT	SILTY SAND	SILTY SAND	
Depth (m)			0.3 to 0.6	0.3 to 0.6	0.2 to 0.6	0.8 to 1.4	0.2 to 0.6	Table 2.1: Agri
antimony	µg/g	0.10	<0.10	<0.10	0.10	<0.10	0.14	7.5
arsenic	µg/g	0.10	1.54	1.75	3.16	1.87	2.81	11
barium	µg/g	0.50	10.8	12.5	50.1	17.0	49.2	390
beryllium	µg/g	0.10	0.13	0.15	0.38	0.20	0.34	4
boron	µg/g	5.0	<5.0	<5.0	6.3	<5.0	<5.0	120
boron, hot water soluble	µg/g	0.10	0.29	0.30	0.14	<0.10	0.55	1.5
cadmium	µg/g	0.020	0.053	0.070	0.182	0.091	0.264	1
chromium	µg/g	0.50	6.78	7.44	15.6	7.95	13.1	160
cobalt	µg/g	0.10	1.49	1.81	5.16	2.23	4.68	22
copper	µg/g	0.50	4.36	5.31	11.2	5.17	10.5	140
lead	µg/g	0.50	4.12	4.48	10.7	6.54	20.8	45
mercury	µg/g	0.0050	0.0051	0.0061	0.0156	0.0111	0.0226	0.24
molybdenum	µg/g	0.10	0.14	0.15	0.45	0.17	0.36	6.9
nickel	µg/g	0.50	2.97	3.46	11.3	5.00	8.46	100
selenium	µg/g	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	2.4
silver	µg/g	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	20
thallium	µg/g	0.050	<0.050	<0.050	0.085	<0.050	0.079	1
uranium	µg/g	0.050	0.367	0.400	0.654	0.362	0.597	23
vanadium	µg/g	0.20	12.8	14.6	25.4	18.8	26.0	86
zinc	µg/g	2.0	25.4	27.4	50.8	34.6	62.6	340
Electrical Conductivity (2:1)	mS/cm	0.00500	0.129	0.146	0.224	0.105	0.119	0.7
pH	pH units	0.10	7.39	7.61	7.62	7.17	6.83	surface: 5 to 9, subsurface: 5 to 11
Sodium Adsorption Ratio	N/A	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	5

NOTES:

"NV"- No Value

"NM" - Not Measured

"DL" - Detection Limit

Bold & Yellow - Exceedance of Table 2.1 Criteria

Criteria: O.Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Ground Water Condition, Agricultural or Other Property Use

Table 4: Relative Percent Difference
Petroleum Hydrocarbon Pararameters (PHCs)

965 Gartshore Street, Fergus, Ontario

G4599-22-6

Sample I.D.	DL	**Borehole** BH2 SS2	**Borehole** BH201 SS2 (duplicate of BH2 SS2)	RPD	Alert Limit
Date of Sample Collection		27/Oct/22	27/Oct/22		
Date of Sample Analysis		Nov 6 to 24, 2022	Nov 6 to 24, 2022		
Certificate of Analysis Number		WT2220348	WT2220348		
Laboratory I.D.		WT2220348-004	WT2220348-006		
Soil Type		SANDY SILT	SANDY SILT		
Depth (m)		0.8 to 1.4	0.8 to 1.4		
F1 (C6-C10)	5	<5.0	<5.0	nc	>30%
F1-BTEX	5	<5.0	<5.0	nc	>30%
F2 (C10-C16)	10	<10	<10	nc	>30%
F3 (C16-C34)	50	<50	<50	nc	>30%
F4 (C34-C50)	50	<50	<50	nc	>30%
Benzene	0.0068	<0.0050	<0.0050	nc	>30%
Ethylbenzene	0.018	<0.015	<0.015	nc	>30%
Toluene	0.08	<0.050	<0.050	nc	>30%
Xylenes (Total)	0.05	<0.050	<0.050	nc	>30%

NOTES:

'nc' means "not calculable" or 0%, since one (or both) of the results are less than the DL.

Exceedences of alert limits are shown in **bold and orange**

Table 5: Relative Percent Difference
Organochlorine Pesticides (OCPs)

965 Gartshore Street, Fergus, Ontario
G4599-22-6

Sample I.D.	DL	**Borehole** BH2 SS1	**Borehole** BH201 SS1 (duplicate of BH2 SS1)	RPD	Alert Limit
Date of Sample Collection		27/Oct/22	27/Oct/22		
Date of Sample Analysis		Nov 6 to 24, 2022	Nov 6 to 24, 2022		
Certificate of Analysis Number		WT2220348	WT2220348		
Laboratory I.D.		WT2220348-003	WT2220348-005		
Soil Type		SANDY SILT	SANDY SILT		
Depth (m)		0.3 to 0.6	0.3 to 0.6		
DDD, total	0.05	<0.030	<0.030	nc	>40%
DDE, total	0.05	<0.030	<0.030	nc	>40%
DDT, total	0.05	<0.030	<0.030	nc	>40%
aldrin	0.05	<0.020	<0.020	nc	>40%
chlordane, total	0.05	<0.030	<0.030	nc	>40%
dieldrin	0.05	<0.020	<0.020	nc	>40%
endosulfan, total	0.05	<0.030	<0.030	nc	>40%
endrin	0.05	<0.020	<0.020	nc	>40%
heptachlor	0.05	<0.020	<0.020	nc	>40%
heptachlor epoxide	0.05	<0.020	<0.020	nc	>40%
hexachlorobenzene	0.05	<0.010	<0.010	nc	>40%
hexachlorobutadiene	0.05	<0.010	<0.010	nc	>40%
hexachlorocyclohexane, gamma-	0.05	<0.010	<0.010	nc	>40%
hexachloroethane	0.0424	<0.010	<0.010	nc	>40%
methoxychlor	0.03	<0.020	<0.020	nc	>40%

NOTES:
'nc' means "not calculable" and/or 0%, since one (or both) of the results are less than the DL.
Exceedences of alert limits are shown in **bold and orange**

Table 6: Relative Percent Difference
Metals, Hydride Forming Metals and Other Regulated Parameters

965 Gartshore Street, Fergus, Ontario

G4599-22-6

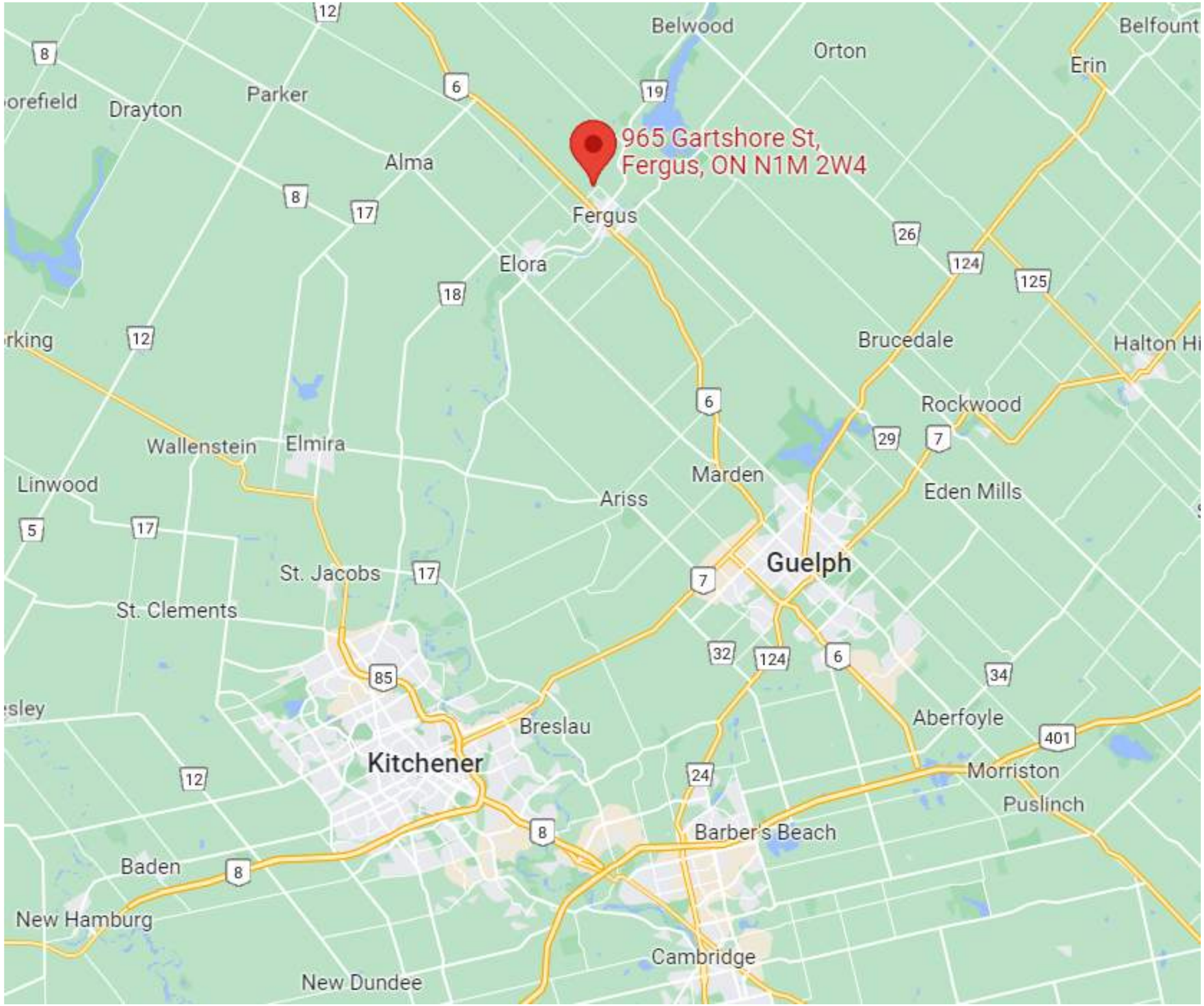
Sample I.D.	DL	**Borehole** BH2 SS1	**Borehole** BH201 SS1 (duplicate of BH2 SS1)	RPD	Alert Limit
Date of Sample Collection		27/Oct/22	27/Oct/22		
Date of Sample Analysis		Nov 6 to 24, 2022	Nov 6 to 24, 2022		
Certificate of Analysis Number		WT2220348	WT2220348		
Laboratory I.D.		WT2220348-003	WT2220348-005		
Soil Type		SANDY SILT	SANDY SILT		
Depth (m)		0.3 to 0.6	0.3 to 0.6		
antimony	0.10	<0.10	<0.10	nc	>40%
arsenic	0.10	1.54	1.75	13	>40%
barium	0.50	10.8	12.5	15	>40%
beryllium	0.10	0.13	0.15	14	>40%
boron	5.0	<5.0	<5.0	nc	>40%
boron, hot water soluble	0.10	0.29	0.30	3	>40%
cadmium	0.020	0.053	0.070	28	>40%
chromium	0.50	6.78	7.44	9	>40%
cobalt	0.10	1.49	1.81	19	>40%
copper	0.50	4.36	5.31	20	>40%
lead	0.50	4.12	4.48	8	>40%
mercury	0.0050	0.0051	0.0061	18	>40%
molybdenum	0.10	0.14	0.15	7	>40%
nickel	0.50	2.97	3.46	15	>40%
selenium	0.20	<0.20	<0.20	nc	>40%
silver	0.10	<0.10	<0.10	nc	>40%
thallium	0.050	<0.050	<0.050	nc	>40%
uranium	0.050	0.367	0.400	9	>40%
vanadium	0.20	12.8	14.6	13	>40%
zinc	2.0	25.4	27.4	8	>40%
Electrical Conductivity (2:1)	0.00500	0.129	0.146	12	>40%
pH	0.10	7.39	7.61	3	>40%
Sodium Adsorption Ratio	0.10	<0.10	<0.10	nc	>40%

NOTES:

'nc' means "not calculable" and/or 0%, since one (or both) of the results are less than the DL.

Exceedences of alert limits are shown in **bold and orange**

Figures



Project North

JLP
Geotechnical & Environmental Consultants

Locality Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 1
Source: Google Maps	Scale: N.T.S.	

Legend

Project Area

Project North

JLP
Geotechnical & Environmental Consultants

Site Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 2
Source: Google Maps	Scale: N.T.S.	

Legend

Project Area

Borehole with Monitor (JLP, 2022)

N

Project North

- This drawing shall be read in conjunction with the associated technical report.
- El = Elevation
- The ground surface elevations were obtained using a Sokkia GcX3 global position system referenced to the coordinate system known as NAD83 no trans, which is the North American Datum of 1983 of the Canadian Spatial Reference System, and the Universal Transverse Mercator (UTM) Zone 17.
- The soil types and boundaries are applicable only at the location of the boreholes. Between boreholes, they are assumed and may change substantially. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.
- The soil samples will be retained for three months from the date of issue of the final report and then discarded, unless the client has requested to extend the storage period with fees.

JLP

Geotechnical & Environmental Consultants

Borehole Location Plan
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 19, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 3
Source: Google Maps	Scale: N.T.S.	

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1	Entire Project Area	PCA #40	20 acres	Organochlorine Pesticides, Metals
APEC #2	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHC & BTEX
		PCA #39		Metals & HFM, VOCs
		PCA #33		Metals & HFM, VOCs, PHC & BTEX
		PCA #57		Metals, VOCs, PHC & BTEX

Legend:

Project Area

Areas of Potential Concern (APECs)

APEC 1- Entire Site Area

APEC 2 - Central Farm Portion

APEC 3 - Southern Portion of Site

Potentially Contaminating Activities (PCAs)

PCA Location

PCA	Description	Contributing to APECs at Site
PCA 1	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes (On-Site)
PCA 2	PCA (Other)- De-icing activities	Yes (On-Site)
PCA 3	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes (potential groundwater migration)
PCA 4	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 5	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)
PCA 6	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 7	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes (potential groundwater migration)
PCA 8	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)

N
Project North

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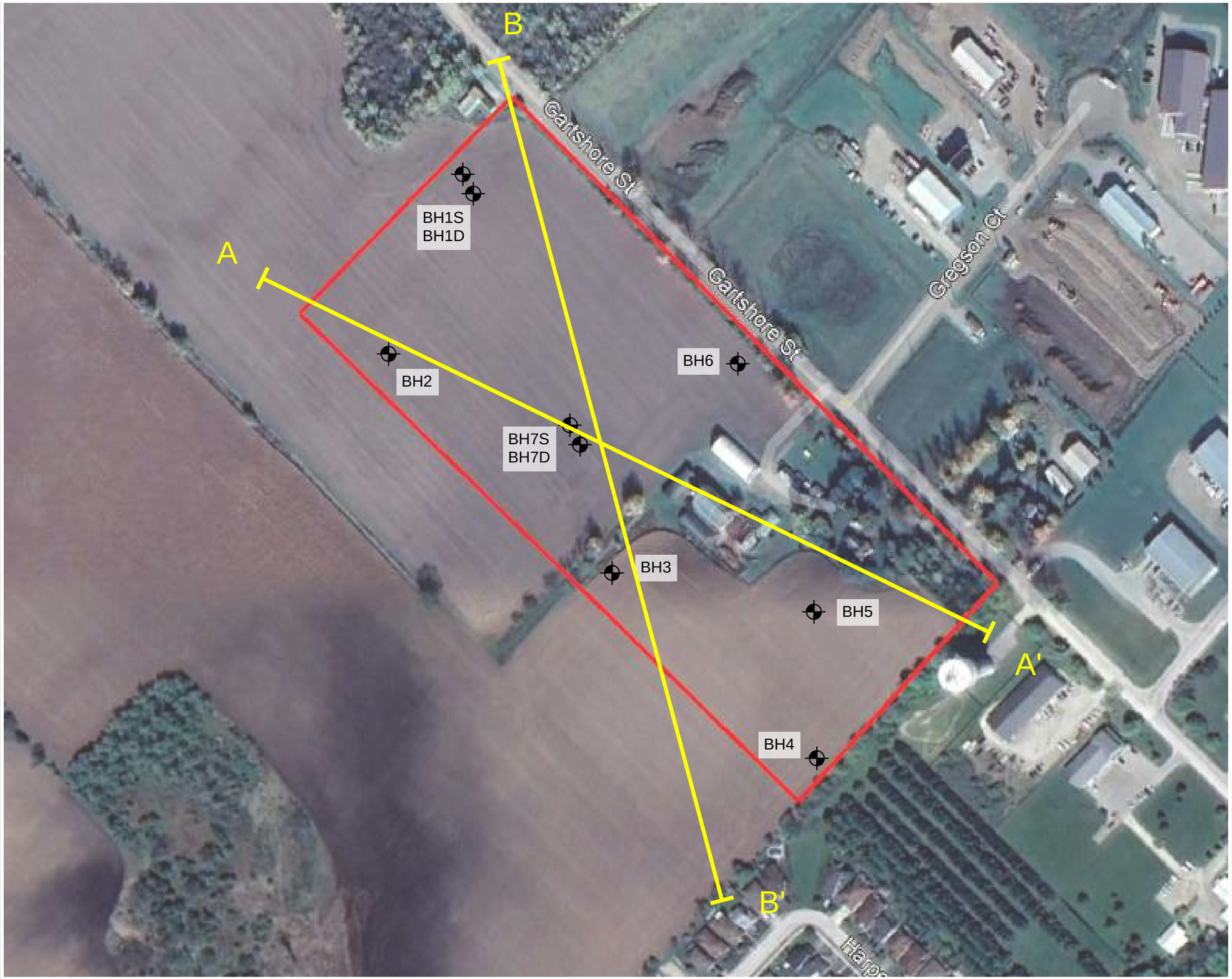
Geotechnical & Environmental Consultants

Potentially Contaminating Activities
965 Gartshore Street,
Fergus, Ontario

Date: Aug. 3, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 4
Source: Google Maps	Scale: N.T.S.	



Legend

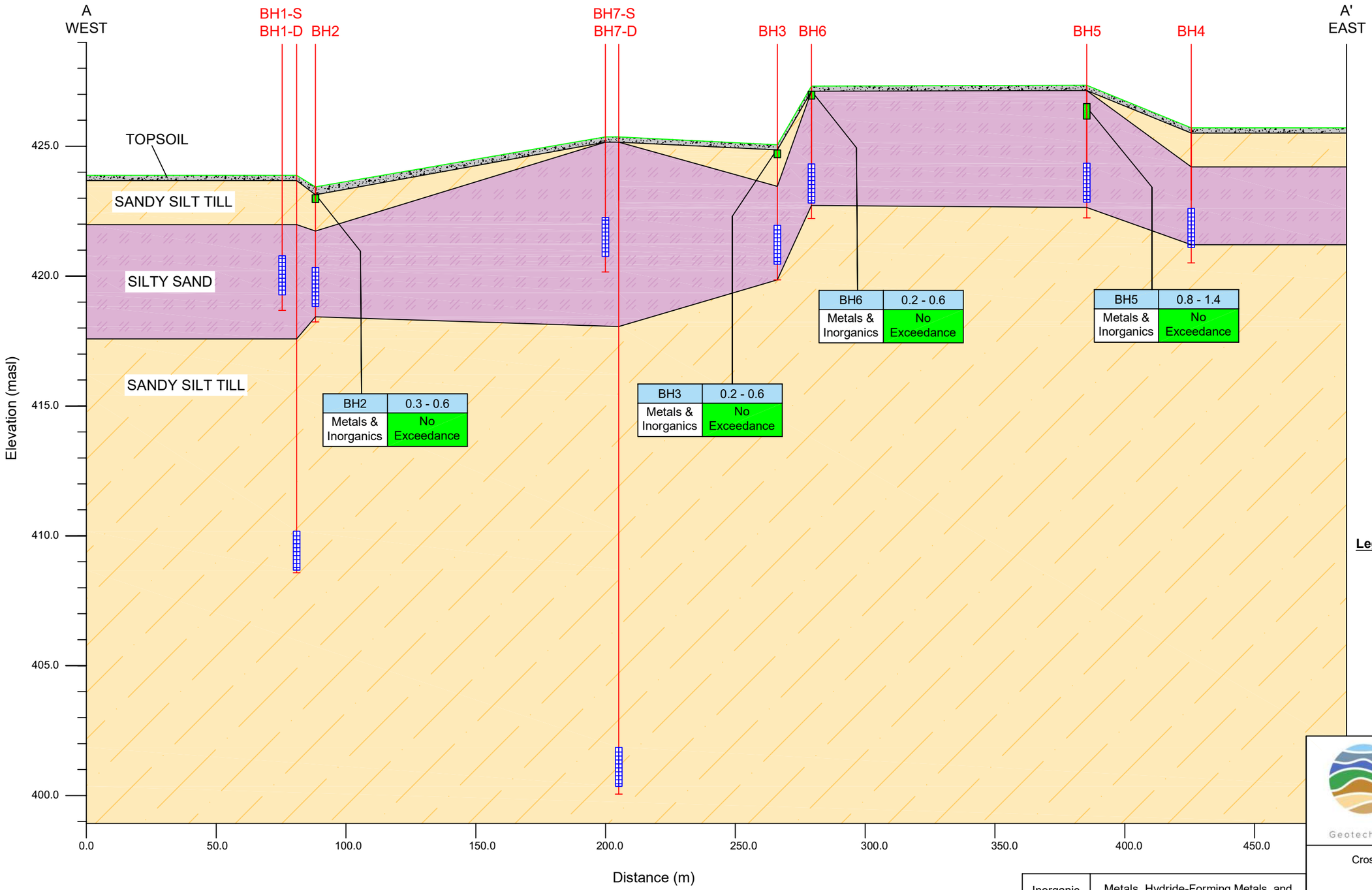
- Project Area
- Borehole with Monitor (JLP, 2022)
- A — A' Cross Section Axis

N
Project North

JLP
Geotechnical & Environmental Consultants

Cross Section Plan
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 19, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 5
Source: Google Maps	Scale: N.T.S.	



Vertical Exaggeration - 10x

Inorganic Parameters	Metals, Hydride-Forming Metals, and Other Regulated Parameters (ORPs)

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section A-A' - Metals & Inorganics
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 6a
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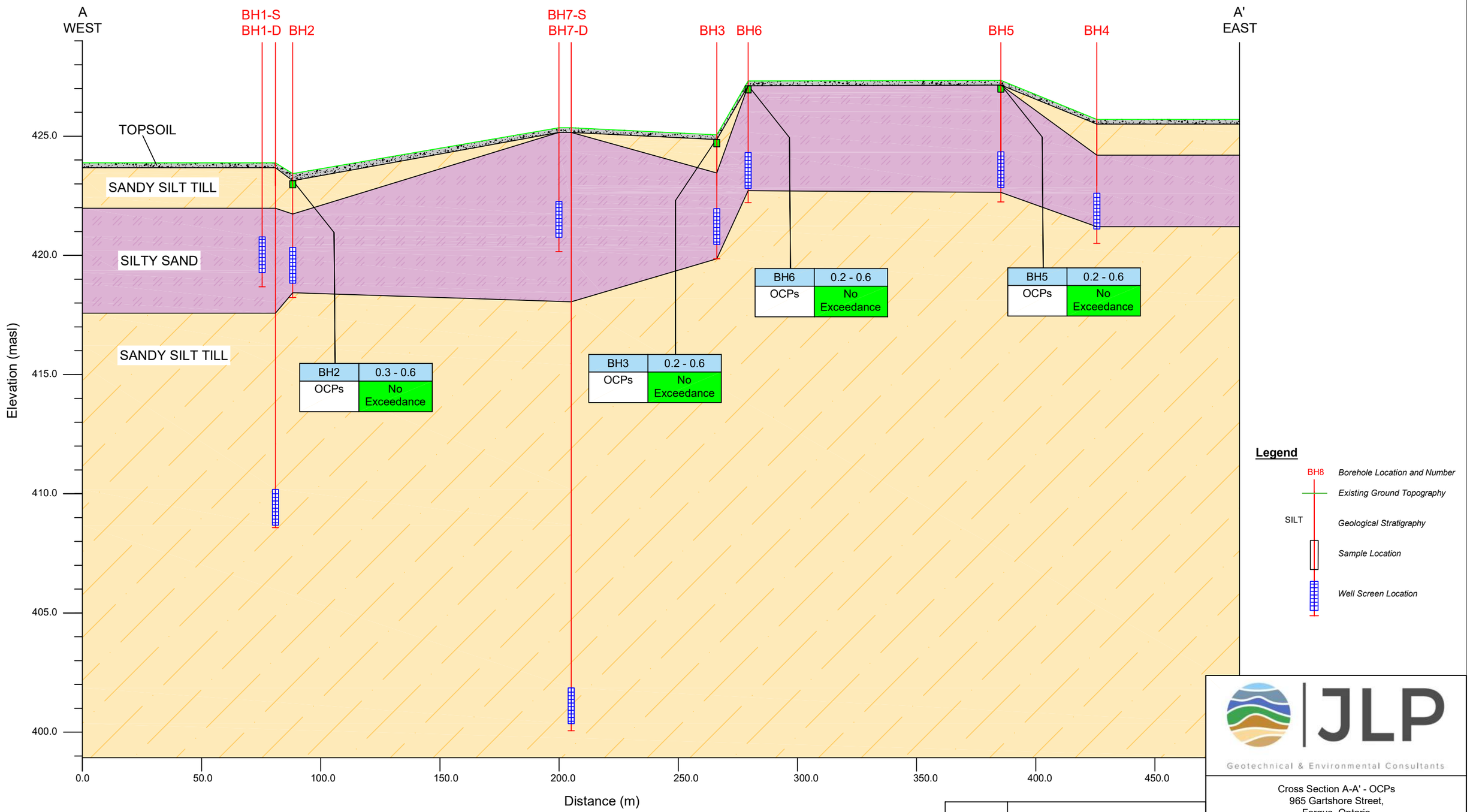


Vertical Exaggeration - 10x

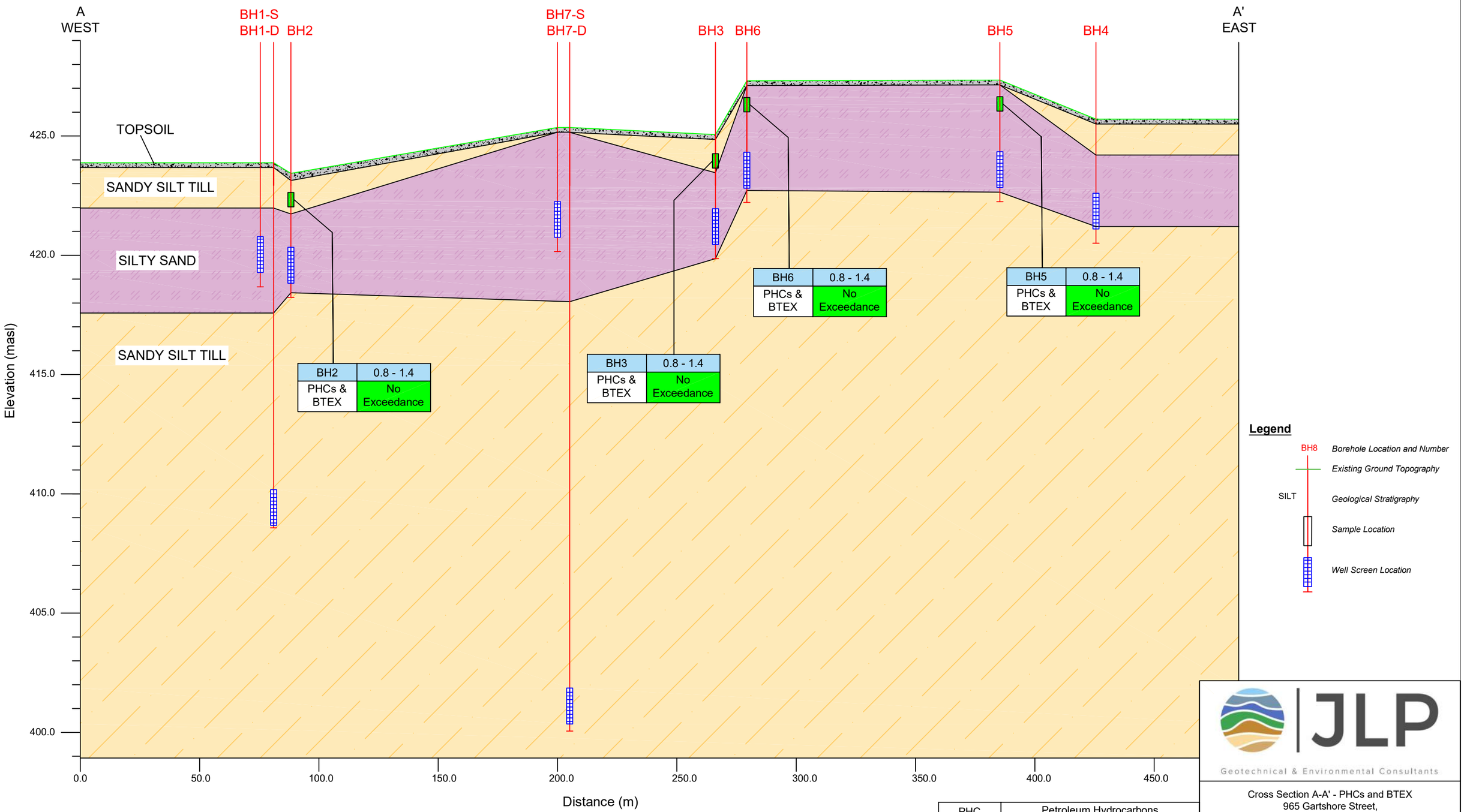
OCP	Organochlorine Pesticides

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section A-A' - OCPs
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 6b
Horizontal Scale: 1:1500	Vertical Scale: 1:150	



Vertical Exaggeration - 10x

PHC	Petroleum Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section A-A' - PHCs and BTEX
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 6c
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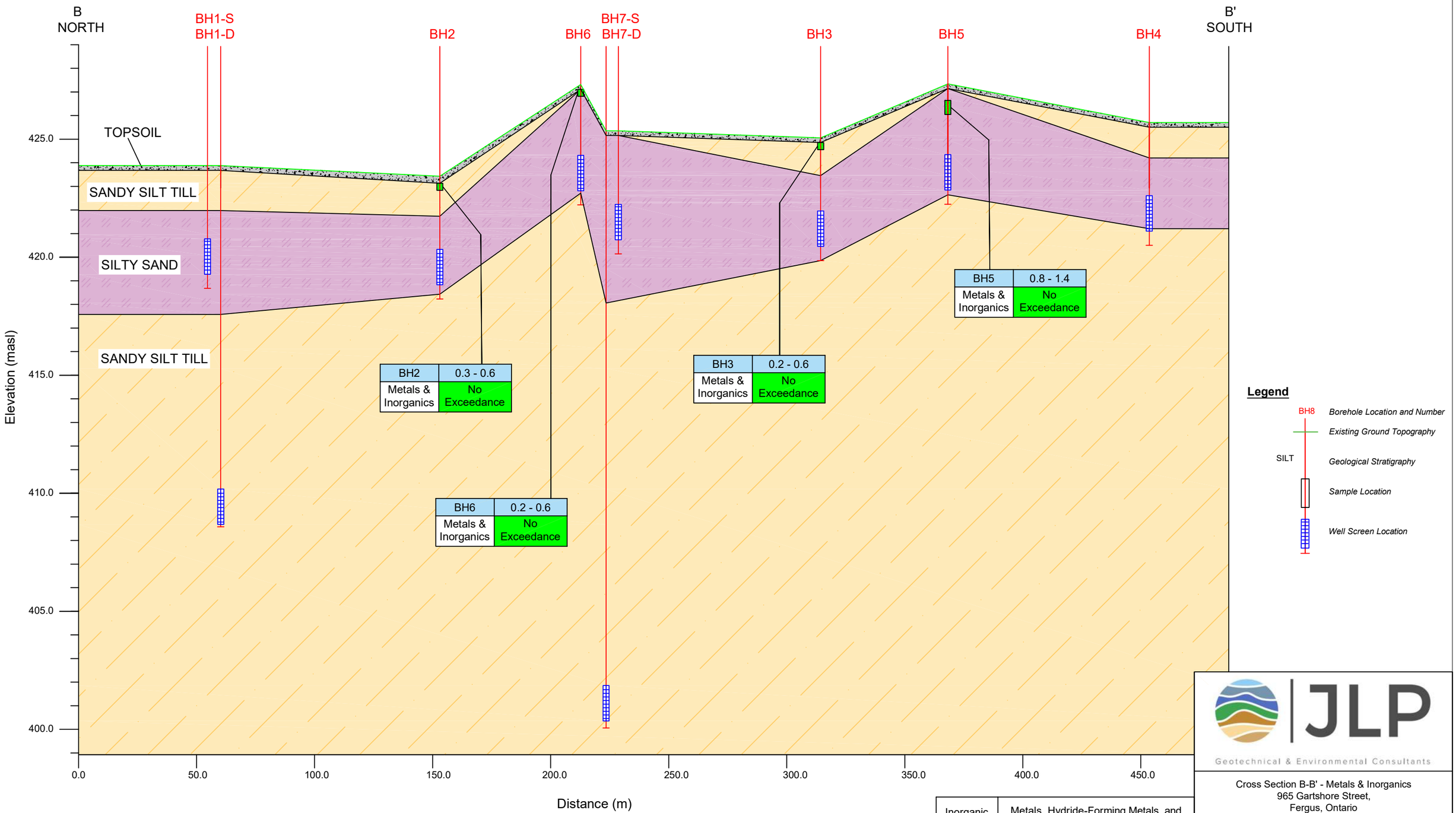


Vertical Exaggeration - 10x

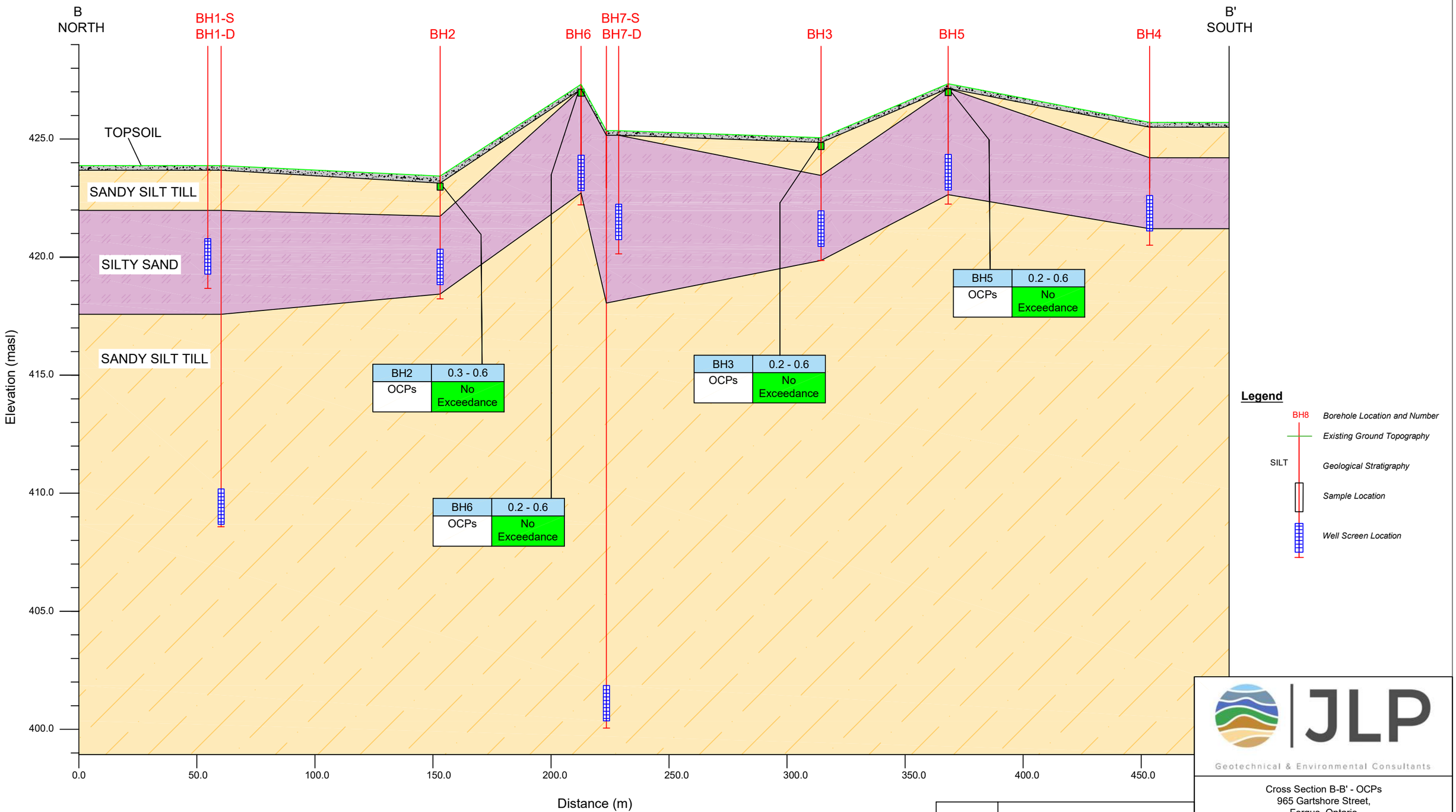
Inorganic Parameters	Metals, Hydride-Forming Metals, and Other Regulated Parameters (ORPs)

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section B-B' - Metals & Inorganics
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 7a
Horizontal Scale: 1:1500	Vertical Scale: 1:150	



Vertical Exaggeration - 10x

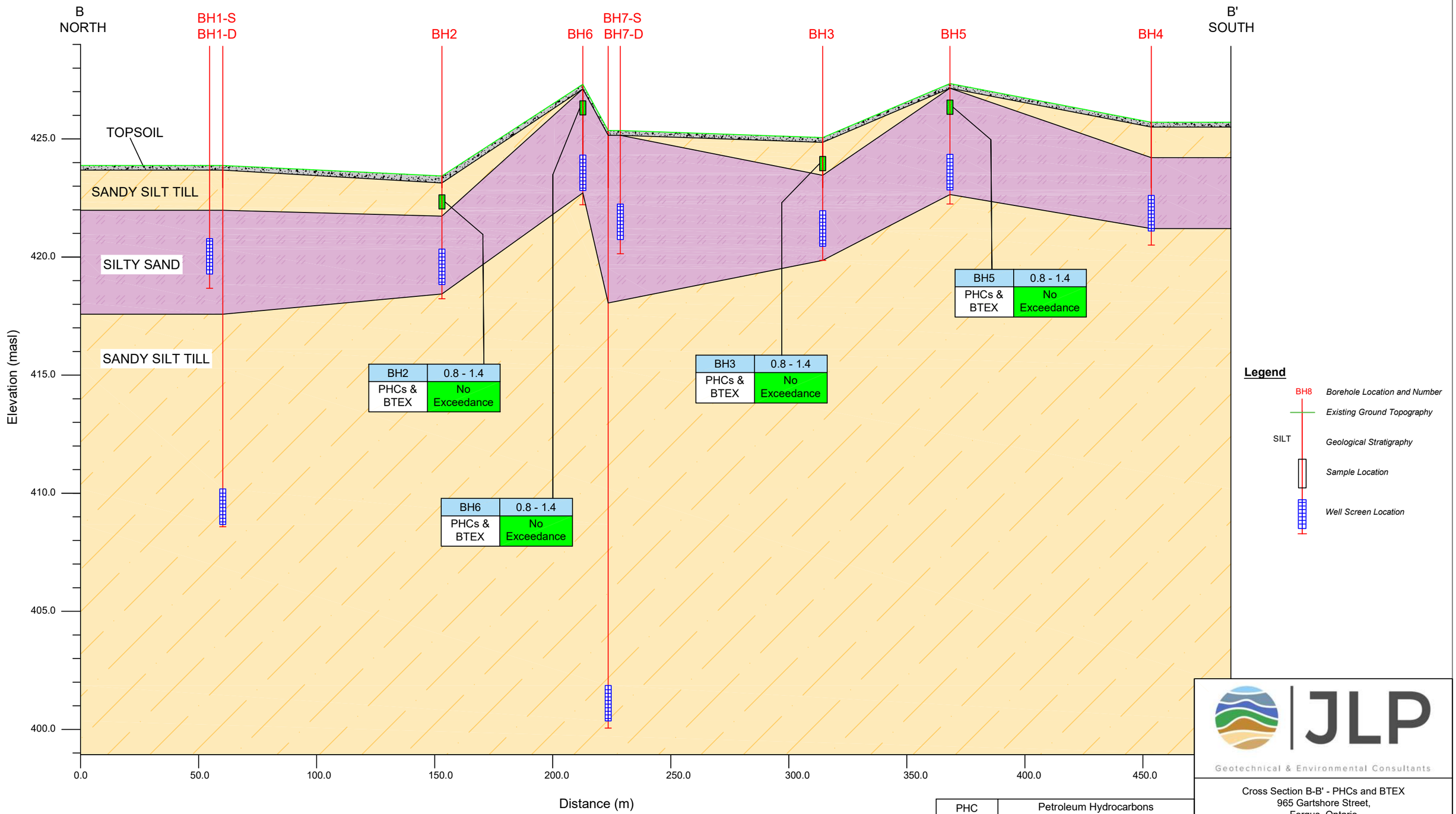
OCP	Organochlorine Pesticides

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section B-B' - OCPs
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 7b
Horizontal Scale: 1:1500	Vertical Scale: 1:150	



Vertical Exaggeration - 10x

PHC	Petroleum Hydrocarbons
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes

No Exceedances = Concentrations of all parameters are below Criteria: Ontario Reg. 406/19 Table 2.1:Full Depth Excess Soil Quality Standards in a Potable Ground Water Standards, Agricultural or Other Property Use

JLP
Geotechnical & Environmental Consultants

Cross Section B-B' - PHCs and BTEX
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 2, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked By: AJ	DWG. No. 7c
Horizontal Scale: 1:1500	Vertical Scale: 1:150	

Legend

Project Area

Borehole with Monitor (JLP, 2022)

Sample	Depth (mbgs)	Date
BH5 SS2	0.8 to 1.4	Oct-25-2022
BH2 SS1	0.3 to 0.6	Oct-27-2022
BH201 SS1	0.3 to 0.6	Oct-27-2022
BH3 SS1	0.2 to 0.6	Oct-27-2022
BH6 SS1	0.2 to 0.6	Oct-25-2022

N

Project North

- Criteria: Ontario Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition, Agricultural or Other Property Use
- results are in units of µg/g, unless otherwise noted.
- mbgs = metres below ground surface
- Location and contaminant exceeding standards is shown in green.
- Location and contaminant exceeding standards is shown in red.
- The Ground Surface elevations at the borehole locations were derived from the Temporary Benchmark (TBM) as shown.
- The soil types and boundaries are applicable only at the location of the boreholes. Between boreholes, they are assumed and may change substantially. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.
- The soil samples will be retained for three months from the date of issue of the final report and then discarded, unless the client has requested to extend the storage period with fees.

JLP

Geotechnical & Environmental Consultants

Soil Analytical Results - Metals & Inorganics
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 19, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 8a
Source: Google Maps	Scale: N.T.S.	

Legend

Project Area

Borehole with Monitor (JLP, 2022)

Sample	Depth (mbgs)	Date
BH5 SS1	0.2 to 0.6	Oct-25-2022
BH2 SS1	0.3 to 0.6	Oct-27-2022
BH201 SS1	0.3 to 0.6	Oct-27-2022
BH3 SS1	0.2 to 0.6	Oct-27-2022
BH6 SS1	0.2 to 0.6	Oct-25-2022

N

Project North

- Criteria: Ontario Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition, Agricultural or Other Property Use
- results are in units of µg/g, unless otherwise noted.
- mbgs = metres below ground surface
- Location and contaminant exceeding standards is shown in green.
- Location and contaminant exceeding standards is shown in red.
- The Ground Surface elevations at the borehole locations were derived from the Temporary Benchmark (TBM) as shown.
- The soil types and boundaries are applicable only at the location of the boreholes. Between boreholes, they are assumed and may change substantially. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.
- The soil samples will be retained for three months from the date of issue of the final report and then discarded, unless the client has requested to extend the storage period with fees.

JLP

Geotechnical & Environmental Consultants

Soil Analytical Results - Organochlorine Pesticides (OCPs)
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 19, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 8b
Source: Google Maps	Scale: N.T.S.	

Legend

Project Area

Borehole with Monitor (JLP, 2022)

Sample	Depth (mbgs)	Date
BH5 SS2	0.8 to 1.4	Oct-25-2022
BH2 SS2	0.8 to 1.4	Oct-27-2022
BH201 SS2	0.8 to 1.4	Oct-27-2022
BH3 SS2	0.8 to 1.4	Oct-27-2022
BH6 SS2	0.8 to 1.4	Oct-25-2022

N

Project North

- Criteria: Ontario Reg. 406/19 Table 2.1: Full Depth Excess Soil Quality Standards in a Potable Groundwater Condition, Agricultural or Other Property Use
- results are in units of µg/g, unless otherwise noted.
- mbgs = metres below ground surface
- Location and contaminant exceeding standards is shown in green.
- Location and contaminant exceeding standards is shown in red.
- The Ground Surface elevations at the borehole locations were derived from the Temporary Benchmark (TBM) as shown.
- The soil types and boundaries are applicable only at the location of the boreholes. Between boreholes, they are assumed and may change substantially. The topsoil thicknesses quoted in the report are used for discussion purposes only and should not be used for estimating purposes.
- The soil samples will be retained for three months from the date of issue of the final report and then discarded, unless the client has requested to extend the storage period with fees.

JLP

Geotechnical & Environmental Consultants

Soil Analytical Results - PHCs and BTEX
965 Gartshore Street,
Fergus, Ontario

Date: Dec. 19, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 8c
Source: Google Maps	Scale: N.T.S.	

Appendix A – Limitations and Use of Report

REPORT TERMS AND CONDITIONS

NOTICE: THE FOLLOWING PROVISIONS SET FORTH IMPORTANT QUALIFICATIONS AND LIMITATIONS ON THE FINDINGS AND RECOMMENDATIONS IN THE REPORT AS WELL AS THE USE OF, AND RELIANCE ON, THE REPORT.

1. **DEFINITIONS**. The following capitalized terms have the following meanings:

   (a) "**Additional Investigations**" means investigations that JLP has indicated to the Client should be undertaken to take into account any Out-of-Scope Requirements, but that are not otherwise specifically within the scope of investigations conducted for the purpose of the Report.

   (b) "**Applicable Laws**" means and includes without limitation all applicable provincial laws, regulations, guidelines, policies, standards, protocols, and objectives administered by the Ministry of the Environment and Climate Change or any other duly-constituted governmental authority, all as in force as of the date of the Report.

   (c) "**Client**" means the Client as referred to in the Report.

   (d) "**Client Information**" means the information, representations, and instructions provided by the Client, the Client's representatives, and/or others and upon which the Report is based, in whole or in part.

   (e) "**Findings**" means the evaluations and conclusions set forth in the Report.

   (f) "**JLP**" means JLP Services Inc.

   (g) "**Out-of-Scope Requirements**" means special concerns or requirements of the Client in respect of the subject matter of the Report.

   (h) "**Recommendations**" mean the findings and recommendations referred to in the Report, taking into account any Out-of-Scope Requirements that were disclosed to JLP prior to the date of the Report.

   (i) "**Report**" means the report to which these Terms and Conditions are attached and form part.

   (j) "**Report Documents**" means the underlying documents, records, data, and files, in any medium whatsoever, generated in connection with the preparation of the Report, including without limitation, the instructions and objectives communicated to JLP by the Client, communications between JLP and the Client, and other reports, proposals, or documents prepared by JLP for the Client in connection with the Site.

   (k) "**Site**" means the site in respect of which the Report was prepared.

   (l) "**Site Conditions**" means Site conditions known as a result of, or reasonably imputed by, the investigations that were undertaken as of the date of the Report.

2. **BASIS OF REPORT**. The Report is based on the Site Conditions. Any changes to the Site Conditions after the date of the Report that could or will affect the Site Conditions may or will have a corresponding effect on the Recommendations. The Report does not take into account any (a) Additional Investigations that were not undertaken, or (b) Out-of-Scope Requirements that were not communicated prior to completion of the investigations that were been undertaken as of the date of the Report. Where recommended field services are referred to, they are the minimum services necessary to determine compliance of construction with Applicable Laws, generally accepted industry-standard practices, and the Recommendations.

3. **RELIANCE & USE**. The Report has been prepared only for the Site and the related design, development, building, or building assessment objectives identified by the Client. The Findings and Recommendations are based on the Site

Conditions and the Client Information. In preparing the Report, JLP has relied upon the Client Information and disclaims any responsibility for any inaccuracy, misstatement, omission, unintentional misrepresentation, or other deficiency contained in the Report as a result of such reliance. Unless specifically stated otherwise, the applicability and reliability of the Findings and the Recommendations expressed in the Report are only valid to the extent that (a) there has been no material change to or variation from any of the Client Information, (b) the Client Information contains no untrue statement of a material fact, or (c) the Client Information omits no statement of a material fact necessary in order to make the Client Information not misleading.

The Report and the Findings and Recommendations are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the prior written consent of JLP, which may be arbitrarily withheld or conditioned.

RELIANCE UPON THE REPORT OR ANY OF THE DETERMINATIONS MADE HEREIN BY A THIRD PARTY WITHOUT JLP'S CONSENT IS PROHIBITED AND JLP MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY IN FAVOUR OF ANY THIRD PARTY WITH RESPECT TO THE REPORT WHATSOEVER. JLP FULLY DISCLAIMS, AND WILL HAVE NO LIABILITY FOR, ANY LOSS, DAMAGES, OR EXPENSES WHICH ANY THIRD PARTY MAY INCUR OR SUFFER AS A RESULT OF THE USE OF OR RELIANCE ON THIE REPORT WHERE JLP HAS NOT EXPRESSLY AUTHORIZED SAME. ANY THIRD PARTY WHO RELIES ON THE REPORT TO ANY EXTENT DOES SO AT SUCH PARTY'S OWN RISK AND COMPLETELY WAIVES ANY AND ALL CLAIMS AGAINST JLP IN CONNECTION WITH THE REPORT, REGARDLESS OF THE THEORY OF LAW (WHETHER IN CONTRACT, TORT, OR ANY THEORY OF LAW COMING INTO EXISTENCE HEREAFTER).

4. **STANDARD OF CARE**. The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances. No other warranty, expressed or implied, is made or intended in the Report. It is intended that the Findings and Recommendations are meant to assist in reducing the Client's risk associated with environmental impairment at the Site. The Report should not be considered risk mitigation.

5. **ENTIRE REPORT**. The Report also includes the Report Documents. In order to properly understand the Findings and Recommendations, reference must be made to the Report in its entirety. JLP is not responsible for use by any party of a part of the Report only.

6. **GOVERNING FORMAT**. Notwithstanding that JLP may have submitted an electronic version of the Report or any document forming part of the Report, only the signed and sealed physical copy of the Report shall be deemed to be the original and in the event of any dispute or discrepancy, the physical copy shall govern. JLP makes no representation about the compatibility of its electronic or digital file format with the Client's current or future software and/or hardware systems. The documents described herein are JLP's instruments of professional service and shall not be altered without the written consent of JLP.

7. **GENERAL LIMITATIONS**.

   (a) Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

   (b) The Report contains no opinion or determination as to any matters governed by laws other than the laws of the Province of Ontario and the federal laws of Canada applicable therein as of the date hereof.

   (c) During any future development of the Site, conditions not observed during JLP's investigations may become apparent. If this occurs, JLP should be contacted to assess the situation and whether there is a need for additional testing.

Appendix B – Sampling and Analysis Plan

MEMORANDUM

Project Name:	Proposal #21-22, Site Development, Operations Centre - 965 Gartshore Street, Fergus, Ontario	**Project Number:**	G4566-22-9
		Date:	December 30, 2022
		From:	Cindy Luu, B.Sc. Ajay Jayalath, M.Sc., MBA, P.Geo., QP Alexander Lee, M.Sc. (Eng.), P.Eng., QP
To:	Township of Centre Wellington 1 MacDonald Square, Elora, ON N0B 1S0 Tel: (519) 846-9691 Fax: (519) 846-2074		
c/o:	HT Lam, Principal Senior Landscape Architect R.J. Burnside & Associates Ltd. HT.Lam@rjburnside.com Tel: 1-800-265-9662		

RE: Sampling and Analysis Plan
965 Gartshore Street, Fergus, Ontario

1. Introduction

JLP Services Inc. (JLP) was retained by Township of Centre Wellington c/o R.J. Burnside & Associates Ltd. ("Client") to conduct Excess Soil Management Program (sampling and reporting activities) for the proposed site development of a Township Operations Centre located in Fergus, Ontario, herein referred to as the "Site" and "Project Area".

The Site is to be reconstructed in the near future as part of Township of Centre Wellington's construction projects. The reconstruction activities will generate excess soil which will need to be managed and disposed of in a safe and sustainable manner. The volume of soil to be generated during the reconstruction activities is unknown during the fieldwork and reporting phases. Thus, additional sampling and reporting will be required when detailed development plans and excess soil volumes are available.

JLP conducted an Assessment of Past Uses (APU) for the Project Area in December 2022, which should be read in conjunction with this Sampling and Analysis Plan (SAP). This SAP was completed in accordance with Ontario Regulation (O.Reg.) 406/19 and the Ministry of Environmental, Conservation and Parks (MECP) document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS).

The SAP was developed to investigate any Potentially Contaminating Activities (PCAs) and Areas of Potential Environmental Concern (APECs) highlighted in the APU. It is to be noted that groundwater sampling is outside the scope of this excess soil investigation.

2. Assessment of Past Uses

JLP conducted an Assessment of Past Uses (APU) for the Project Area in December 2022. A summary of the APECs and associated PCAs are summarized in Table 2.1 below and shown on Figure 3 as attached.

Table 2.1: Areas of Potential Environmental Concern

APEC	Location	APEC Dimension	PCA	Location of PCA	Contaminant of Concern
APEC #1	Entire Project Area	20 acres	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site historical pesticide use	OCPs Metals
APEC #2	Central Farm Portion	2 acres	PCA (Other)- De-icing activities	De-icing of asphalt/gravel roadway to the farm area	EC/SAR
APEC #3	Southern Portion of Site	5 acres	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	950 Gartshore Street - adjacent property to the east	VOCs
			#33 - Metal Treatment, Coating, Plating and Finishing #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks	935 Gartshore Steet - adjacent property to the east	Metals & HFM VOCs PHCs F1 to F4 & BTEX
			PCA #33 - Metal Treatment, Coating, Plating and Finishing	151 Gregson Court - upgradient from Subject Site	Metals & HFM VOCs PHC & BTEX
			PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	938 Glengarry Crescent - upgradient from Subject Site	Metals VOCs PHC & BTEX

Notes:
APEC: Area of Potential Environmental Concern
PCA: Potentially Contaminating Activity
PHCs F1 to F4: Petroleum Hydrocarbons Fractions F1 to F4
BTEX: Benzene, Toluene, Ethylbenzene and Xylenes
VOCs: Volatile Organic Compounds
EC: Electrical Conductivity
SAR: Sodium Adsorption Ratio
OCPs: Organochlorine Pesticides
PAH: Polycyclic Aromatic Hydrocarbons
HFM: Hydride Forming Metals

3. Sampling and Analysis Plan

At the time of the fieldwork and reporting phases, the estimated volume of excess soil to be generated during reconstruction activities on-Site is unknown. Given the scope of work prescribed within the Request for Proposal (RFP) #21-22 "Consulting Services, Site Development- Operations Centre", four (4) samples were collected throughout the Project Area for Petroleum Hydrocarbons (PHCs) fractions F1 to F4, including benzene, toluene, ethylbenzene and xylenes (BTEX), Organochlorine Pesticides (OCPs), metals and hydride forming metals, pH, electrical conductivity (EC) and sodium adsorption ratio (SAR). One (1) duplicate sample for each parameter was obtained and analyzed for quality control purposes.

It is to be noted that the scope of work for the excess soil program was prescribed within the RFP #21-22 "Consulting Services, Site Development- Operations Centre". The subsurface investigation program was completed for Geotechnical Investigation completed by JLP and Hydrogeological Investigation completed by R.J. Burnside & Associates Limited. Thus, additional sampling and reporting as per the Sampling and Analysis Plan prepared by JLP will be required when development plans and excess soil volumes are available.

JLP should be retained to ensure that the sampling and analysis plan meets the requirements of O.Reg. 406/19 during the construction activities. The proposed soil samples will be collected using a CME- track mounted drill rig with a split spoon sampler. Private and public locate clearances will be completed prior to the drilling activities. Soil Samples will be collected at regular intervals for field screening purposes and visual/olfactory observations, including evidence of impacts. A hydrocarbon surveyor will be used to measure total organic content. Selected soil samples based on field screening will be collected and submitted for laboratory analysis.

It is to be noted that the minimum number of soil samples required to comply with O.Reg. 406/19 is outlined in the MECP document "Rules for Soil Management and Excess Soil Quality Standards" (ESQS). The sampling requirements are summarized in the Table 3.1 below.

Table 3.1: Excess Soil Sampling Frequency

Volume Threshold	Minimum Number of Samples	Minimum Number of Samples for Leachate Analysis*
≤350 m^3 to <600 m^3	≥ 3 samples	≥ 3 samples
>600 m^3 to <10,000 m^3	≥ 1 sample for each additional 200 m^3 within threshold limits	≥ 3 samples + 10% of Bulk Soil Samples collected
>10,000 m^3 to <40,000 m^3	≥ 1 sample for each additional 450 m^3 within threshold limits	
>40,000 m^3	≥ 1 sample for each additional 2,000 m^3 within threshold limits	

Notes:
*Soil sample parameters that are below Table 1: Full Depth Background Site Condition Standards, leaching of contaminants are not anticipated and leachate analysis is not required.

Table 3.2: Sampling Requirements and Planned Sampling (in RFP #21-22)

Parameters	Total Samples Required	Samples Prescribed in RFP #21-22 and completed by JLP	Additional Samples Required in future
Metals & Inorganics	9	5	4
Petroleum Hydrocarbons Fractions F1 to F4	7	5	2
Volatile Organic Compounds	3	0	3
Organochlorinated Pesticides	7	5	2
Notes: Leachate sampling requirements are pending the soil sample results compared to Table 1: Full Depth Background Site Condition Standard.			

Details regarding boreholes, sampling depths, and sampling parameters are outlined in Appendix B.

4. Field Sampling and Additional Precautions

- Boreholes will be advanced using a track-mounted drill rig using a split spoon sampler.
- Samples will be collected and inspected (visual/olfactory) and screened using a hydrocarbon surveyor. One worst case soil sample will be collected for each parameter from each of the boreholes for laboratory analysis. The soil samples selected for laboratory analysis were immediately placed into laboratory prepared glass jars, labelled, and stored in a cooler with ice at less than 10˚C.
- It is to be noted that samples will only be collected within the excavated depth. In the event of notable contamination, deeper delineation samples will be retrieved on placed on hold- pending Client's approval for analysis.
- Washing/decontamination split spoons/trowels using alconox and disposable gloves for each new soil sample are some precautions that may be taken in the field to minimize cross-contamination.

5. Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Sincerely,

JLP Services Inc.

Cindy Luu, B.Sc
Environmental Scientist

Ajay Jayalath, M.Sc., MBA, P.Geo., QP.
Senior Environmental Scientist

Alexander Lee, M.Sc. (Eng.), P.Eng., QP
Senior Consultant, Partner

LICENSED PROFESSIONAL ENGINEER
A. H-M. LEE
PROVINCE OF ONTARIO

JLP
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Figures

Legend:

Project Area

Study Area

N

Project North

JLP

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Site and Surrounding Area Land Use Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 2
Source: Google Maps	Scale: N.T.S.	

Legend

Project Area

N
Project North

JLP
Geotechnical & Environmental Consultants

Site Plan
965 Gartshore Street,
Fergus, Ontario

Date: July 27, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 1
Source: Google Maps	Scale: N.T.S.	

APEC	Location	PCA	APEC Dimension	Contaminant of Concern
APEC #1	Entire Project Area	PCA #40	20 acres	Organochlorine Pesticides, Metals
APEC #2	Central Farm Portion	PCA (Other)	2 acres	EC/SAR
APEC #3	Southern Portion of Site	PCA #51	5 acres	VOCs
		PCA #27 & 28		PHC & BTEX
		PCA #39		Metals & HFM, VOCs
		PCA #33		Metals & HFM, VOCs, PHC & BTEX
		PCA #57		Metals, VOCs, PHC & BTEX

Legend:

Project Area

Areas of Potential Concern (APECs)

APEC 1- Entire Site Area

APEC 2 - Central Farm Portion

APEC 3 - Southern Portion of Site

Potentially Contaminating Activities (PCAs)

PCA Location

PCA	Description	Contributing to APECs at Site
PCA 1	PCA #40 - Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Yes (On-Site)
PCA 2	PCA (Other)- De-icing activities	Yes (On-Site)
PCA 3	PCA #51 - Solvent Manufacturing, Processing and Bulk Storage	Yes (potential groundwater migration)
PCA 4	PCA #27- Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles PCA #28 - Gasoline and Associated Products Storage in Fixed Tanks PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 5	PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)
PCA 6	PCA #33 - Metal Treatment, Coating, Plating and Finishing	Yes (potential groundwater migration)
PCA 7	PCA #33 - Metal Treatment, Coating, Plating and Finishing PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #57 - Vehicles and Associated Parts Manufacturing	Yes (potential groundwater migration)
PCA 8	PCA #39 - Paints Manufacturing, Processing and Bulk Storage PCA #43 - Plastics (including Fiberglass) Manufacturing and Processing	No (cross gradient to Site)

N
Project North

JLP
Geotechnical & Environmental Consultants

Potentially Contaminating Activities
965 Gartshore Street,
Fergus, Ontario

Date: Aug. 3, 2022	Ref. No. G4599-22-6	
Prepared By: CL	Checked by: AJ	FIG. No. 3
Source: Google Maps	Scale: N.T.S.	

Appendix A – Limitations and Use of Report

REPORT TERMS AND CONDITIONS

NOTICE: THE FOLLOWING PROVISIONS SET FORTH IMPORTANT QUALIFICATIONS AND LIMITATIONS ON THE FINDINGS AND RECOMMENDATIONS IN THE REPORT AS WELL AS THE USE OF, AND RELIANCE ON, THE REPORT.

1. **DEFINITIONS**. The following capitalized terms have the following meanings:

   (a) "**Additional Investigations**" means investigations that JLP has indicated to the Client should be undertaken to take into account any Out-of-Scope Requirements, but that are not otherwise specifically within the scope of investigations conducted for the purpose of the Report.

   (b) "**Applicable Laws**" means and includes without limitation all applicable provincial laws, regulations, guidelines, policies, standards, protocols, and objectives administered by the Ministry of the Environment and Climate Change or any other duly-constituted governmental authority, all as in force as of the date of the Report.

   (c) "**Client**" means the Client as referred to in the Report.

   (d) "**Client Information**" means the information, representations, and instructions provided by the Client, the Client's representatives, and/or others and upon which the Report is based, in whole or in part.

   (e) "**Findings**" means the evaluations and conclusions set forth in the Report.

   (f) "**JLP**" means JLP Services Inc.

   (g) "**Out-of-Scope Requirements**" means special concerns or requirements of the Client in respect of the subject matter of the Report.

   (h) "**Recommendations**" mean the findings and recommendations referred to in the Report, taking into account any Out-of-Scope Requirements that were disclosed to JLP prior to the date of the Report.

   (i) "**Report**" means the report to which these Terms and Conditions are attached and form part.

   (j) "**Report Documents**" means the underlying documents, records, data, and files, in any medium whatsoever, generated in connection with the preparation of the Report, including without limitation, the instructions and objectives communicated to JLP by the Client, communications between JLP and the Client, and other reports, proposals, or documents prepared by JLP for the Client in connection with the Site.

   (k) "**Site**" means the site in respect of which the Report was prepared.

   (l) "**Site Conditions**" means Site conditions known as a result of, or reasonably imputed by, the investigations that were undertaken as of the date of the Report.

2. **BASIS OF REPORT**. The Report is based on the Site Conditions. Any changes to the Site Conditions after the date of the Report that could or will affect the Site Conditions may or will have a corresponding effect on the Recommendations. The Report does not take into account any (a) Additional Investigations that were not undertaken, or (b) Out-of-Scope Requirements that were not communicated prior to completion of the investigations that were been undertaken as of the date of the Report. Where recommended field services are referred to, they are the minimum services necessary to determine compliance of construction with Applicable Laws, generally accepted industry-standard practices, and the Recommendations.

3. **RELIANCE & USE**. The Report has been prepared only for the Site and the related design, development, building, or building assessment objectives identified by the Client. The Findings and Recommendations are based on the Site Conditions and the Client Information. In preparing the Report, JLP has relied upon the Client Information and disclaims any responsibility for any inaccuracy, misstatement, omission, unintentional misrepresentation, or other deficiency contained in the Report as a result of such reliance. Unless specifically stated otherwise, the applicability and reliability of the Findings and the Recommendations expressed in the Report are only valid to the extent that (a) there has been no material change to or variation from any of the Client Information, (b) the Client Information contains no untrue statement of a material fact, or (c) the Client Information omits no statement of a material fact necessary in order to make the Client Information not misleading.

   The Report and the Findings and Recommendations are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the prior written consent of JLP, which may be arbitrarily withheld or conditioned.

   RELIANCE UPON THE REPORT OR ANY OF THE DETERMINATIONS MADE HEREIN BY A THIRD PARTY WITHOUT JLP'S CONSENT IS PROHIBITED AND JLP MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY IN FAVOUR OF ANY THIRD PARTY WITH RESPECT TO THE REPORT WHATSOEVER. JLP FULLY DISCLAIMS, AND WILL HAVE NO LIABILITY FOR, ANY LOSS, DAMAGES, OR EXPENSES WHICH ANY THIRD PARTY MAY INCUR OR SUFFER AS A RESULT OF THE USE OF OR RELIANCE ON THIE REPORT WHERE JLP HAS NOT EXPRESSLY AUTHORIZED SAME. ANY THIRD PARTY WHO RELIES ON THE REPORT TO ANY EXTENT DOES SO AT SUCH PARTY'S OWN RISK AND COMPLETELY WAIVES ANY AND ALL CLAIMS AGAINST JLP IN CONNECTION WITH THE REPORT, REGARDLESS OF THE THEORY OF LAW (WHETHER IN CONTRACT, TORT, OR ANY THEORY OF LAW COMING INTO EXISTENCE HEREAFTER).

4. **STANDARD OF CARE**. The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances. No other warranty, expressed or implied, is made or intended in the Report. It is intended that the Findings and Recommendations are meant to assist in reducing the Client's risk associated with environmental impairment at the Site. The Report should not be considered risk mitigation.

5. **ENTIRE REPORT**. The Report also includes the Report Documents. In order to properly understand the Findings and Recommendations, reference must be made to the Report in its entirety. JLP is not responsible for use by any party of a part of the Report only.

6. **GOVERNING FORMAT**. Notwithstanding that JLP may have submitted an electronic version of the Report or any document forming part of the Report, only the signed and sealed physical copy of the Report shall be deemed to be the original and in the event of any dispute or discrepancy, the physical copy shall govern. JLP makes no representation about the compatibility of its electronic or digital file format with the Client's current or future software and/or hardware systems. The documents described herein are JLP's instruments of professional service and shall not be altered without the written consent of JLP.

7. **GENERAL LIMITATIONS**.

   (a) Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

   (b) The Report contains no opinion or determination as to any matters governed by laws other than the laws of the Province of Ontario and the federal laws of Canada applicable therein as of the date hereof.

   (c) During any future development of the Site, conditions not observed during JLP's investigations may become apparent. If this occurs, JLP should be contacted to assess the situation and whether there is a need for additional testing.

Appendix B – Sampling and Analysis Plan

Excess Soil Management

Sampling and Analysis Plan

APEC	Borehole	Sample Number	Soil Analysis				Depth	
			Metals & Inorganics	Organochlorinated Pesticides	Petroleum Hydrocarbons	Volatile Organic Compounds	From (m)	To (m)
APEC 1 (Entire Site)	BH2	SS1	x	x			grade	0.6
	BH2	SS2			x		0.8	1.4
	BH3	SS1	x	x			grade	0.6
	BH3	SS2			x		0.8	1.4
	BH5	SS1	x	x			grade	0.6
	BH5	SS2			x		0.8	1.4
	BH6	SS1	x	x			grade	0.6
	BH6	SS2			x		0.8	1.4
APEC 2 (Central Farm Portion)	BH6	SS1	x				grade	0.6
	Required (BHX)	SS1	x				grade	0.6
	Required (BHY)	SS1	x				grade	0.6
APEC 3 (Southern Portion of Site)	BH5	SS1	x	x			grae	0.6
	BH5	SS2			x	x	0.8	1.4
	Required	SS1	x	x			grade	0.6
	Required	SS2			x	x	0.8	1.4
	Required	SS1	x	x			grade	0.6
	Required	SS2			x	x	0.8	1.4
Quality Control Samples	BH201 (Duplicate of BH2)	SS1	x	x			grade	0.6
	BH201 (Duplicate of BH2)	SS2			x	x	0.8	1.4
		Sub-Total:	5	5	5	0		
		Additionally Required	4	2	2	3		
		Total Samples Collected:	5	*for each parameter*				

Notes:

*This Sampling and Analysis Plan outlines the scope of work prescribed within the RFP #21-22 "Consulting Services, Site Development- Operations Centre".

Highlighted cells indicate additional sampling (outside of sampling prescribed in RFP #21-22) required to investigate PCAs and APECs identified in the APU.

Additional or alternative samples will be analyzed based on field observations (staining, odour and/or high vapour readings, etc.).

Deeper delineation samples may be obtained for future analysis- pending client approval.

Required Samples for unknown cubic metres	
1 sample per 200 cubes to 10,000	unknown
Total minimum needed	unknown

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Appendix C – Borehole Logs

BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 26-10-22 **COMPLETED** 26-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.43 m / Elev 421.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining. (0.3)	SS 1	1-3-4-6 (7)					
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining.	SS 2	3-2-3-4 (5)					
422	2		(1.9) **SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.	SS 3	2-3-9-9 (12)					
				SS 4	3-6-5-4 (11)					
421	3			SS 5	2-6-5-10 (11)					
420	4			SS 6	4-7-10-17 (17)					
419	5			SS 7	9-23-50 (73)					
418	6		(6.3) **SANDY SILT TILL** trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining.	SS 8	9-12-48-42 (60)					
417	7									
416	8			SS	19-29-32-31					

(Continued Next Page)

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BORING NUMBER BH1D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, very dense no odour, no staining. *(continued)*	9	(61)					
415	9									
				SS 10	23-32-44-50 (76)					
414	10									
413	11			SS 11	40-50					
412	12									
				SS 12	24-33-20-47 (53)					
411	13									
410	14			SS 13	50/0.10				>>	
409	15									
			15.3	SS 14	50/0.10				>>	

End of Borehole at 15.34 mbgs.

BORING NUMBER BH1S

JLP
Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.881 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.34 m / Elev 422.54 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, trace gravel, scattered organic inclusions; black to dark brown, moist no odour, no staining. (0.3)							
423	1		**SANDY SILT TILL** trace to some gravel, scattered organic inclusions in upper zone; dark brown to brown, moist, loose to compact no odour, no staining. (1.9)							
422	2		**SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact to very dense no odour, no staining.							
421	3									
420	4									
419	5		(5.2)							

End of Borehole at 5.18 mbgs.

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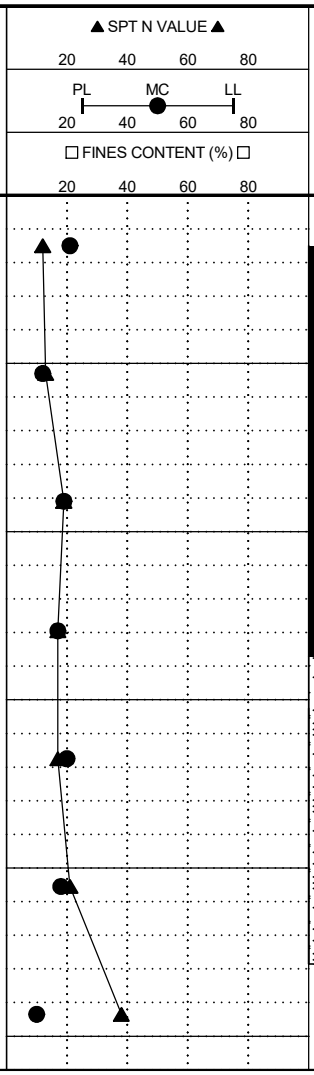
BORING NUMBER BH2

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 423.47 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 1.23 m / Elev 422.24 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
423			**TOPSOIL** sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining.	0.3	SS 1	2-4-8-8 (12)			
	1		**SANDY SILT TILL** trace to some gravel inclusions; dark brown to brown, moist, compact no odour, no staining.		SS 2	3-4-9-7 (13)			
422				1.7	SS 3	7-8-11-10 (19)			
	2		**SILTY SAND** fine grained, scattered silt seams; brown, wet to saturated, compact no odour, no staining.						
421					SS 4	6-7-10-11 (17)			
	3								
420					SS 5	5-7-10-11 (17)			
	4				SS 6	5-8-13-13 (21)			
419									
	5			5.0	SS 7	8-19-19-15 (38)			
			SANDY SILT TILL trace gravel inclusions, trace clay; grey, moist, dense no odour, no staining.	5.2					

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

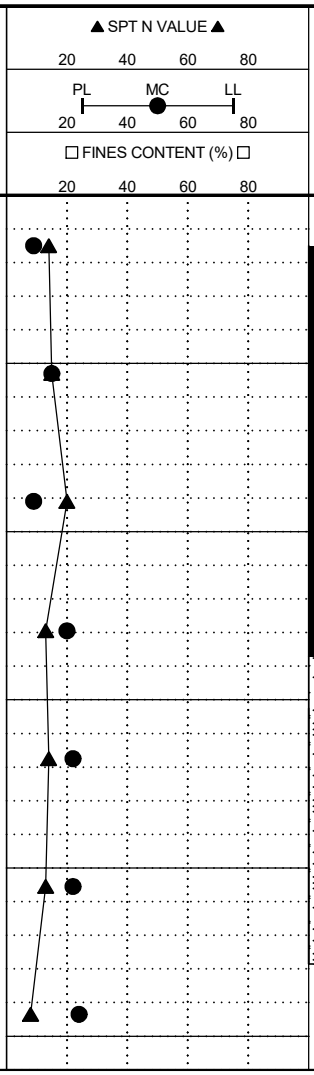
BORING NUMBER BH3

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.06 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.64 m / Elev 422.42 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
425			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-5-9-12 (14)			
424	1		**SANDY SILT TILL** trace to some gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining.	1.6	SS 2	9-10-5-6 (15)			
423	2		**SILTY SAND** fine to medium grained; brown, moist to wet, compact to loose no odour, no staining.		SS 3	7-11-9-8 (20)			
					SS 4	4-5-8-5 (13)			
422	3				SS 5	5-6-8-4 (14)			
421	4				SS 6	6-6-7-6 (13)			
420	5		becoming grey at 5.0m	5.2	SS 7	4-3-5-5 (8)			

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH4

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 27-10-22 **COMPLETED** 27-10-22
GROUND ELEVATION 425.668 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.21 m / Elev 423.46 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
			TOPSOIL sandy silt, scattered organic inclusions and rootlets; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-5-7-5 (12)					
425	1		**SANDY SILT TILL** trace gravel inclusions, scattered organic inclusions in upper zone; dark brown to brown, moist, compact no odour, no staining.	1.5	SS 2	3-5-8-7 (13)					
424	2		**SILTY SAND** fine to medium grained; brown, wet to saturated, compact to loose no odour, no staining.		SS 3	4-5-5-5 (10)					
423	3				SS 4	4-5-5-7 (10)					
422	4		becoming grey at about 4.1m		SS 5	2-2-7-4 (9)					
				4.5	SS 6	4-10-8-4 (18)					
421	5		**SANDY SILT TILL** trace to some clay,trace gravel inclusions, scattered sand seams; grey, wet, compact no odour, no staining.	5.2	SS 7	3-6-4-5 (10)					

End of Borehole at 5.18 mbgs.

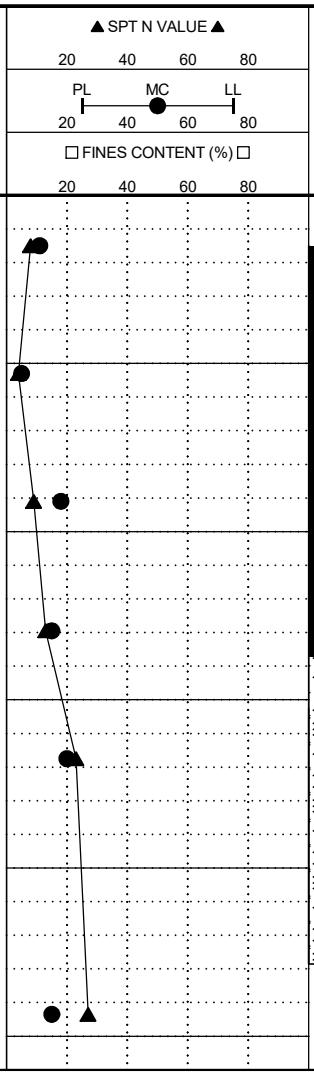
BORING NUMBER BH5

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.339 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.82 m / Elev 423.52 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.2	SS 1	2-3-5-5 (8)			
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	3-2-2-1 (4)			
426									
	2				SS 3	3-4-5-6 (9)			
425					SS 4	4-6-7-8 (13)			
	3								
424					SS 5	7-12-11-12 (23)			
	4								
423				4.8	SS 6	8-14-13-18 (27)			
	5		**SANDY SILT TILL** trace to some gravel inclusions; grey, moist, compact no odour, no staining.	5.2					

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

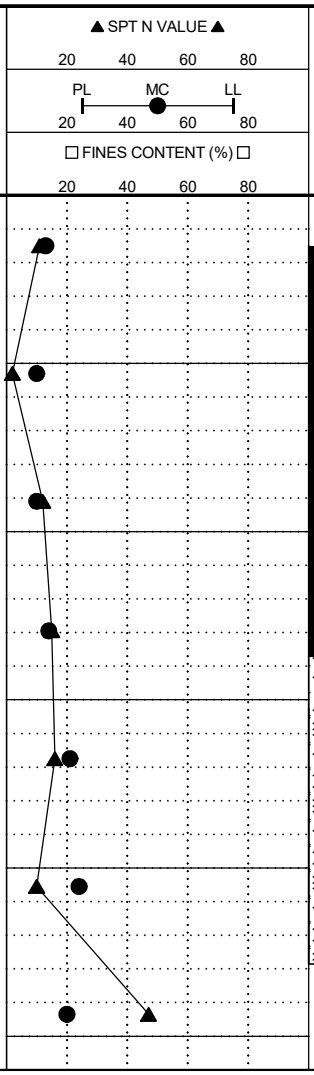
BORING NUMBER BH6

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 427.327 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 3.88 m / Elev 423.45 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	DEPTH (m)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS
427			**TOPSOIL** sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	0.3	SS 1	1-5-6-4 (11)			
	1		**SILTY SAND** fine to medium grained; brown, moist to wet, loose to compact no odour, no staining.		SS 2	2-1-1-1 (2)			
426									
	2				SS 3	1-5-7-9 (12)			
425					SS 4	3-6-9-7 (15)			
	3								
424					SS 5	5-8-8-10 (16)			
	4				SS 6	4-4-6-7 (10)			
423				4.7					
	5		**SANDY SILT TILL** trace to some gravel inclusions; brown, moist, dense no odour, no staining.	5.2	SS 7	13-19-28-37 (47)			

End of Borehole at 5.18 mbgs.



WELL CONSTRUCTION

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 24-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY AK **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 11.78 m / Elev 413.57 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	SPT N VALUE / PL MC LL / FINES CONTENT (%)	WELL CONSTRUCTION
425			**TOPSOIL** (0.2) sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.	SS 1	2-4-6-6 (10)					
	1		**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.	SS 2	5-4-5-6 (9)					
424										
	2			SS 3	7-9-10-10 (19)					
423				SS 4	3-5-6-6 (11)					
	3									
422				SS 5	5-6-8-7 (14)					
	4			SS 6	3-8-9-9 (17)					
421										
	5			SS 7	8-8-10-8 (18)					
420										
	6									
419			sand and gravel, some silt, coarse grained, clayey seams; wet	SS 8	18-16-50 (66)					
	7									
418			(7.3) **SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining.	SS 9	50/0.10				>>	
	8									

(Continued Next Page)

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
417			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	9									
416				SS 10	50/0.13				>>	
	10									
415										
	11			SS 11	41-50					
414										
	12									
413				SS 12	50/0.10				>>	
	13									
412										
	14			SS 13	45-45-50 (95)					
411										
	15									
410				SS 14	16-16-50 (66)					
	16									
409										
	17			SS 15	50/0.13				>>	

(Continued Next Page)

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BORING NUMBER BH7D

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington

PROJECT NAME Operation Centre

PROJECT NUMBER G4599-22-6

PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
408			**SANDY SILT TILL** some clay, trace to some gravel; grey, wet, very dense no odour, no staining. *(continued)*							
	18									
407				SS 16	50/0.13				>>	
	19									
406										
	20			SS 17	50/0.13				>>	
405										
	21									
404				SS 18	50/0.13				>>	
	22									
403										
	23			SS 19	50/0.13				>>	
402										
	24									
401				SS 20	50/0.13				>>	
	25									
			25.3	SS 21	40-50					

End of Borehole at 25.3 mbgs.

JLP Services Inc., www.jlpservices.ca

BORING NUMBER BH7S

JLP Geotechnical & Environmental Consultants

CLIENT Township of Centre Wellington
PROJECT NAME Operation Centre
PROJECT NUMBER G4599-22-6
PROJECT LOCATION 965 Gartshore Street, Fergus, Ontario
DATE STARTED 25-10-22 **COMPLETED** 25-10-22
GROUND ELEVATION 425.347 m Geodetic **HOLE SIZE** 200mm
DRILLING CONTRACTOR Pontil Drilling
GROUND WATER LEVELS:
DRILLING METHOD D50. Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY GB **CHECKED BY** AL
AT END OF DRILLING ---
NOTES
AFTER DRILLING 2.72 m / Elev 422.63 m

ELEV. (m)	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION (DEPTH (m))	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	RECOVERY %	HEADSPACE VAPOUR	ANALYSIS	▲SPT N VALUE▲ 20 40 60 80 / PL MC LL 20 40 60 80 / ☐FINES CONTENT (%)☐ 20 40 60 80	WELL CONSTRUCTION
425			**TOPSOIL** 0.2 sandy silt, scattered organic seams and inclusions; black to dark brown, moist no odour, no staining.							
	1		**SILTY SAND** fine grained, scattered organic inclusions in upper zone; dark brown to brown, moist to wet, compact no odour, no staining.							
424										
	2									
423										
	3									
422										
	4									
421										
	5		5.2							

End of Borehole at 5.18 mbgs.

JLP Services Inc., www.jlpservices.ca

Appendix D – Laboratory Certificates of Analysis

ALS Canada Ltd.

right solutions. right partner.

CERTIFICATE OF ANALYSIS (GUIDELINE EVALUATION)

Work Order	: **WT2220348**	Page	: 1 of 12
Amendment	: **2**		
Client	: **JLP Services Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Ajay Jayalath	Account Manager	: Andrew Martin
Address	: 405 York Road Guelph ON Canada N1E 3H3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 519 763 3101	Telephone	: +1 519 886 6910
Project	: G4599	Date Samples Received	: 01-Nov-2022 17:48
PO	: ----	Date Analysis Commenced	: 05-Nov-2022
C-O-C number	: 17-641692	Issue Date	: 02-Dec-2022 14:48
Sampler	: CLIENT		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Guideline Comparison

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amarpreet Singh	Analyst	Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Inorganics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Joseph Scharbach		Centralized Prep, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Organics, Waterloo, Ontario

No Breaches Found

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.
Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Application of guidelines is provided "as is" without warranty of any kind, either expressed or implied, including, but not limited to fitness for a particular purpose, or non-infringement. ALS assumes no responsibility for errors or omissions in the information. Guidelines are not adjusted for the hardness, pH or temperature of the sample (the most conservative values are used). Measurement uncertainty is not applied to test results prior to comparison with specified criteria values.

Key : LOR: Limit of Reporting (detection limit).

Unit	*Description*
-	no units
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
mS/cm	millisiemens per centimetre
pH units	pH units

>: greater than.
<: less than.
Red shading is applied where the result is greater than the Guideline Upper Limit or the result is lower than the Guideline Lower Limit.
For drinking water samples, Red shading is applied where the result for E.coli, fecal or total coliforms is greater than or equal to the Guideline Upper Limit.

Workorder Comments

Amendment (28/11/2022): This report has been amended and re-released to allow the reporting of additional analytical data.

Amendment (02/12/2022): This report has been amended and re-released to allow additional guideline criteria. All analysis results are as per the previous report.

Qualifiers

Qualifier	Description
FR5	*As per applicable reference method(s), soil:water ratio for Fixed Ratio Leach was modified to 1:5 due to high soil organic content*

Analytical Results Evaluation

Matrix: **Soil**

Analyte	CAS Number	Unit	BH5- SS1	BH5- SS2	BH2- SS1	BH2- SS2	BH201- SS1	BH201- SS2	BH3- SS1
Client sample ID			BH5- SS1	BH5- SS2	BH2- SS1	BH2- SS2	BH201- SS1	BH201- SS2	BH3- SS1
Sampling date/time			25-Oct-2022 13:45	25-Oct-2022 13:55	27-Oct-2022 13:00	27-Oct-2022 13:05	27-Oct-2022 13:10	27-Oct-2022 13:15	27-Oct-2022 14:40
Sub-Matrix			Soil	Soil	Soil	Soil	Soil	Soil	Soil
			WT2220348-001	WT2220348-002	WT2220348-003	WT2220348-004	WT2220348-005	WT2220348-006	WT2220348-007
Physical Tests									
conductivity (1:2 leachate)	----	mS/cm	----	0.105	0.129	----	0.146	----	0.224 FR5
moisture	----	%	10.8	9.84	22.4	9.38	13.4	8.25	10.0
pH (1:2 soil:CaCl2-aq)	----	pH units	----	7.17	7.39	----	7.61	----	7.62
Cyanides									
cyanide, weak acid dissociable	----	mg/kg	----	<0.050	<0.050	----	<0.050	----	<0.050
Fixed-Ratio Extractables									
calcium, soluble ion content	7440-70-2	mg/L	----	13.4	20.3	----	23.3	----	15.1 FR5
magnesium, soluble ion content	7439-95-4	mg/L	----	1.78	1.46	----	1.81	----	1.43 FR5
sodium, soluble ion content	17341-25-2	mg/L	----	0.87	0.96	----	1.16	----	0.72 FR5
sodium adsorption ratio [SAR]	----	-	----	<0.10	<0.10	----	<0.10	----	<0.10 FR5
Metals									
antimony	7440-36-0	mg/kg	----	<0.10	<0.10	----	<0.10	----	0.10
arsenic	7440-38-2	mg/kg	----	1.87	1.54	----	1.75	----	3.16
barium	7440-39-3	mg/kg	----	17.0	10.8	----	12.5	----	50.1
beryllium	7440-41-7	mg/kg	----	0.20	0.13	----	0.15	----	0.38
boron	7440-42-8	mg/kg	----	<5.0	<5.0	----	<5.0	----	6.3
boron, hot water soluble	7440-42-8	mg/kg	----	<0.10	0.29	----	0.30	----	0.14
cadmium	7440-43-9	mg/kg	----	0.091	0.053	----	0.070	----	0.182
chromium	7440-47-3	mg/kg	----	7.95	6.78	----	7.44	----	15.6
cobalt	7440-48-4	mg/kg	----	2.23	1.49	----	1.81	----	5.16
copper	7440-50-8	mg/kg	----	5.17	4.36	----	5.31	----	11.2
lead	7439-92-1	mg/kg	----	6.54	4.12	----	4.48	----	10.7
mercury	7439-97-6	mg/kg	----	0.0111	0.0051	----	0.0061	----	0.0156
molybdenum	7439-98-7	mg/kg	----	0.17	0.14	----	0.15	----	0.45
nickel	7440-02-0	mg/kg	----	5.00	2.97	----	3.46	----	11.3
selenium	7782-49-2	mg/kg	----	<0.20	<0.20	----	<0.20	----	<0.20
silver	7440-22-4	mg/kg	----	<0.10	<0.10	----	<0.10	----	<0.10

Analytical Results Evaluation

Matrix: **Soil**

		Client sample ID	BH5- SS1	BH5- SS2	BH2- SS1	BH2- SS2	BH201- SS1	BH201- SS2	BH3- SS1
		Sampling date/time	25-Oct-2022 13:45	25-Oct-2022 13:55	27-Oct-2022 13:00	27-Oct-2022 13:05	27-Oct-2022 13:10	27-Oct-2022 13:15	27-Oct-2022 14:40
		Sub-Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	CAS Number	Unit	WT2220348-001	WT2220348-002	WT2220348-003	WT2220348-004	WT2220348-005	WT2220348-006	WT2220348-007
Metals									
thallium	7440-28-0	mg/kg	----	<0.050	<0.050	----	<0.050	----	0.085
uranium	7440-61-1	mg/kg	----	0.362	0.367	----	0.400	----	0.654
vanadium	7440-62-2	mg/kg	----	18.8	12.8	----	14.6	----	25.4
zinc	7440-66-6	mg/kg	----	34.6	25.4	----	27.4	----	50.8
Speciated Metals									
chromium, hexavalent [Cr VI]	18540-29-9	mg/kg	----	<0.10	<0.10	----	<0.10	----	<0.10
Volatile Organic Compounds									
benzene	71-43-2	mg/kg	----	<0.0050	----	<0.0050	----	<0.0050	----
ethylbenzene	100-41-4	mg/kg	----	<0.015	----	<0.015	----	<0.015	----
toluene	108-88-3	mg/kg	----	<0.050	----	<0.050	----	<0.050	----
xylene, m+p-	179601-23-1	mg/kg	----	<0.030	----	<0.030	----	<0.030	----
xylene, o-	95-47-6	mg/kg	----	<0.030	----	<0.030	----	<0.030	----
xylenes, total	1330-20-7	mg/kg	----	<0.050	----	<0.050	----	<0.050	----
BTEX, total	----	mg/kg	----	<0.10	----	<0.10	----	<0.10	----
Hydrocarbons									
F1 (C6-C10)	----	mg/kg	----	<5.0	----	<5.0	----	<5.0	----
F2 (C10-C16)	----	mg/kg	----	<10	----	<10	----	<10	----
F3 (C16-C34)	----	mg/kg	----	<50	----	<50	----	<50	----
F4 (C34-C50)	----	mg/kg	----	<50	----	<50	----	<50	----
F1-BTEX	----	mg/kg	----	<5.0	----	<5.0	----	<5.0	----
hydrocarbons, total (C6-C50)	----	mg/kg	----	<80	----	<80	----	<80	----
chromatogram to baseline at nC50	n/a	-	----	YES	----	YES	----	YES	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	%	----	85.7	----	86.0	----	87.5	----
dichlorotoluene, 3,4-	97-75-0	%	----	116	----	103	----	87.6	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	%	----	104	----	99.1	----	91.5	----
difluorobenzene, 1,4-	540-36-3	%	----	120	----	114	----	106	----

Analytical Results Evaluation

Matrix: **Soil**

		Client sample ID	BH5- SS1	BH5- SS2	BH2- SS1	BH2- SS2	BH201- SS1	BH201- SS2	BH3- SS1
		Sampling date/time	25-Oct-2022 13:45	25-Oct-2022 13:55	27-Oct-2022 13:00	27-Oct-2022 13:05	27-Oct-2022 13:10	27-Oct-2022 13:15	27-Oct-2022 14:40
		Sub-Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Analyte	CAS Number	Unit	WT2220348-001	WT2220348-002	WT2220348-003	WT2220348-004	WT2220348-005	WT2220348-006	WT2220348-007
Organochlorine Pesticides									
aldrin	309-00-2	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
chlordane, cis- (alpha)	5103-71-9	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
chlordane, total	57-74-9	mg/kg	<0.030	----	<0.030	----	<0.030	----	<0.030
chlordane, trans- (gamma)	5103-74-2	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDD, 2,4'-	53-19-0	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDD, 4,4'-	72-54-8	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDD, total	----	mg/kg	<0.030	----	<0.030	----	<0.030	----	<0.030
DDE, 2,4'-	3424-82-6	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDE, 4,4'-	72-55-9	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDE, total	----	mg/kg	<0.030	----	<0.030	----	<0.030	----	<0.030
DDT, 2,4'-	789-02-6	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDT, 4,4'-	50-29-3	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
DDT, total	----	mg/kg	<0.030	----	<0.030	----	<0.030	----	<0.030
dieldrin	60-57-1	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
endosulfan, alpha-	959-98-8	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
endosulfan, beta-	33213-65-9	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
endosulfan, total	----	mg/kg	<0.030	----	<0.030	----	<0.030	----	<0.030
endrin	72-20-8	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
heptachlor	76-44-8	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
heptachlor epoxide	1024-57-3	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
hexachlorobenzene	118-74-1	mg/kg	<0.010	----	<0.010	----	<0.010	----	<0.010
hexachlorobutadiene	87-68-3	mg/kg	<0.010	----	<0.010	----	<0.010	----	<0.010
hexachlorocyclohexane, gamma-	58-89-9	mg/kg	<0.010	----	<0.010	----	<0.010	----	<0.010
hexachloroethane	67-72-1	mg/kg	<0.010	----	<0.010	----	<0.010	----	<0.010
methoxychlor	72-43-5	mg/kg	<0.020	----	<0.020	----	<0.020	----	<0.020
Organochlorine Pesticides Surrogates									
decachlorobiphenyl	2051-24-3	%	95.8	----	99.1	----	104	----	87.4
tetrachloro-m-xylene	877-09-8	%	81.2	----	72.0	----	68.7	----	70.3

Analytical Results Evaluation

Matrix: **Soil**

		Client sample ID	BH3- SS2	BH6- SS1	BH6- SS2	----	----	----	----
		Sampling date/time	27-Oct-2022 14:45	27-Oct-2022 12:00	27-Oct-2022 12:05	----	----	----	----
		Sub-Matrix	Soil	Soil	Soil	----	----	----	----
Analyte	CAS Number	Unit	WT2220348-008	WT2220348-009	WT2220348-010	--------	--------	--------	--------
Physical Tests									
conductivity (1:2 leachate)	----	mS/cm	----	0.119	----	----	----	----	----
moisture	----	%	7.45	13.0	4.64	----	----	----	----
pH (1:2 soil:CaCl2-aq)	----	pH units	----	6.83	----	----	----	----	----
Cyanides									
cyanide, weak acid dissociable	----	mg/kg	----	<0.050	----	----	----	----	----
Fixed-Ratio Extractables									
calcium, soluble ion content	7440-70-2	mg/L	----	12.6	----	----	----	----	----
magnesium, soluble ion content	7439-95-4	mg/L	----	2.98	----	----	----	----	----
sodium, soluble ion content	17341-25-2	mg/L	----	1.05	----	----	----	----	----
sodium adsorption ratio [SAR]	----	-	----	<0.10	----	----	----	----	----
Metals									
antimony	7440-36-0	mg/kg	----	0.14	----	----	----	----	----
arsenic	7440-38-2	mg/kg	----	2.81	----	----	----	----	----
barium	7440-39-3	mg/kg	----	49.2	----	----	----	----	----
beryllium	7440-41-7	mg/kg	----	0.34	----	----	----	----	----
boron	7440-42-8	mg/kg	----	<5.0	----	----	----	----	----
boron, hot water soluble	7440-42-8	mg/kg	----	0.55	----	----	----	----	----
cadmium	7440-43-9	mg/kg	----	0.264	----	----	----	----	----
chromium	7440-47-3	mg/kg	----	13.1	----	----	----	----	----
cobalt	7440-48-4	mg/kg	----	4.68	----	----	----	----	----
copper	7440-50-8	mg/kg	----	10.5	----	----	----	----	----
lead	7439-92-1	mg/kg	----	20.8	----	----	----	----	----
mercury	7439-97-6	mg/kg	----	0.0226	----	----	----	----	----
molybdenum	7439-98-7	mg/kg	----	0.36	----	----	----	----	----
nickel	7440-02-0	mg/kg	----	8.46	----	----	----	----	----
selenium	7782-49-2	mg/kg	----	<0.20	----	----	----	----	----
silver	7440-22-4	mg/kg	----	<0.10	----	----	----	----	----
thallium	7440-28-0	mg/kg	----	0.079	----	----	----	----	----
uranium	7440-61-1	mg/kg	----	0.597	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil**

		Client sample ID	BH3- SS2	BH6- SS1	BH6- SS2	----	----	----	----
		Sampling date/time	27-Oct-2022 14:45	27-Oct-2022 12:00	27-Oct-2022 12:05	----	----	----	----
		Sub-Matrix	Soil	Soil	Soil	----	----	----	----
Analyte	CAS Number	Unit	WT2220348-008	WT2220348-009	WT2220348-010	--------	--------	--------	--------
Metals									
vanadium	7440-62-2	mg/kg	----	26.0	----	----	----	----	----
zinc	7440-66-6	mg/kg	----	62.6	----	----	----	----	----
Speciated Metals									
chromium, hexavalent [Cr VI]	18540-29-9	mg/kg	----	<0.10	----	----	----	----	----
Volatile Organic Compounds									
benzene	71-43-2	mg/kg	<0.0050	----	<0.0050	----	----	----	----
ethylbenzene	100-41-4	mg/kg	<0.015	----	<0.015	----	----	----	----
toluene	108-88-3	mg/kg	<0.050	----	<0.050	----	----	----	----
xylene, m+p-	179601-23-1	mg/kg	<0.030	----	<0.030	----	----	----	----
xylene, o-	95-47-6	mg/kg	<0.030	----	<0.030	----	----	----	----
xylenes, total	1330-20-7	mg/kg	<0.050	----	<0.050	----	----	----	----
BTEX, total	----	mg/kg	<0.10	----	<0.10	----	----	----	----
Hydrocarbons									
F1 (C6-C10)	----	mg/kg	<5.0	----	<5.0	----	----	----	----
F2 (C10-C16)	----	mg/kg	<10	----	<10	----	----	----	----
F3 (C16-C34)	----	mg/kg	<50	----	<50	----	----	----	----
F4 (C34-C50)	----	mg/kg	<50	----	<50	----	----	----	----
F1-BTEX	----	mg/kg	<5.0	----	<5.0	----	----	----	----
hydrocarbons, total (C6-C50)	----	mg/kg	<80	----	<80	----	----	----	----
chromatogram to baseline at nC50	n/a	-	YES	----	YES	----	----	----	----
Hydrocarbons Surrogates									
bromobenzotrifluoride, 2- (F2-F4 surr)	392-83-6	%	86.2	----	87.2	----	----	----	----
dichlorotoluene, 3,4-	97-75-0	%	94.2	----	91.6	----	----	----	----
Volatile Organic Compounds Surrogates									
bromofluorobenzene, 4-	460-00-4	%	96.6	----	93.3	----	----	----	----
difluorobenzene, 1,4-	540-36-3	%	112	----	108	----	----	----	----
Organochlorine Pesticides									
aldrin	309-00-2	mg/kg	----	<0.020	----	----	----	----	----

Analytical Results Evaluation

Matrix: **Soil**

		Client sample ID	BH3- SS2	BH6- SS1	BH6- SS2	----	----	----	----
		Sampling date/time	27-Oct-2022 14:45	27-Oct-2022 12:00	27-Oct-2022 12:05	----	----	----	----
		Sub-Matrix	Soil	Soil	Soil	----	----	----	----
Analyte	CAS Number	Unit	WT2220348-008	WT2220348-009	WT2220348-010	--------	--------	--------	--------
Organochlorine Pesticides									
chlordane, cis- (alpha)	5103-71-9	mg/kg	----	<0.020	----	----	----	----	----
chlordane, total	57-74-9	mg/kg	----	<0.030	----	----	----	----	----
chlordane, trans- (gamma)	5103-74-2	mg/kg	----	<0.020	----	----	----	----	----
DDD, 2,4'-	53-19-0	mg/kg	----	<0.020	----	----	----	----	----
DDD, 4,4'-	72-54-8	mg/kg	----	<0.020	----	----	----	----	----
DDD, total	----	mg/kg	----	<0.030	----	----	----	----	----
DDE, 2,4'-	3424-82-6	mg/kg	----	<0.020	----	----	----	----	----
DDE, 4,4'-	72-55-9	mg/kg	----	<0.020	----	----	----	----	----
DDE, total	----	mg/kg	----	<0.030	----	----	----	----	----
DDT, 2,4'-	789-02-6	mg/kg	----	<0.020	----	----	----	----	----
DDT, 4,4'-	50-29-3	mg/kg	----	<0.020	----	----	----	----	----
DDT, total	----	mg/kg	----	<0.030	----	----	----	----	----
dieldrin	60-57-1	mg/kg	----	<0.020	----	----	----	----	----
endosulfan, alpha-	959-98-8	mg/kg	----	<0.020	----	----	----	----	----
endosulfan, beta-	33213-65-9	mg/kg	----	<0.020	----	----	----	----	----
endosulfan, total	----	mg/kg	----	<0.030	----	----	----	----	----
endrin	72-20-8	mg/kg	----	<0.020	----	----	----	----	----
heptachlor	76-44-8	mg/kg	----	<0.020	----	----	----	----	----
heptachlor epoxide	1024-57-3	mg/kg	----	<0.020	----	----	----	----	----
hexachlorobenzene	118-74-1	mg/kg	----	<0.010	----	----	----	----	----
hexachlorobutadiene	87-68-3	mg/kg	----	<0.010	----	----	----	----	----
hexachlorocyclohexane, gamma-	58-89-9	mg/kg	----	<0.010	----	----	----	----	----
hexachloroethane	67-72-1	mg/kg	----	<0.010	----	----	----	----	----
methoxychlor	72-43-5	mg/kg	----	<0.020	----	----	----	----	----
Organochlorine Pesticides Surrogates									
decachlorobiphenyl	2051-24-3	%	----	111	----	----	----	----	----
tetrachloro-m-xylene	877-09-8	%	----	84.3	----	----	----	----	----

Please refer to the General Comments section for an explanation of any qualifiers detected.

Summary of Guideline Limits

Analyte	CAS Number	Unit	ON153/04 T1-RPIICC	ON406/20 T2.1-S-AG					
Physical Tests									
conductivity (1:2 leachate)	----	mS/cm	**0.57 mS/cm**	**0.7 mS/cm**					
moisture	----	%							
pH (1:2 soil:CaCl2-aq)	----	pH units							
Cyanides									
cyanide, weak acid dissociable	----	mg/kg	**0.051 mg/kg**	**0.051 mg/kg**					
Fixed-Ratio Extractables									
calcium, soluble ion content	7440-70-2	mg/L							
magnesium, soluble ion content	7439-95-4	mg/L							
sodium adsorption ratio [SAR]	----	-	**2.4 -**	**5 -**					
sodium, soluble ion content	17341-25-2	mg/L							
Metals									
antimony	7440-36-0	mg/kg	**1.3 mg/kg**	**7.5 mg/kg**					
arsenic	7440-38-2	mg/kg	**18 mg/kg**	**11 mg/kg**					
barium	7440-39-3	mg/kg	**220 mg/kg**	**390 mg/kg**					
beryllium	7440-41-7	mg/kg	**2.5 mg/kg**	**4 mg/kg**					
boron, hot water soluble	7440-42-8	mg/kg		**1.5 mg/kg**					
boron	7440-42-8	mg/kg	**36 mg/kg**	**120 mg/kg**					
cadmium	7440-43-9	mg/kg	**1.2 mg/kg**	**1 mg/kg**					
chromium	7440-47-3	mg/kg	**70 mg/kg**	**160 mg/kg**					
cobalt	7440-48-4	mg/kg	**21 mg/kg**	**22 mg/kg**					
copper	7440-50-8	mg/kg	**92 mg/kg**	**140 mg/kg**					
lead	7439-92-1	mg/kg	**120 mg/kg**	**45 mg/kg**					
mercury	7439-97-6	mg/kg	**0.27 mg/kg**	**0.24 mg/kg**					
molybdenum	7439-98-7	mg/kg	**2 mg/kg**	**6.9 mg/kg**					
nickel	7440-02-0	mg/kg	**82 mg/kg**	**100 mg/kg**					
selenium	7782-49-2	mg/kg	**1.5 mg/kg**	**2.4 mg/kg**					
silver	7440-22-4	mg/kg	**0.5 mg/kg**	**20 mg/kg**					
thallium	7440-28-0	mg/kg	**1 mg/kg**	**1 mg/kg**					
uranium	7440-61-1	mg/kg	**2.5 mg/kg**	**23 mg/kg**					
vanadium	7440-62-2	mg/kg	**86 mg/kg**	**86 mg/kg**					
zinc	7440-66-6	mg/kg	**290 mg/kg**	**340 mg/kg**					
Speciated Metals									
chromium, hexavalent [Cr VI]	18540-29-9	mg/kg	**0.66 mg/kg**	**8 mg/kg**					
Volatile Organic Compounds									
benzene	71-43-2	mg/kg	**0.02 mg/kg**	**0.02 mg/kg**					
BTEX, total	----	mg/kg							
ethylbenzene	100-41-4	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					

Analyte	CAS Number	Unit	ON153/04 T1-RPIICC	ON406/20 T2.1-S-AG					
Volatile Organic Compounds - Continued									
toluene	108-88-3	mg/kg	**0.2 mg/kg**	**0.2 mg/kg**					
xylene, m+p-	179601-23-1	mg/kg							
xylene, o-	95-47-6	mg/kg							
xylenes, total	1330-20-7	mg/kg	**0.05 mg/kg**	**0.091 mg/kg**					
Hydrocarbons									
chromatogram to baseline at nC50	n/a	-							
F1 (C6-C10)	----	mg/kg	**25 mg/kg**	**17 mg/kg**					
F1-BTEX	----	mg/kg	**25 mg/kg**	**17 mg/kg**					
F2 (C10-C16)	----	mg/kg	**10 mg/kg**	**10 mg/kg**					
F3 (C16-C34)	----	mg/kg	**240 mg/kg**	**240 mg/kg**					
F4 (C34-C50)	----	mg/kg	**120 mg/kg**	**2800 mg/kg**					
hydrocarbons, total (C6-C50)	----	mg/kg							
Organochlorine Pesticides									
aldrin	309-00-2	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					
chlordane, cis- (alpha)	5103-71-9	mg/kg							
chlordane, total	57-74-9	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					
chlordane, trans- (gamma)	5103-74-2	mg/kg							
DDD, 2,4'-	53-19-0	mg/kg							
DDD, 4,4'-	72-54-8	mg/kg							
DDD, total	----	mg/kg	**0.05 mg/kg**	**3.3 mg/kg**					
DDE, 2,4'-	3424-82-6	mg/kg							
DDE, 4,4'-	72-55-9	mg/kg							
DDE, total	----	mg/kg	**0.05 mg/kg**	**0.26 mg/kg**					
DDT, 2,4'-	789-02-6	mg/kg							
DDT, 4,4'-	50-29-3	mg/kg							
DDT, total	----	mg/kg	**1.4 mg/kg**	**0.078 mg/kg**					
dieldrin	60-57-1	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					
endosulfan, alpha-	959-98-8	mg/kg							
endosulfan, beta-	33213-65-9	mg/kg							
endosulfan, total	----	mg/kg	**0.04 mg/kg**	**0.04 mg/kg**					
endrin	72-20-8	mg/kg	**0.04 mg/kg**	**0.04 mg/kg**					
heptachlor epoxide	1024-57-3	mg/kg	**0.05 mg/kg**	**0.05 mg/kg**					
heptachlor	76-44-8	mg/kg	**0.05 mg/kg**	**0.072 mg/kg**					
hexachlorobenzene	118-74-1	mg/kg	**0.01 mg/kg**	**0.034 mg/kg**					
hexachlorobutadiene	87-68-3	mg/kg	**0.01 mg/kg**	**0.01 mg/kg**					
hexachlorocyclohexane, gamma-	58-89-9	mg/kg	**0.01 mg/kg**	**0.01 mg/kg**					
hexachloroethane	67-72-1	mg/kg	**0.01 mg/kg**	**0.01 mg/kg**					
methoxychlor	72-43-5	mg/kg	**0.05 mg/kg**	**0.24 mg/kg**					

Please refer to the General Comments section for an explanation of any qualifiers detected.

Key:

ON153/04		Ontario Regulation 153/04 - April 15, 2011 Standards (JUL, 2011)
	T1-RPIICC	153 T1-Soil-Res/Park/Inst/Ind/Com/Commu Property Use
ON406/20		Ontario Regulation 406/19 - Excess Soils - 17-December-20
	T2.1-S-AG	406 T2.1 - Volume Independent Soil - Agricultural or Other Property Use

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **WT2220348**	Page	: 1 of 17
Amendment	: **2**		
Client	: **JLP Services Inc.**	Laboratory	: Waterloo - Environmental
Contact	: Ajay Jayalath	Account Manager	: Andrew Martin
Address	: 405 York Road Guelph ON Canada N1E 3H3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	: 519 763 3101	Telephone	: +1 519 886 6910
Project	: G4599	Date Samples Received	: 01-Nov-2022 17:48
PO	: ----	Issue Date	: 02-Dec-2022 14:49
C-O-C number	: 17-641692		
Sampler	: CLIENT		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Laboratory Control Sample (LCS) Recoveries								
Speciated Metals	QC-732402-002	----	chromium, hexavalent [Cr VI]	18540-29-9	E532	78.3 % LCS-ND	80.0-120%	Recovery less than lower control limit

Result Qualifiers

Qualifier	*Description*
LCS-ND	*Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap BH5- SS2	E336A	25-Oct-2022	05-Nov-2022	14 days	11 days	✓	10-Nov-2022	14 days	5 days	✓
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap BH2- SS1	E336A	27-Oct-2022	05-Nov-2022	14 days	9 days	✓	10-Nov-2022	14 days	5 days	✓
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap BH201- SS1	E336A	27-Oct-2022	05-Nov-2022	14 days	9 days	✓	10-Nov-2022	14 days	5 days	✓
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap BH3- SS1	E336A	27-Oct-2022	05-Nov-2022	14 days	9 days	✓	10-Nov-2022	14 days	5 days	✓
Cyanides : WAD Cyanide (0.01M NaOH Extraction)										
Glass soil jar/Teflon lined cap BH6- SS1	E336A	27-Oct-2022	05-Nov-2022	14 days	9 days	✓	10-Nov-2022	14 days	5 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap BH6- SS1	E484	27-Oct-2022	16-Nov-2022	180 days	20 days	✓	16-Nov-2022	180 days	0 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap BH2- SS1	E484	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap										
BH201- SS1	E484	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap										
BH3- SS1	E484	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓
Fixed-Ratio Extractables : Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)										
Glass soil jar/Teflon lined cap										
BH5- SS2	E484	25-Oct-2022	17-Nov-2022	180 days	23 days	✓	17-Nov-2022	180 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH2- SS2	E581.F1	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	08-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH201- SS2	E581.F1	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	08-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH3- SS2	E581.F1	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	08-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH6- SS2	E581.F1	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	08-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHC - F1 by Headspace GC-FID										
Glass soil methanol vial [ON MECP]										
BH5- SS2	E581.F1	25-Oct-2022	07-Nov-2022	14 days	13 days	✓	07-Nov-2022	40 days	0 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH2- SS2	E601.SG-L	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH201- SS2	E601.SG-L	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH3- SS2	E601.SG-L	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH6- SS2	E601.SG-L	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	14-Nov-2022	40 days	7 days	✓
Hydrocarbons : CCME PHCs - F2-F4 by GC-FID (Low Level)										
Glass soil jar/Teflon lined cap										
BH5- SS2	E601.SG-L	25-Oct-2022	07-Nov-2022	14 days	13 days	✓	10-Nov-2022	40 days	3 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH6- SS1	E487	27-Oct-2022	16-Nov-2022	180 days	20 days	✓	16-Nov-2022	180 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH2- SS1	E487	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH201- SS1	E487	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH3- SS1	E487	27-Oct-2022	17-Nov-2022	180 days	21 days	✓	17-Nov-2022	180 days	0 days	✓
Metals : Boron-Hot Water Extractable by ICPOES										
Glass soil jar/Teflon lined cap										
BH5- SS2	E487	25-Oct-2022	17-Nov-2022	180 days	23 days	✓	17-Nov-2022	180 days	0 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH6- SS1	E510	27-Oct-2022	16-Nov-2022	----	----		16-Nov-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH2- SS1	E510	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	28 days	21 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH201- SS1	E510	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	28 days	21 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH3- SS1	E510	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	28 days	21 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
Glass soil jar/Teflon lined cap										
BH5- SS2	E510	25-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	28 days	23 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH6- SS1	E440	27-Oct-2022	16-Nov-2022	----	----		16-Nov-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH2- SS1	E440	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	180 days	21 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH201- SS1	E440	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	180 days	21 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH3- SS1	E440	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	180 days	21 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
Glass soil jar/Teflon lined cap										
BH5- SS2	E440	25-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	180 days	23 days	✓
Organochlorine Pesticides : OCPs by GC-MS-MS										
Glass soil jar/Teflon lined cap										
BH2- SS1	E660F	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Organochlorine Pesticides : OCPs by GC-MS-MS										
Glass soil jar/Teflon lined cap										
BH201- SS1	E660F	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Organochlorine Pesticides : OCPs by GC-MS-MS										
Glass soil jar/Teflon lined cap										
BH3- SS1	E660F	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Organochlorine Pesticides : OCPs by GC-MS-MS										
Glass soil jar/Teflon lined cap										
BH6- SS1	E660F	27-Oct-2022	07-Nov-2022	14 days	11 days	✓	10-Nov-2022	40 days	3 days	✓
Organochlorine Pesticides : OCPs by GC-MS-MS										
Glass soil jar/Teflon lined cap										
BH5- SS1	E660F	25-Oct-2022	07-Nov-2022	14 days	13 days	✓	10-Nov-2022	40 days	3 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH2- SS1	E100-L	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	30 days	21 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH201- SS1	E100-L	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	30 days	21 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH3- SS1	E100-L	27-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	30 days	21 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH6- SS1	E100-L	27-Oct-2022	16-Nov-2022	----	----		17-Nov-2022	30 days	21 days	✓
Physical Tests : Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)										
Glass soil jar/Teflon lined cap										
BH5- SS2	E100-L	25-Oct-2022	17-Nov-2022	----	----		17-Nov-2022	30 days	23 days	✓
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH2- SS1	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH2- SS2	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH201- SS1	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH201- SS2	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH3- SS1	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH3- SS2	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH5- SS1	E144	25-Oct-2022	----	----	----		06-Nov-2022	----	----	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH5- SS2	E144	25-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH6- SS1	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
Glass soil jar/Teflon lined cap										
BH6- SS2	E144	27-Oct-2022	----	----	----		06-Nov-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH2- SS1	E108A	27-Oct-2022	05-Nov-2022	----	----		09-Nov-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH201- SS1	E108A	27-Oct-2022	05-Nov-2022	----	----		09-Nov-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH3- SS1	E108A	27-Oct-2022	05-Nov-2022	----	----		09-Nov-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH6- SS1	E108A	27-Oct-2022	05-Nov-2022	----	----		09-Nov-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received										
Glass soil jar/Teflon lined cap										
BH5- SS2	E108A	25-Oct-2022	05-Nov-2022	----	----		09-Nov-2022	30 days	15 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH2- SS1	E532	27-Oct-2022	11-Nov-2022	30 days	15 days	✓	15-Nov-2022	7 days	4 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH201- SS1	E532	27-Oct-2022	11-Nov-2022	30 days	15 days	✓	15-Nov-2022	7 days	4 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH3- SS1	E532	27-Oct-2022	11-Nov-2022	30 days	15 days	✓	15-Nov-2022	7 days	4 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH6- SS1	E532	27-Oct-2022	11-Nov-2022	30 days	15 days	✓	15-Nov-2022	7 days	4 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap										
BH5- SS2	E532	25-Oct-2022	11-Nov-2022	30 days	17 days	✓	15-Nov-2022	7 days	4 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH2- SS2	E611A	27-Oct-2022	24-Nov-2022	14 days	28 days	× EHT	24-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH201- SS2	E611A	27-Oct-2022	24-Nov-2022	14 days	28 days	× EHT	24-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH3- SS2	E611A	27-Oct-2022	24-Nov-2022	14 days	28 days	× EHT	24-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH6- SS2	E611A	27-Oct-2022	24-Nov-2022	14 days	28 days	× EHT	24-Nov-2022	40 days	0 days	✓
Volatile Organic Compounds : BTEX by Headspace GC-MS										
Glass soil methanol vial [ON MECP]										
BH5- SS2	E611A	25-Oct-2022	24-Nov-2022	14 days	30 days	× EHT	24-Nov-2022	40 days	0 days	✓

Legend & Qualifier Definitions

EHT: Exceeded ALS recommended hold time prior to analysis.

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Boron-Hot Water Extractable by ICPOES	E487	732953	2	5	40.0	5.0	✓
BTEX by Headspace GC-MS	E611A	756349	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	733565	2	35	5.7	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	732950	2	28	7.1	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	732952	2	10	20.0	5.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	732402	1	15	6.6	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	732949	2	16	12.5	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	732948	2	22	9.0	5.0	✓
Moisture Content by Gravimetry	E144	732947	1	20	5.0	5.0	✓
OCPs by GC-MS-MS	E660F	733115	1	5	20.0	5.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	732403	1	15	6.6	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	732951	2	10	20.0	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	732401	1	15	6.6	5.0	✓
Laboratory Control Samples (LCS)							
Boron-Hot Water Extractable by ICPOES	E487	732953	4	5	80.0	10.0	✓
BTEX by Headspace GC-MS	E611A	756349	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	733565	2	35	5.7	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	732950	2	28	7.1	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	732952	4	10	40.0	10.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	732402	2	15	13.3	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	732949	4	16	25.0	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	732948	4	22	18.1	10.0	✓
Moisture Content by Gravimetry	E144	732947	1	20	5.0	5.0	✓
OCPs by GC-MS-MS	E660F	733115	1	5	20.0	5.0	✓
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A	732403	1	15	6.6	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	732951	4	10	40.0	10.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	732401	1	15	6.6	5.0	✓
Method Blanks (MB)							
Boron-Hot Water Extractable by ICPOES	E487	732953	2	5	40.0	5.0	✓
BTEX by Headspace GC-MS	E611A	756349	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	733565	2	35	5.7	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	732950	2	28	7.1	5.0	✓
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L	732952	2	10	20.0	5.0	✓
Hexavalent Chromium (Cr VI) by IC	E532	732402	1	15	6.6	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	732949	2	16	12.5	5.0	✓

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Method Blanks (MB) - Continued							
Metals in Soil/Solid by CRC ICPMS	E440	732948	2	22	9.0	5.0	✓
Moisture Content by Gravimetry	E144	732947	1	20	5.0	5.0	✓
OCPs by GC-MS-MS	E660F	733115	1	5	20.0	5.0	✓
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484	732951	2	10	20.0	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	732401	1	15	6.6	5.0	✓
Matrix Spikes (MS)							
BTEX by Headspace GC-MS	E611A	756349	1	20	5.0	5.0	✓
CCME PHC - F1 by Headspace GC-FID	E581.F1	733565	2	35	5.7	5.0	✓
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L	732950	2	28	7.1	5.0	✓
OCPs by GC-MS-MS	E660F	733115	1	5	20.0	5.0	✓
WAD Cyanide (0.01M NaOH Extraction)	E336A	732401	1	15	6.6	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Conductivity in Soil (1:2 Soil:Water Extraction) (Low Level)	E100-L Waterloo - Environmental	Soil/Solid	CSSS Ch. 15 (mod)/APHA 2510 (mod)	Conductivity, also known as Electrical Conductivity (EC) or Specific Conductance, is measured by immersion of a conductivity cell with platinum electrodes into a soil sample that has been added in a defined ratio of soil to deionized water, then shaken well and allowed to settle. Conductance is measured in the fluid that is observed in the upper layer.
pH by Meter (1:2 Soil:0.01M CaCl2 Extraction) - As Received	E108A Waterloo - Environmental	Soil/Solid	MOEE E3137A	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) and is carried out in accordance with procedures described in the Analytical Protocol (prescriptive method). A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling, or decanting and then analyzed using a pH meter and electrode.
Moisture Content by Gravimetry	E144 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
WAD Cyanide (0.01M NaOH Extraction)	E336A Waterloo - Environmental	Soil/Solid	APHA 4500-CN I (mod)	Weak Acid Dissociable (WAD) cyanide is determined after extraction by Continuous Flow Analyzer (CFA) with in-line distillation followed by colourmetric analysis.
Metals in Soil/Solid by CRC ICPMS	E440 Waterloo - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Sodium Adsorption Ratio (SAR) - 1:2 Soil:Water (Dry)	E484 Waterloo - Environmental	Soil/Solid	SW846 6010C	A dried, disaggregated solid sample is extracted with deionized water, the aqueous extract is separated from the solid, acidified and then analyzed using a ICP/OES. The concentrations of Na, Ca and Mg are reported as per CALA requirements for calculated parameters. These individual parameters are not for comparison to any guideline.
Boron-Hot Water Extractable by ICPOES	E487 Waterloo - Environmental	Soil/Solid	HW EXTR, EPA 6010B	A dried solid sample is extracted with calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Mercury in Soil/Solid by CVAAS	E510 Waterloo - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
CCME PHC - F1 by Headspace GC-FID	E581.F1 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	CCME Fraction 1 (F1) is analyzed by static headspace GC-FID. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
CCME PHCs - F2-F4 by GC-FID (Low Level)	E601.SG-L Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Sample extracts are subjected to in-situ silica gel treatment prior to analysis by GC-FID for CCME hydrocarbon fractions (F2-F4).
BTEX by Headspace GC-MS	E611A Waterloo - Environmental	Soil/Solid	EPA 8260D (mod)	Volatile Organic Compounds (VOCs) are analyzed by static headspace GC-MS. Samples are prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
OCPs by GC-MS-MS	E660F Waterloo - Environmental	Soil/Solid	EPA 8270E (mod)	OCPs are analyzed by GC-MS-MS.
F1-BTEX	EC580 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	F1-BTEX is calculated as follows: F1-BTEX = F1 (C6-C10) minus benzene, toluene, ethylbenzene and xylenes (BTEX).
Sum F1 to F4 (C6-C50)	EC581 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Hydrocarbons, total (C6-C50) is the sum of CCME Fractions F1(C6-C10), F2(C10-C16), F3(C16-C34), and F4(C34-C50). F4G-sg is not used within this calculation due to overlap with other fractions.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Waterloo - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Leach 1:2 Soil : 0.01CaCl2 - As Received for pH	EP108A Waterloo - Environmental	Soil/Solid	MOEE E3137A	A minimum 10g portion of the sample, as received, is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil by centrifuging, settling or decanting and then analyzed using a pH meter and electrode.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Cyanide Extraction for CFA (0.01M NaOH)	EP333A Waterloo - Environmental	Soil/Solid	ON MECP E3015 (mod)	Extraction for various cyanide analysis is by rotary extraction of the soil with 0.01M Sodium Hydroxide.
Digestion for Metals and Mercury	EP440 Waterloo - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl. This method is intended to liberate metals that may be environmentally available.
Boron-Hot Water Extractable	EP487 Waterloo - Environmental	Soil/Solid	HW EXTR, EPA 6010B	A dried solid sample is extracted with weak calcium chloride, the sample undergoes a heating process. After cooling the sample is filtered and analyzed by ICP/OES. Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011)
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
VOCs Methanol Extraction for Headspace Analysis	EP581 Waterloo - Environmental	Soil/Solid	EPA 5035A (mod)	VOCs in samples are extracted with methanol. Extracts are then prepared in headspace vials and are heated and agitated on the headspace autosampler, causing VOCs to partition between the aqueous phase and the headspace in accordance with Henry's law.
PHCs and PAHs Hexane-Acetone Tumbler Extraction	EP601 Waterloo - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1 (mod)	Samples are subsampled and Petroleum Hydrocarbons (PHC) and PAHs are extracted with 1:1 hexane:acetone using a rotary extractor.
Pesticides, PCB, PAH, and Neutral Extractable Chlorinated Hydrocarbons Extraction	EP660 Waterloo - Environmental	Soil/Solid	EPA 3570 (mod)	A homogenized subsample is extracted with organic solvents using a mechanical shaker.

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QUALITY CONTROL REPORT

Work Order	: **WT2220348**	Page	: 1 of 18
Amendment	: **2**		
Client	: JLP Services Inc.	Laboratory	: Waterloo - Environmental
Contact	: Ajay Jayalath	Account Manager	: Andrew Martin
Address	: 405 York Road Guelph ON Canada N1E 3H3	Address	: 60 Northland Road, Unit 1 Waterloo, Ontario Canada N2V 2B8
Telephone	:	Telephone	: +1 519 886 6910
Project	: G4599	Date Samples Received	: 01-Nov-2022 17:48
PO	: ----	Date Analysis Commenced	: 05-Nov-2022
C-O-C number	: 17-641692	Issue Date	: 02-Dec-2022 14:48
Sampler	: CLIENT 519 763 3101		
Site	: ----		
Quote number	: Standing Offer 2022		
No. of samples received	: 10		
No. of samples analysed	: 10		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Amarpreet Singh	Analyst	Waterloo Organics, Waterloo, Ontario
Greg Pokocky	Supervisor - Inorganic	Waterloo Metals, Waterloo, Ontario
Jeremy Gingras	Team Leader - Semi-Volatile Instrumentation	Waterloo Organics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Inorganics, Waterloo, Ontario
Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Joseph Scharbach		Waterloo Centralized Prep, Waterloo, Ontario
Sarah Birch	VOC Section Supervisor	Waterloo Organics, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 732403)											
WT2220348-003	BH2- SS1	pH (1:2 soil:CaCl2-aq)	----	E108A	0.10	pH units	7.39	7.20	2.60%	5%	----
Physical Tests (QC Lot: 732947)											
WT2220348-001	BH5- SS1	moisture	----	E144	0.25	%	10.8	10.1	6.64%	20%	----
Physical Tests (QC Lot: 732952)											
WT2220348-002	BH5- SS2	conductivity (1:2 leachate)	----	E100-L	5.00	µS/cm	0.105 mS/cm	101	3.87%	20%	----
Physical Tests (QC Lot: 733118)											
WT2220348-009	BH6- SS1	conductivity (1:2 leachate)	----	E100-L	5.00	µS/cm	0.119 mS/cm	141	16.6%	20%	----
Cyanides (QC Lot: 732401)											
WT2220348-002	BH5- SS2	cyanide, weak acid dissociable	----	E336A	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
Metals (QC Lot: 732948)											
WT2220348-002	BH5- SS2	antimony	7440-36-0	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	1.87	1.69	10.2%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	17.0	15.2	11.3%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.20	0.18	0.02	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.091	0.082	0.009	Diff <2x LOR	----
		chromium	7440-47-3	E440	0.50	mg/kg	7.95	7.81	1.78%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	2.23	2.20	1.74%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	5.17	4.69	9.76%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	6.54	6.14	6.20%	40%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.17	0.18	0.008	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	5.00	4.93	1.44%	30%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.362	0.336	7.47%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	18.8	19.9	5.57%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	34.6	31.4	9.74%	30%	----
Metals (QC Lot: 732949)											
WT2220348-002	BH5- SS2	mercury	7439-97-6	E510	0.0050	mg/kg	0.0111	0.0107	0.0004	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 732951)											
WT2220348-002	BH5- SS2	calcium, soluble ion content	7440-70-2	E484	0.50	mg/L	13.4	12.7	5.36%	30%	----
		magnesium, soluble ion content	7439-95-4	E484	0.50	mg/L	1.78	1.64	0.14	Diff <2x LOR	----
		sodium, soluble ion content	17341-25-2	E484	0.50	mg/L	0.87	0.78	0.09	Diff <2x LOR	----
Metals (QC Lot: 732953)											
WT2220348-002	BH5- SS2	boron, hot water soluble	7440-42-8	E487	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
Metals (QC Lot: 733116)											
WT2220348-009	BH6- SS1	antimony	7440-36-0	E440	0.10	mg/kg	0.14	0.13	0.007	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	2.81	2.77	1.38%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	49.2	47.2	4.16%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.31	0.03	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.264	0.246	6.68%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	13.1	12.4	5.12%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	4.68	4.52	3.53%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	10.5	10.1	3.48%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	20.8	20.1	3.55%	40%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.36	0.33	0.03	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	8.46	8.11	4.18%	30%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.079	0.073	0.007	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.597	0.531	11.7%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	26.0	25.3	2.89%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	62.6	61.1	2.50%	30%	----
Metals (QC Lot: 733119)											
WT2220348-009	BH6- SS1	calcium, soluble ion content	7440-70-2	E484	0.50	mg/L	12.6	15.7	21.9%	30%	----
		magnesium, soluble ion content	7439-95-4	E484	0.50	mg/L	2.98	3.62	0.64	Diff <2x LOR	----
		sodium, soluble ion content	17341-25-2	E484	0.50	mg/L	1.05	1.12	0.07	Diff <2x LOR	----
Metals (QC Lot: 733120)											
WT2220348-009	BH6- SS1	boron, hot water soluble	7440-42-8	E487	0.10	mg/kg	0.55	0.56	1.58%	40%	----
Metals (QC Lot: 748439)											
WT2221987-001	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0205	0.0216	0.0011	Diff <2x LOR	----
Speciated Metals (QC Lot: 732402)											
WT2220348-002	BH5- SS2	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Laboratory Duplicate (DUP) Report						
					LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Volatile Organic Compounds (QC Lot: 756349)											
TY2204311-001	Anonymous	benzene	71-43-2	E611A	0.0160	mg/kg	<0.0170	<0.0160	0.0170	Diff <2x LOR	----
		ethylbenzene	100-41-4	E611A	0.040	mg/kg	<0.040	<0.040	0	Diff <2x LOR	----
		toluene	108-88-3	E611A	0.095	mg/kg	<0.140	<0.095	0.045	Diff <2x LOR	----
		xylene, m+p-	179601-23-1	E611A	0.060	mg/kg	<0.078	<0.060	0.078	Diff <2x LOR	----
		xylene, o-	95-47-6	E611A	0.040	mg/kg	<0.040	<0.040	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 732950)											
WT2220197-001	Anonymous	F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	<10	0	Diff <2x LOR	----
		F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	<50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 733121)											
WT2220363-003	Anonymous	F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10 µg/g	<10	0	Diff <2x LOR	----
		F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50 µg/g	<50	0	Diff <2x LOR	----
		F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50 µg/g	<50	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 733565)											
WT2220197-001	Anonymous	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
Hydrocarbons (QC Lot: 733826)											
WT2220920-001	Anonymous	F1 (C6-C10)	----	E581.F1	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
Organochlorine Pesticides (QC Lot: 733115)											
WT2220348-001	BH5- SS1	aldrin	309-00-2	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		chlordane, cis- (alpha)	5103-71-9	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		chlordane, trans- (gamma)	5103-74-2	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDD, 2,4'-	53-19-0	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDD, 4,4'-	72-54-8	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDE, 2,4'-	3424-82-6	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDE, 4,4'-	72-55-9	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDT, 2,4'-	789-02-6	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		DDT, 4,4'-	50-29-3	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		dieldrin	60-57-1	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		endosulfan, alpha-	959-98-8	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		endosulfan, beta-	33213-65-9	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		endrin	72-20-8	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		heptachlor	76-44-8	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		heptachlor epoxide	1024-57-3	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----
		hexachlorobenzene	118-74-1	E660F	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	***Client sample ID***	***Analyte***	***CAS Number***	***Method***	***LOR***	***Unit***	***Original Result***	***Duplicate Result***	***RPD(%) or Difference***	***Duplicate Limits***	***Qualifier***
Organochlorine Pesticides (QC Lot: 733115) - continued											
WT2220348-001	BH5- SS1	hexachlorobutadiene	87-68-3	E660F	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		hexachlorocyclohexane, gamma-	58-89-9	E660F	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		hexachloroethane	67-72-1	E660F	0.010	mg/kg	<0.010	<0.010	0	Diff <2x LOR	----
		methoxychlor	72-43-5	E660F	0.020	mg/kg	<0.020	<0.020	0	Diff <2x LOR	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 732947)						
moisture	----	E144	0.25	%	<0.25	----
Physical Tests (QCLot: 732952)						
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	<5.00	----
Physical Tests (QCLot: 733118)						
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	<5.00	----
Cyanides (QCLot: 732401)						
cyanide, weak acid dissociable	----	E336A	0.05	mg/kg	<0.050	----
Metals (QCLot: 732948)						
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 732949)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 732951)						
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	<0.50	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	<0.50	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	<0.50	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 732953)						
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	<0.10	----
Metals (QCLot: 733116)						
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Metals (QCLot: 733119)						
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	<0.50	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	<0.50	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	<0.50	----
Metals (QCLot: 733120)						
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	<0.10	----
Metals (QCLot: 748439)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Speciated Metals (QCLot: 732402)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
Volatile Organic Compounds (QCLot: 756349)						
benzene	71-43-2	E611A	0.005	mg/kg	<0.0050	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	<0.015	----
toluene	108-88-3	E611A	0.05	mg/kg	<0.050	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	<0.030	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Volatile Organic Compounds (QCLot: 756349) - continued						
xylene, o-	95-47-6	E611A	0.03	mg/kg	<0.030	----
Hydrocarbons (QCLot: 732950)						
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	----
Hydrocarbons (QCLot: 733121)						
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	<10	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	<50	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	<50	----
Hydrocarbons (QCLot: 733565)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----
Hydrocarbons (QCLot: 733826)						
F1 (C6-C10)	----	E581.F1	5	mg/kg	<5.0	----
Organochlorine Pesticides (QCLot: 733115)						
aldrin	309-00-2	E660F	0.02	mg/kg	<0.020	----
chlordane, cis- (alpha)	5103-71-9	E660F	0.02	mg/kg	<0.020	----
chlordane, trans- (gamma)	5103-74-2	E660F	0.02	mg/kg	<0.020	----
DDD, 2,4'-	53-19-0	E660F	0.02	mg/kg	<0.020	----
DDD, 4,4'-	72-54-8	E660F	0.02	mg/kg	<0.020	----
DDE, 2,4'-	3424-82-6	E660F	0.02	mg/kg	<0.020	----
DDE, 4,4'-	72-55-9	E660F	0.02	mg/kg	<0.020	----
DDT, 2,4'-	789-02-6	E660F	0.02	mg/kg	<0.020	----
DDT, 4,4'-	50-29-3	E660F	0.02	mg/kg	<0.020	----
dieldrin	60-57-1	E660F	0.02	mg/kg	<0.020	----
endosulfan, alpha-	959-98-8	E660F	0.02	mg/kg	<0.020	----
endosulfan, beta-	33213-65-9	E660F	0.02	mg/kg	<0.020	----
endrin	72-20-8	E660F	0.02	mg/kg	<0.020	----
heptachlor	76-44-8	E660F	0.02	mg/kg	<0.020	----
heptachlor epoxide	1024-57-3	E660F	0.02	mg/kg	<0.020	----
hexachlorobenzene	118-74-1	E660F	0.01	mg/kg	<0.010	----
hexachlorobutadiene	87-68-3	E660F	0.01	mg/kg	<0.010	----
hexachlorocyclohexane, gamma-	58-89-9	E660F	0.01	mg/kg	<0.010	----
hexachloroethane	67-72-1	E660F	0.01	mg/kg	<0.010	----
methoxychlor	72-43-5	E660F	0.02	mg/kg	<0.020	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 732403)									
pH (1:2 soil:CaCl2-aq)	----	E108A	----	pH units	7 pH units	99.8	98.0	102	----
Physical Tests (QCLot: 732947)									
moisture	----	E144	0.25	%	50 %	98.8	90.0	110	----
Physical Tests (QCLot: 732952)									
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	1409 µS/cm	99.3	90.0	110	----
Physical Tests (QCLot: 733118)									
conductivity (1:2 leachate)	----	E100-L	5	µS/cm	1409 µS/cm	101	90.0	110	----
Cyanides (QCLot: 732401)									
cyanide, weak acid dissociable	----	E336A	0.05	mg/kg	2.5 mg/kg	97.2	80.0	125	----
Metals (QCLot: 732948)									
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.3	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.4	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.7	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	88.8	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	97.8	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.5	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.8	80.0	120	----
Metals (QCLot: 732949)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 732951)									

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 732951) - continued									
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	300 mg/L	107	80.0	120	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	50 mg/L	101	80.0	120	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	50 mg/L	104	80.0	120	----
Metals (QCLot: 732953)									
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	1.33333 mg/kg	113	70.0	130	----
Metals (QCLot: 733116)									
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	95.0	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.6	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.6	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.5	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.1	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.4	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.1	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	82.0	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.9	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.4	80.0	120	----
Metals (QCLot: 733119)									
calcium, soluble ion content	7440-70-2	E484	0.5	mg/L	300 mg/L	105	80.0	120	----
magnesium, soluble ion content	7439-95-4	E484	0.5	mg/L	50 mg/L	99.8	80.0	120	----
sodium, soluble ion content	17341-25-2	E484	0.5	mg/L	50 mg/L	103	80.0	120	----
Metals (QCLot: 733120)									
boron, hot water soluble	7440-42-8	E487	0.1	mg/kg	1.33333 mg/kg	104	70.0	130	----
Metals (QCLot: 748439)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.0	80.0	120	----
Speciated Metals (QCLot: 732402)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	# 78.3	80.0	120	LCS-ND

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%) LCS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Volatile Organic Compounds (QCLot: 756349)									
benzene	71-43-2	E611A	0.005	mg/kg	3.475 mg/kg	105	70.0	130	----
ethylbenzene	100-41-4	E611A	0.015	mg/kg	3.475 mg/kg	102	70.0	130	----
toluene	108-88-3	E611A	0.05	mg/kg	3.475 mg/kg	105	70.0	130	----
xylene, m+p-	179601-23-1	E611A	0.03	mg/kg	6.95 mg/kg	106	70.0	130	----
xylene, o-	95-47-6	E611A	0.03	mg/kg	3.475 mg/kg	101	70.0	130	----
Hydrocarbons (QCLot: 732950)									
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	924.49 mg/kg	94.4	70.0	130	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	1108.95 mg/kg	109	70.0	130	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	1071.36 mg/kg	80.2	70.0	130	----
Hydrocarbons (QCLot: 733121)									
F2 (C10-C16)	----	E601.SG-L	10	mg/kg	916.995 mg/kg	100	70.0	130	----
F3 (C16-C34)	----	E601.SG-L	50	mg/kg	1190.25 mg/kg	102	70.0	130	----
F4 (C34-C50)	----	E601.SG-L	50	mg/kg	879.735 mg/kg	98.9	70.0	130	----
Hydrocarbons (QCLot: 733565)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	69.1875 mg/kg	112	80.0	120	----
Hydrocarbons (QCLot: 733826)									
F1 (C6-C10)	----	E581.F1	5	mg/kg	69.1875 mg/kg	105	80.0	120	----
Organochlorine Pesticides (QCLot: 733115)									
aldrin	309-00-2	E660F	0.02	mg/kg	0.01 mg/kg	73.6	50.0	150	----
chlordane, cis- (alpha)	5103-71-9	E660F	0.02	mg/kg	0.01 mg/kg	72.9	50.0	150	----
chlordane, trans- (gamma)	5103-74-2	E660F	0.02	mg/kg	0.01 mg/kg	75.6	50.0	150	----
DDD, 2,4'-	53-19-0	E660F	0.02	mg/kg	0.01 mg/kg	74.8	50.0	150	----
DDD, 4,4'-	72-54-8	E660F	0.02	mg/kg	0.01 mg/kg	78.0	50.0	150	----
DDE, 2,4'-	3424-82-6	E660F	0.02	mg/kg	0.01 mg/kg	68.6	50.0	150	----
DDE, 4,4'-	72-55-9	E660F	0.02	mg/kg	0.01 mg/kg	67.6	50.0	150	----
DDT, 2,4'-	789-02-6	E660F	0.02	mg/kg	0.01 mg/kg	71.8	50.0	150	----
DDT, 4,4'-	50-29-3	E660F	0.02	mg/kg	0.01 mg/kg	83.0	50.0	150	----
dieldrin	60-57-1	E660F	0.02	mg/kg	0.01 mg/kg	71.0	50.0	150	----
endosulfan, alpha-	959-98-8	E660F	0.02	mg/kg	0.01 mg/kg	56.4	50.0	150	----
endosulfan, beta-	33213-65-9	E660F	0.02	mg/kg	0.01 mg/kg	66.5	50.0	150	----
endrin	72-20-8	E660F	0.02	mg/kg	0.01 mg/kg	68.2	50.0	150	----
heptachlor	76-44-8	E660F	0.02	mg/kg	0.01 mg/kg	74.2	50.0	150	----
heptachlor epoxide	1024-57-3	E660F	0.02	mg/kg	0.01 mg/kg	73.1	50.0	150	----
hexachlorobenzene	118-74-1	E660F	0.01	mg/kg	0.01 mg/kg	69.3	50.0	150	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report: Spike Concentration	Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High	Qualifier
Organochlorine Pesticides (QCLot: 733115) - continued									
hexachlorobutadiene	87-68-3	E660F	0.01	mg/kg	0.01 mg/kg	58.7	50.0	150	----
hexachlorocyclohexane, gamma-	58-89-9	E660F	0.01	mg/kg	0.01 mg/kg	73.5	50.0	150	----
hexachloroethane	67-72-1	E660F	0.01	mg/kg	0.01 mg/kg	55.0	50.0	150	----
methoxychlor	72-43-5	E660F	0.02	mg/kg	0.01 mg/kg	82.5	50.0	150	----

Qualifiers

Qualifier	Description
LCS-ND	Lab Control Sample recovery was slightly outside ALS DQO. Reported non-detect results for associated samples were unaffected.

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Cyanides (QCLot: 732401)										
WT2220348-002	BH5- SS2	cyanide, weak acid dissociable	----	E336A	1.20 mg/kg	2.5 mg/kg	97.9	70.0	130	----
Volatile Organic Compounds (QCLot: 756349)										
TY2204311-001	Anonymous	benzene	71-43-2	E611A	2.97 mg/kg	3.125 mg/kg	99.2	60.0	140	----
		ethylbenzene	100-41-4	E611A	2.82 mg/kg	3.125 mg/kg	94.1	60.0	140	----
		toluene	108-88-3	E611A	2.97 mg/kg	3.125 mg/kg	99.1	60.0	140	----
		xylene, m+p-	179601-23-1	E611A	5.80 mg/kg	6.25 mg/kg	96.9	60.0	140	----
		xylene, o-	95-47-6	E611A	2.84 mg/kg	3.125 mg/kg	94.7	60.0	140	----
Hydrocarbons (QCLot: 732950)										
WT2220197-001	Anonymous	F2 (C10-C16)	----	E601.SG-L	723 mg/kg	924.49 mg/kg	99.7	60.0	140	----
		F3 (C16-C34)	----	E601.SG-L	985 mg/kg	1108.95 mg/kg	113	60.0	140	----
		F4 (C34-C50)	----	E601.SG-L	720 mg/kg	1071.36 mg/kg	85.6	60.0	140	----
Hydrocarbons (QCLot: 733121)										
WT2220363-003	Anonymous	F2 (C10-C16)	----	E601.SG-L	684 mg/kg	916.995 mg/kg	92.2	60.0	140	----
		F3 (C16-C34)	----	E601.SG-L	894 mg/kg	1190.25 mg/kg	92.8	60.0	140	----
		F4 (C34-C50)	----	E601.SG-L	669 mg/kg	879.735 mg/kg	94.0	60.0	140	----
Hydrocarbons (QCLot: 733565)										
WT2220197-001	Anonymous	F1 (C6-C10)	----	E581.F1	47.0 mg/kg	62.5 mg/kg	104	60.0	140	----
Hydrocarbons (QCLot: 733826)										
WT2220920-001	Anonymous	F1 (C6-C10)	----	E581.F1	52.6 mg/kg	93.75 mg/kg	93.4	60.0	140	----
Organochlorine Pesticides (QCLot: 733115)										
WT2220348-001	BH5- SS1	aldrin	309-00-2	E660F	0.008 mg/kg	0.01 mg/kg	78.0	50.0	150	----
		chlordane, cis- (alpha)	5103-71-9	E660F	0.008 mg/kg	0.01 mg/kg	75.8	50.0	150	----
		chlordane, trans- (gamma)	5103-74-2	E660F	0.008 mg/kg	0.01 mg/kg	78.2	50.0	150	----
		DDD, 2,4'-	53-19-0	E660F	0.008 mg/kg	0.01 mg/kg	78.5	50.0	150	----
		DDD, 4,4'-	72-54-8	E660F	0.008 mg/kg	0.01 mg/kg	84.0	50.0	150	----
		DDE, 2,4'-	3424-82-6	E660F	0.007 mg/kg	0.01 mg/kg	69.1	50.0	150	----
		DDE, 4,4'-	72-55-9	E660F	0.007 mg/kg	0.01 mg/kg	70.1	50.0	150	----
		DDT, 2,4'-	789-02-6	E660F	0.007 mg/kg	0.01 mg/kg	66.8	50.0	150	----
		DDT, 4,4'-	50-29-3	E660F	0.007 mg/kg	0.01 mg/kg	68.9	50.0	150	----
		dieldrin	60-57-1	E660F	0.007 mg/kg	0.01 mg/kg	71.7	50.0	150	----

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report: Spike Concentration	Spike Target	Recovery (%) MS	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Organochlorine Pesticides (QCLot: 733115) - continued										
WT2220348-001	BH5- SS1	endosulfan, alpha-	959-98-8	E660F	0.006 mg/kg	0.01 mg/kg	56.1	50.0	150	----
		endosulfan, beta-	33213-65-9	E660F	0.007 mg/kg	0.01 mg/kg	67.9	50.0	150	----
		endrin	72-20-8	E660F	0.008 mg/kg	0.01 mg/kg	78.0	50.0	150	----
		heptachlor	76-44-8	E660F	0.008 mg/kg	0.01 mg/kg	79.5	50.0	150	----
		heptachlor epoxide	1024-57-3	E660F	0.007 mg/kg	0.01 mg/kg	70.3	50.0	150	----
		hexachlorobenzene	118-74-1	E660F	0.007 mg/kg	0.01 mg/kg	72.4	50.0	150	----
		hexachlorobutadiene	87-68-3	E660F	0.007 mg/kg	0.01 mg/kg	72.4	50.0	150	----
		hexachlorocyclohexane, gamma-	58-89-9	E660F	0.008 mg/kg	0.01 mg/kg	76.3	50.0	150	----
		hexachloroethane	67-72-1	E660F	0.006 mg/kg	0.01 mg/kg	64.4	50.0	150	----
		methoxychlor	72-43-5	E660F	0.007 mg/kg	0.01 mg/kg	71.0	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

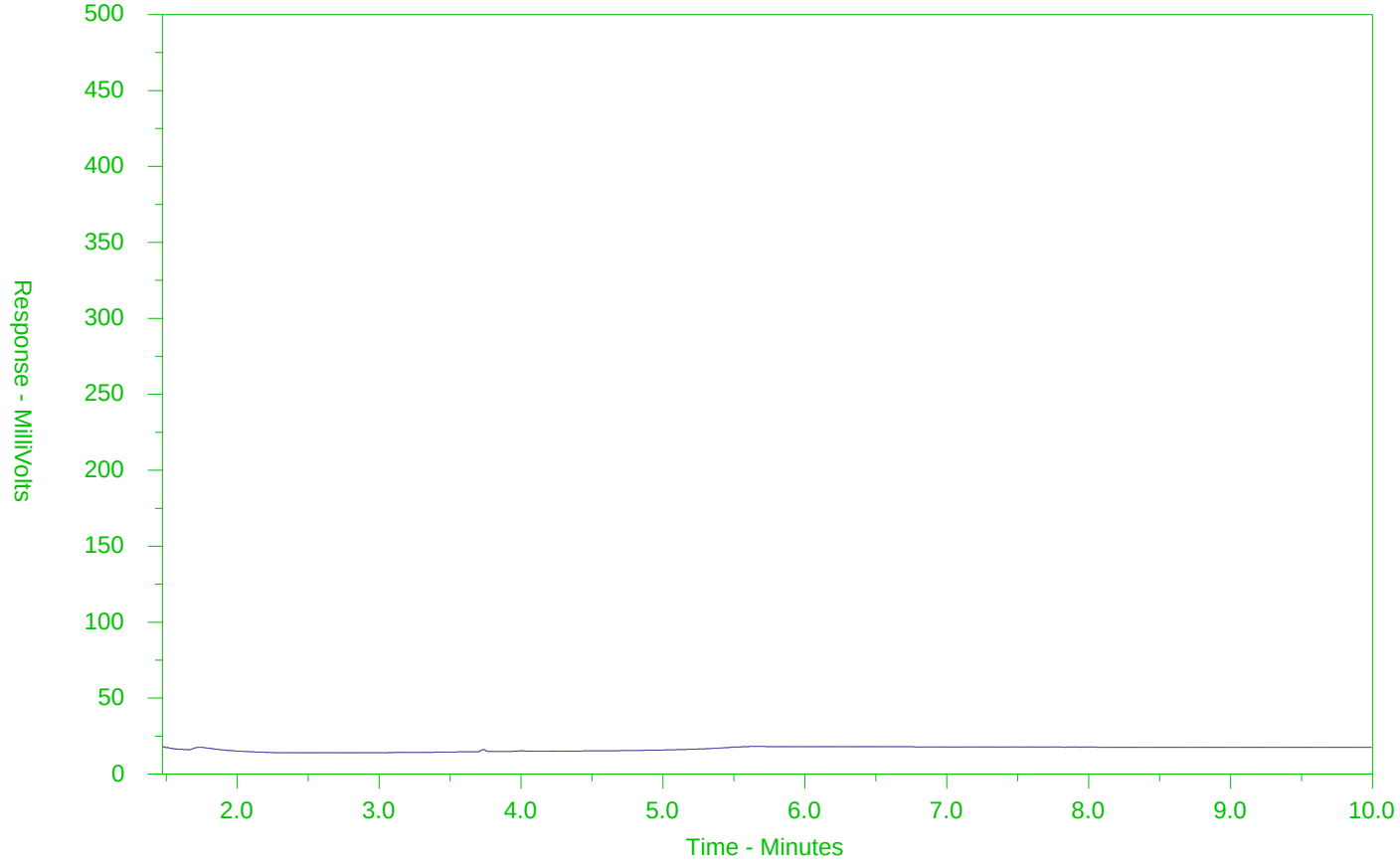
					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Physical Tests (QCLot: 732952)									
	RM	conductivity (1:2 leachate)	----	E100-L	1031.5 µS/cm	105	70.0	130	----
Physical Tests (QCLot: 733118)									
	RM	conductivity (1:2 leachate)	----	E100-L	1031.5 µS/cm	121	70.0	130	----
Metals (QCLot: 732948)									
	RM	antimony	7440-36-0	E440	3.99 mg/kg	94.2	70.0	130	----
	RM	arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	RM	barium	7440-39-3	E440	105 mg/kg	110	70.0	130	----
	RM	beryllium	7440-41-7	E440	0.349 mg/kg	106	70.0	130	----
	RM	boron	7440-42-8	E440	8.5 mg/kg	108	40.0	160	----
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	97.8	70.0	130	----
	RM	chromium	7440-47-3	E440	101 mg/kg	101	70.0	130	----
	RM	cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
	RM	copper	7440-50-8	E440	123 mg/kg	104	70.0	130	----
	RM	lead	7439-92-1	E440	267 mg/kg	98.4	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
	RM	nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
	RM	silver	7440-22-4	E440	4.06 mg/kg	82.7	70.0	130	----
	RM	thallium	7440-28-0	E440	0.0786 mg/kg	98.8	40.0	160	----
	RM	uranium	7440-61-1	E440	0.52 mg/kg	97.6	70.0	130	----
	RM	vanadium	7440-62-2	E440	32.7 mg/kg	102	70.0	130	----
	RM	zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
Metals (QCLot: 732949)									
	RM	mercury	7439-97-6	E510	0.0585 mg/kg	106	70.0	130	----
Metals (QCLot: 732951)									
	RM	calcium, soluble ion content	7440-70-2	E484	86.59 mg/L	104	70.0	130	----
	RM	magnesium, soluble ion content	7439-95-4	E484	25.74 mg/L	104	70.0	130	----
	RM	sodium, soluble ion content	17341-25-2	E484	30.05 mg/L	102	70.0	130	----
Metals (QCLot: 732953)									

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	Qualifier
Metals (QCLot: 732953) - continued									
	RM	boron, hot water soluble	7440-42-8	E487	1.4938 mg/kg	118	60.0	140	----
Metals (QCLot: 733116)									
	RM	antimony	7440-36-0	E440	3.99 mg/kg	88.3	70.0	130	----
	RM	arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	RM	barium	7440-39-3	E440	105 mg/kg	106	70.0	130	----
	RM	beryllium	7440-41-7	E440	0.349 mg/kg	96.8	70.0	130	----
	RM	boron	7440-42-8	E440	8.5 mg/kg	102	40.0	160	----
	RM	cadmium	7440-43-9	E440	0.91 mg/kg	91.5	70.0	130	----
	RM	chromium	7440-47-3	E440	101 mg/kg	90.9	70.0	130	----
	RM	cobalt	7440-48-4	E440	6.9 mg/kg	94.4	70.0	130	----
	RM	copper	7440-50-8	E440	123 mg/kg	93.3	70.0	130	----
	RM	lead	7439-92-1	E440	267 mg/kg	94.2	70.0	130	----
	RM	molybdenum	7439-98-7	E440	1.03 mg/kg	103	70.0	130	----
	RM	nickel	7440-02-0	E440	26.7 mg/kg	95.7	70.0	130	----
	RM	silver	7440-22-4	E440	4.06 mg/kg	95.3	70.0	130	----
	RM	thallium	7440-28-0	E440	0.0786 mg/kg	125	40.0	160	----
	RM	uranium	7440-61-1	E440	0.52 mg/kg	90.8	70.0	130	----
	RM	vanadium	7440-62-2	E440	32.7 mg/kg	93.4	70.0	130	----
	RM	zinc	7440-66-6	E440	297 mg/kg	95.0	70.0	130	----
Metals (QCLot: 733119)									
	RM	calcium, soluble ion content	7440-70-2	E484	86.59 mg/L	112	70.0	130	----
	RM	magnesium, soluble ion content	7439-95-4	E484	25.74 mg/L	113	70.0	130	----
	RM	sodium, soluble ion content	17341-25-2	E484	30.05 mg/L	111	70.0	130	----
Metals (QCLot: 733120)									
	RM	boron, hot water soluble	7440-42-8	E487	1.4938 mg/kg	103	60.0	140	----
Metals (QCLot: 748439)									
	RM	mercury	7439-97-6	E510	0.0585 mg/kg	98.6	70.0	130	----
Speciated Metals (QCLot: 732402)									
	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	92.4	70.0	130	----

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2220348-002-E601.SG-L
Client Sample ID: BH5- SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

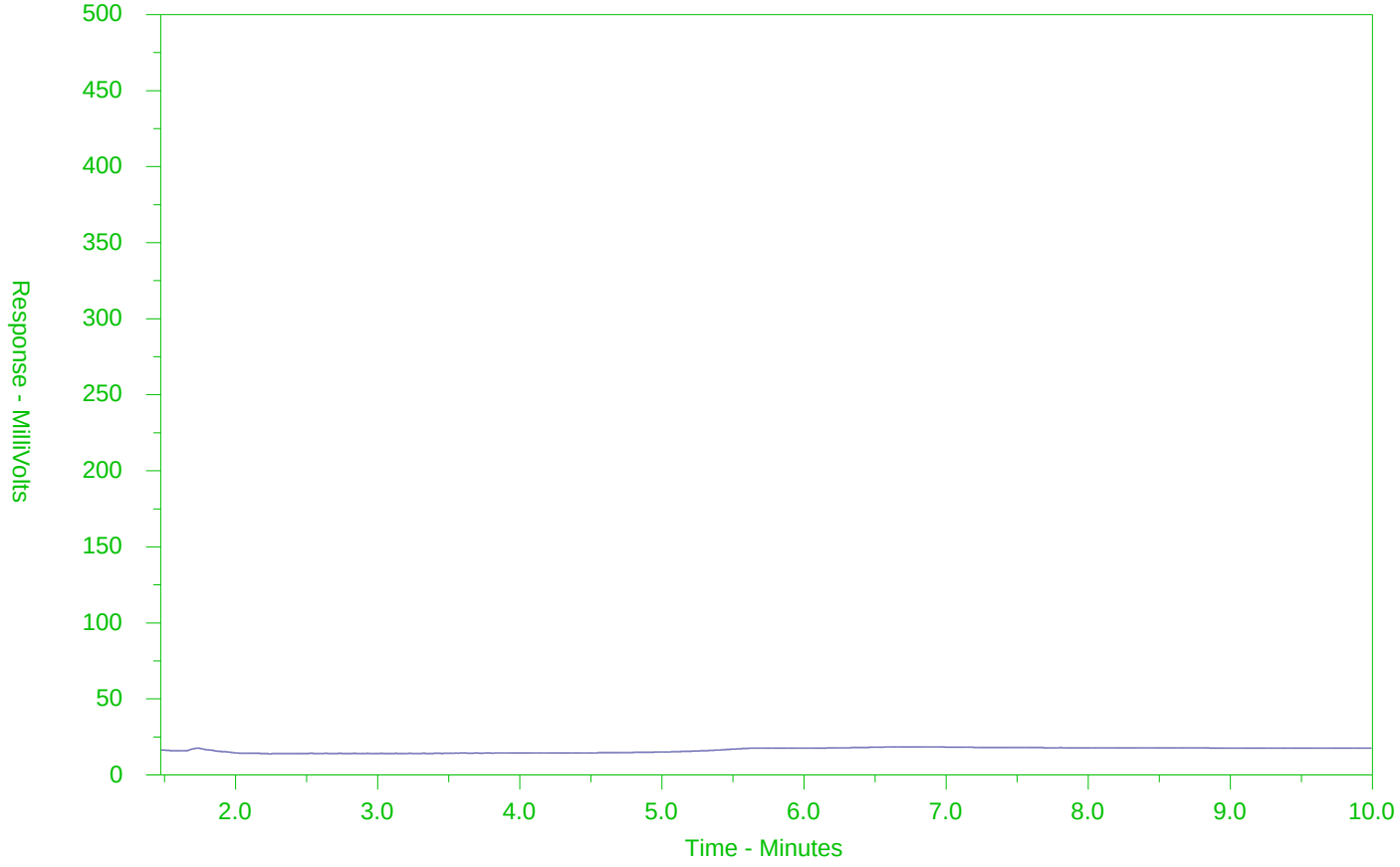
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2220348-004-E601.SG-L
Client Sample ID: BH2- SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

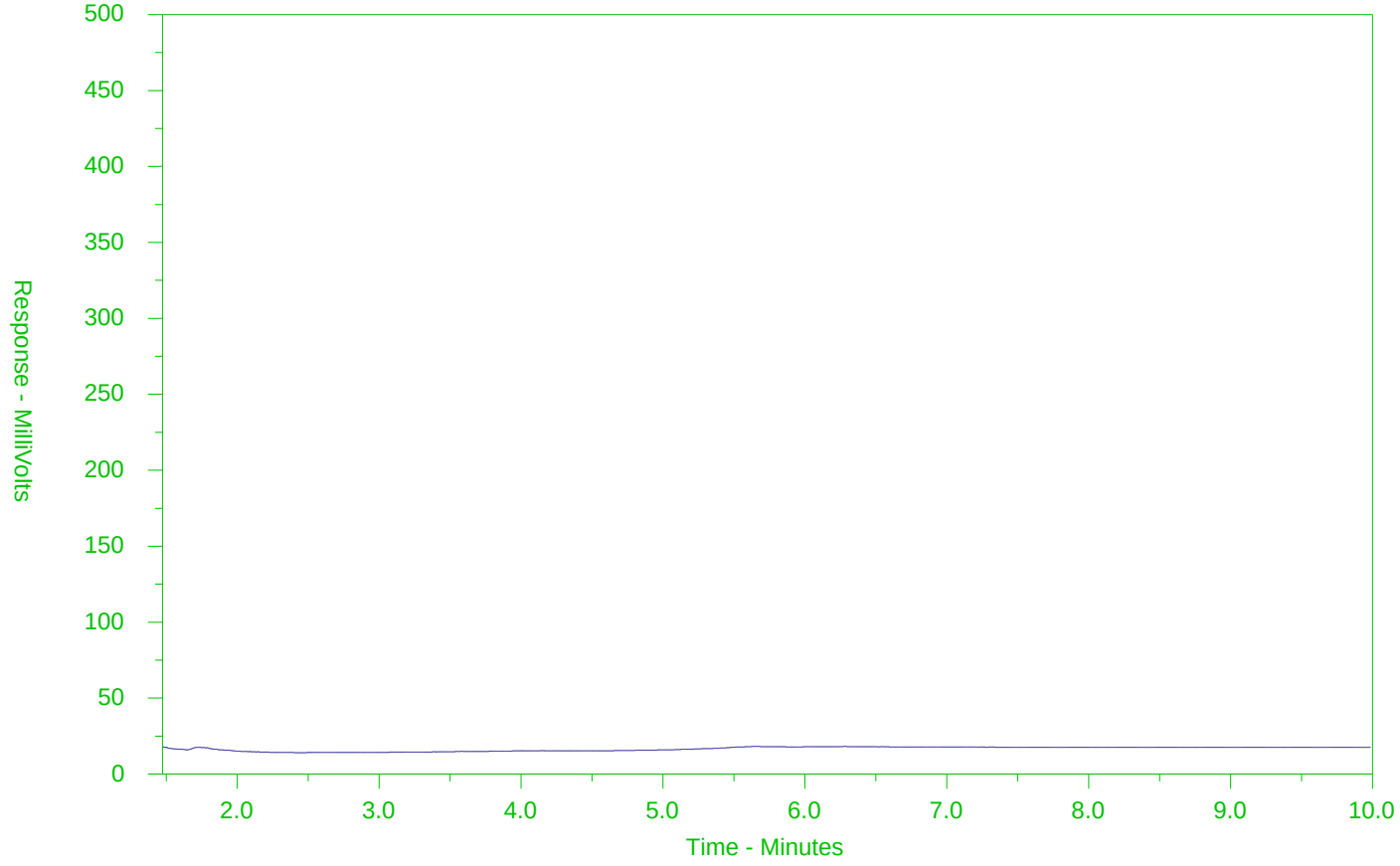
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2220348-006-E601.SG-L
Client Sample ID: BH201- SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

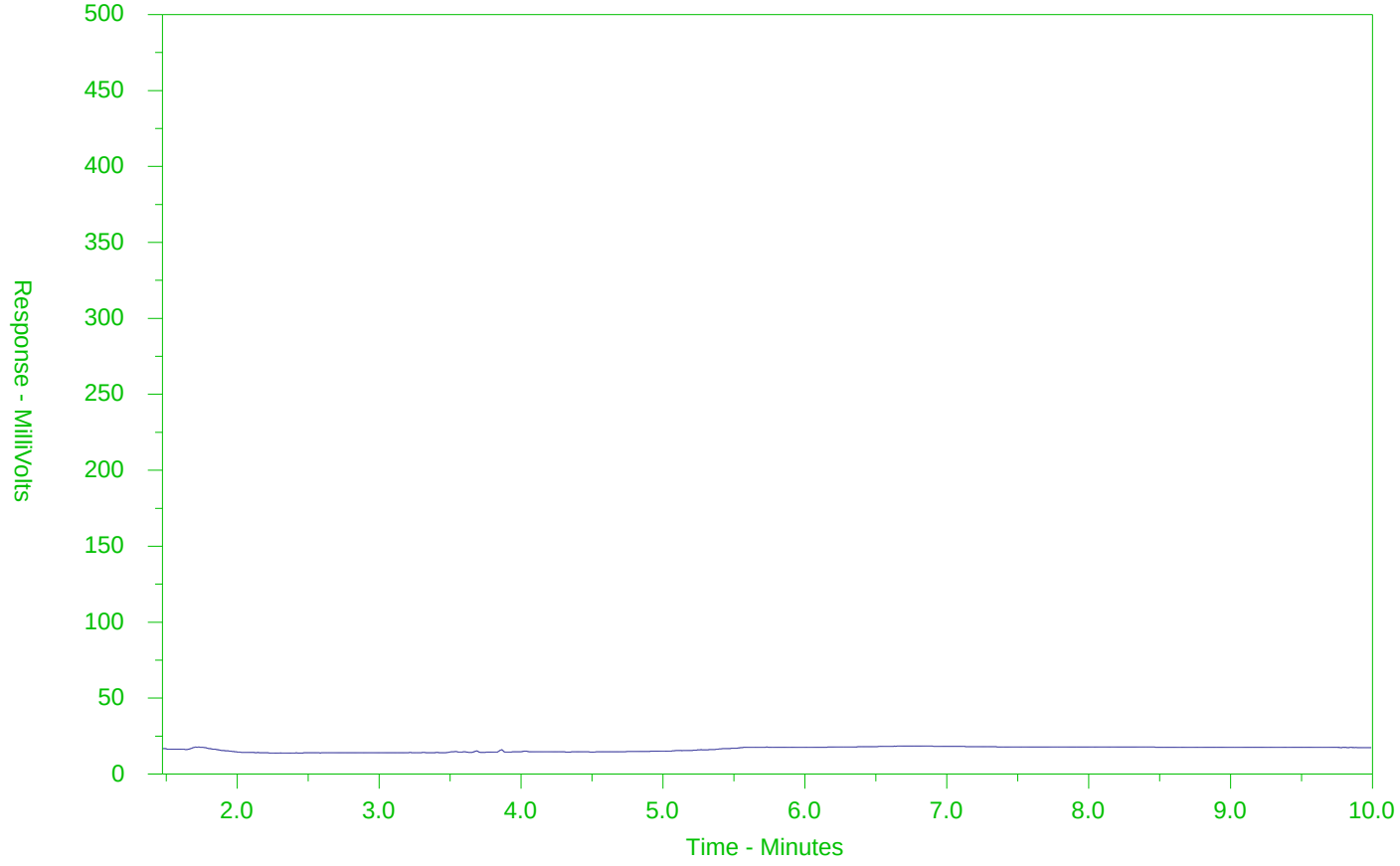
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2220348-008-E601.SG-L
Client Sample ID: BH3- SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

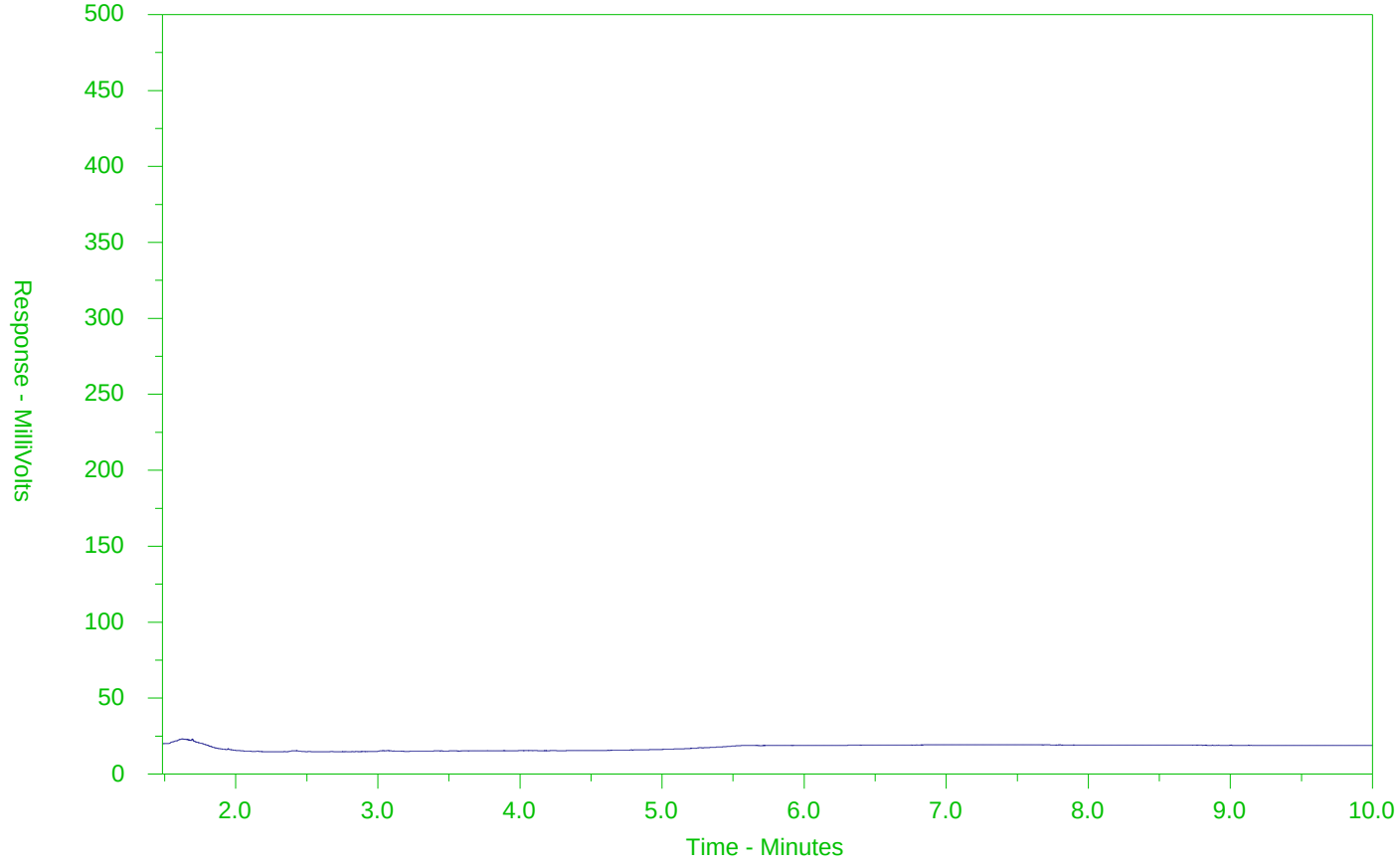
The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

CCME F2-F4 HYDROCARBON DISTRIBUTION REPORT

ALS Sample ID: WT2220348-010-E601.SG-L
Client Sample ID: BH6- SS2



←F2→	←F3→	←F4→	
nC10	nC16	nC34	nC50
174°C	287°C	481°C	575°C
346°F	549°F	898°F	1067°F
Gasoline →		← Motor Oils/Lube Oils/Grease →	
← Diesel/Jet Fuels →			

The CCME F2-F4 Hydrocarbon Distribution Report (HDR) is intended to assist you in characterizing hydrocarbon products that may be present in your sample.

The scale at the bottom of the chromatogram indicates the approximate retention times of common petroleum products and four n-alkane hydrocarbon marker compounds. Retention times may vary between samples, but general patterns and distributions will remain similar.

Peak heights in this report are a function of the sample concentration, the sample amount extracted, the sample dilution factor and the scale at the left.

Note: This chromatogram was produced using GC conditions that are specific to ALS Canada CCME F2-F4 method. Refer to the ALS Canada CCME F2-F4 Hydrocarbon Library for a collection of chromatograms from common reference samples (fuels, oils, etc.). The HDR Library can be found at www.alsglobal.com.

ALS Environmental
www.alsglobal.com

Chain of Custody (COC) / Analytical Request Form

Canada Toll Free: 1 800 668 9878

Environmental Division Waterloo
Work Order Reference
WT2220348

Telephone : +1 519 886 6910

COC Number: 17 - 641692
Page of

Report To	Contact and company name below will appear on the final report
Company:	JLP Services Inc.
Contact:	519 763 3101
Phone:	
Company address below will appear on the final report	
Street:	405 York Road
City/Province:	Guelph
Postal Code:	N1E 3H3
Invoice To	Same as Report To ☐ YES ☐ NO
	Copy of Invoice with Report ☐ YES ☐ NO
Company:	JLP Services Inc.
Contact:	519 763 3101

Report Format / Dist
Select Report Format: ☑ PDF ☐ E
Quality Control (QC) Report with Report
☐ Compare Results to Criteria on Report - provide
Select Distribution: ☑ EMAIL
Email 1 or Fax: ajay.jayalath@j.
Email 2: cindy.luu@jlpservices.ca
Email 3: john.broad@jlpservices.ca

Invoice Distribution
Select Invoice Distribution: ☑ EMAIL ☐ MAIL ☐ FAX
Email 1 or Fax: office@jlpservices.ca
Email 2:

Project Information
ALS Account # / Quote #:
Job #:
PO / AFE:
LSD:

Oil and Gas Required Fields (client use)
AFE/Cost Center: PO#
Major/Minor Code: Routing Code:
Requisitioner:
Location:

ALS Lab Work Order # (lab use only): JD
ALS Contact: Sampler:

Service Level Below - Contact your AM to confirm all E&P TATs (surcharges may apply)
☑ Standard TAT if received by 3 pm - business days - no surcharges apply
EMERGENCY: 1 Business day [E-100%] ☐
Same Day, Weekend or Statutory holiday [E2-200% (Laboratory opening fees may apply)] ☐
Required for all E&P TATs:

For tests that can not be performed according to the service level selected, you will be contacted.

Analysis Request
Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below

ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	M + I + HFM/EGW	OCPs	PHC F1-F4	SAMPLES ON HOLD	Sample is hazardous (please provide further details)	NUMBER OF CONTAINERS
	BH5 - SS1	25-10-22	1:45 PM			✓				1
	BH5 - SS2	25 Oct 22	1:55 PM		✓		✓			4
	BH2 - SS1	27 Oct 22	1:00 PM		✓	✓	✓			2
	BH2 - SS2	27 Oct 22	1:05 PM				✓			3
	BH201 - SS1	27 Oct 22	1:10 PM		✓	✓				2
	BH201 - SS2	27 Oct 22	1:15 PM				✓			3
	BH3 - SS1	27 Oct 22	2:40 PM		✓	✓				2
	BH3 - SS2	27 Oct 22	2:45 PM				✓			3
	BH6 - SS1	25 Oct 22	12:00 PM		✓	✓				2
	BH6 - SS2	25 Oct 22	12:05 PM				✓			3

Drinking Water (DW) Samples[1] (client use)
Are samples taken from a Regulated DW System? ☐ YES ☑ NO
Are samples for human consumption/ use? ☐ YES ☑ NO

Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)
SOL-125, VS-044

SAMPLE CONDITION AS RECEIVED (lab use only)
Frozen ☐ SIF Observations Yes ☐ No ☐
Ice Packs ☐ Ice Cubes ☑ Custody seal intact Yes ☐ No ☐
Cooling Initiated ☐

INITIAL COOLER TEMPERATURES °C	FINAL COOLER TEMPERATURES °C
	8.4

SHIPMENT RELEASE (client use)			INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)		
Released by: OTB	Date: 31 October 2022	Time: 4:00	Received by: TK	Date: 11-1-22	Time: 10:40	Received by: FH	Date: 2022-11-01	Time: 2PM

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION
WHITE - LABORATORY COPY YELLOW - CLIENT COPY
JULY 2017 FRONT

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY. By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.
1. If any water samples are taken from a Regulated Drinking Water (DW) System, please submit using an Authorized DW COC form.

VS-044

Appendix E – Qualification of Assessors

Cindy Luu, B.Sc.

Cindy has a Bachelor of Science in Biomedical Sciences from the University of Waterloo. She then completed a graduate certificate program in Environmental Engineering Applications from Conestoga College.

Cindy is responsible for environmental reporting, including Phase I and II Environmental Site Assessments, due diligence reports, excess soil management, environmental monitoring and investigations, regulatory compliance and regulations.

Ajay Jayalath, MBA, M.Sc., P.Geo.

Mr. Jayalath graduated from University of Toronto with a Bachelor of Science in Environmental Geoscience, specializing in Urban Geoscience and Hydrogeology. He then obtained a Master's of Science degree from the University of Toronto in Environmental Science and a MBA from the DeGroote School of Business, McMaster University.

Mr. Jayalath has over fifteen years of environmental investigations experience in the geo-environmental field. Mr. Jayalath has worked on numerous remediation projects including the design and application of in-situ and ex-situ remediation projects. In addition, he has been involved in over fifty Phase I and II Environmental Site Assessments, from conducting field work to the reporting and project management phases.

His current responsibilities include the management of the environmental groups, including the site assessment, hydrogeological, air quality, hazardous materials, and risk assessment teams. As part of his responsibilities, Mr. Jayalath's role is to ensure the environmental operations are completed in a timely manner to client satisfaction. Mr. Jayalath oversees various contracts for nationwide clients and routinely coordinates with the regional offices to ensure project and contract performance.

Alexander Lee, M.Sc. (Eng.), P.Eng., QP

Alex is a Senior Engineer with over 32 years of experience. His specialties include environmental, geotechnical investigation, soil mechanics and foundation engineering, embankment dams, earth retaining structures, pavement and earthwork construction. Alex has managed various geotechnical investigations and construction review projects throughout the Greater Toronto Areas and in southeastern Ontario.

Alex is responsible for project administration and technical operations, including sales promotion, the preparation of proposals and cost estimates, planning and directing fieldwork and laboratory testing programs, engineering evaluations and analyses, the preparation of geotechnical recommendations and reports. He is also actively involved in construction review services relating to foundations, earthworks, pavements, soil retaining systems and structures. Alex also has experience in engineering analysis and design of tailings disposal facilities including earth dams, storage ponds and delivery pipelines.

BURNSIDE

Environmental Impact Study
Revision 1
Centre Wellington Operations
Centre 965 Gartshore Street
Fergus ON

Township of Centre Wellington
1 Macdonald Square
Elora ON N0B 1S0

Environmental Impact Study
Revision 1
Centre Wellington Operations Centre
965 Gartshore Street
Fergus ON

Township of Centre Wellington
1 Macdonald Square
Elora ON N0B 1S0

R.J. Burnside & Associates Limited
292 Speedvale Avenue West Unit 20
Guelph ON N1H 1C4 CANADA

April 2023
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0	Yes	Yes	Township of Centre Wellington

Record of Revisions

Revision	Date	Description
0	February 13, 2023	First Submission
1	April 13, 2023	Township comments, revised concept plan

R.J. Burnside & Associates Limited

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SY:lam:jh

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Environmental GIS Specialist

Report Reviewed By:

Kevin Butt, B.Sc. (Env.), Eco. Rest. Cert., M.Sc.
Terrestrial Ecologist, ISA Certified Arborist

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1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Township of Centre Wellington (the Township) to prepare a scoped Environmental Impact Statement (EIS) for the proposed operations center located at 965 Gartshore Street, Fergus. This report is in support of the proposed Zoning By-Law Amendment (ZBA).

The Grand River Conservation Authority (GRCA) is requiring the preparation of the EIS due to regulated lands in the study area. Portions of the County's Natural Heritage System are found on the north area of the site and require characterization and demonstration that no impacts to the features and functions will result from the development.

The purpose of this investigation is to assess the off-site wetland and woodland within the study area, as well as determine impacts and mitigation as needed within the context of the proposed development.

This revision addresses comments received about the EIS, and the new concept plan has been incorporated into the figures. The revised concept does not result in any new impacts to the retained natural features.

2.0 Policy and Legislative Framework

The following sections identify the federal, provincial, Conservation Authority and County policies and legislation that apply to the proposed development.

2.1 Migratory Birds Convention Act, 1994

The Migratory Birds Convention Act, 1994 (MBCA) and the Migratory Bird Regulations (MBR) are federal legislative requirements that are binding on members of the public and all levels of government, including federal and provincial governments. The legislation protects certain species[1], controls the harvest of others, and prohibits commercial sale of all species.

One key responsibility under the MBCA is described in Section 6 of the associated MBR:

> *Subject to subsection 5(9), no person shall*
>
> *Disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or*
>
> *Have in his possession a live migratory bird, or a carcass, skin, nest or egg of a migratory bird except under authority of a permit therefore.*

The "incidental take" of migratory birds and the disturbance, destruction or taking of the nest of a migratory bird is prohibited. "Incidental take" is the killing or harming of migratory birds due to actions, such as economic development, which are not primarily focused on taking migratory birds. No permit can be issued for the incidental take of migratory birds or their nest or eggs because of economic activities. These prohibitions apply throughout the year. Environment Canada and the Canadian Wildlife Service have compiled nesting calendars that show the variation in nesting intensity, by habitat type and nesting zone, within broad geographical areas distributed across Canada. While this does not mean nesting birds will not nest outside of these periods, the calendars can be used to greatly reduce the risk of encountering a nest. Environment Canada advises avoidance as the best approach.

---

[1] *Bird species not regulated under the Act include: Rock Dove, American Crow, Brown-headed Cowbird, Common Grackle, House Sparrow, Red-winged Blackbird, and European Starling. In addition, raptors are not regulated under the MBCA. However, they are protected under provincial legislation which restricts and regulates the taking or possession of eggs and nests. Furthermore, if the species identified is protected under Ontario's Endangered Species Act, 2007 or the federal Species at Risk Act, additional restrictions may apply.*

2.3 Provincial Policy Statement (2020)

The PPS (MMAH, 2020) provides general policies on land use patterns, resources, and public health and safety that guide development across Ontario. As stated in Section 2.1.1 of the PPS, "Natural features and areas shall be protected for the long term". This statement is interpreted as the main goal of development should be to prevent additional degradation, reduction or removal of onsite and adjacent natural heritage features and functions.

Additionally, Section 2.1.2 states that:

> *"The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features".*

This statement supports the previous section where natural feature preservation should be partnered with management, restoration and enhancement of the feature(s) and the connections of the feature(s) within a greater natural heritage system.

Specifically related to this location is the requirement to identify natural heritage systems (NHS) in southern Ontario (Ecoregions 6E and 7E), Policy 2.1.3. This report will address Section 2.1 (Natural Heritage).

Specifically, Section 2.1.4 identifies that development and site alteration shall not be permitted within:

a) *Significant wetlands in Ecoregions 5E, 6E, and 7E; and*

b) *Significant coastal wetlands.*

Also, Section 2.1.5 identifies that development and site alteration shall not be permitted within:

a) *Significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E, and 7E;*

b) *Significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Mary's River);*

c) *Significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and St. Mary's River);*

d) *Significant wildlife habitat;*

e) Significant areas of natural and scientific interest; and

f) Coastal wetlands in Ecoregions 5E, 6E, and 7E that are not subject to policy 2.1.4(b) unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

Sections 2.1.6 and 2.1.7 identify two additional natural features where development and site alteration are not permitted except in accordance with provincial and federal requirements.

a) Fish habitat except in accordance with provincial and federal requirements; and

b) Habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

According to Section 2.1.8, development and site alteration are not permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6, unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

2.4 Endangered Species Act, 2007

The Endangered Species Act, 2007 (ESA), provides protection for species at risk (SAR) and their habitat. The ESA was administered by the Ministry of Natural Resources and Forestry (MNRF), but is now the jurisdiction of Ministry of Environment, Conservation and Parks (MECP). The Act presents policies for the protection of extirpated, endangered, and threatened species, as well as species of special concern. These four categories of species form the Species at Risk in Ontario (SARO) List, which are classified by the Committee on the Status of Species at Risk in Ontario (COSSARO). COSSARO is also responsible for maintaining criteria for assessing and classifying SAR.

The ESA helps protect species (Section 9) and their habitat (Section 10). Section 9(1)(a) of the ESA states,

> *No person shall kill, harm, harass, capture or take a living member of a species that is listed on the SARO list as Extirpated, Endangered and Threatened.*

Section 10(1)(a) of the ESA states:

> *No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario list as an endangered or threated species.*

2.5 Grand River Conservation Authority (O. Reg. 150/06)

The GRCA administers Ontario Regulation 150/06: Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. Through this regulation, GRCA has the ability to:

- Prohibit, regulate or require the permission of the authority for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland.
- Prohibit, regulate or require the permission of the authority for development, if in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development.

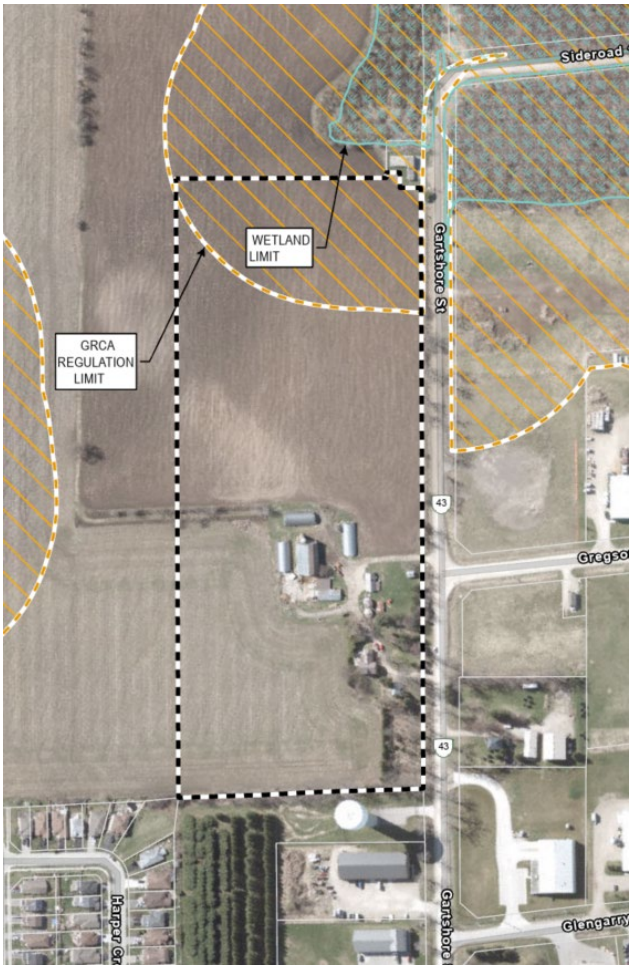
Based on online GRCA Regulation mapping, a portion of 965 Gartshore Street, Fergus is located within GRCA's Regulation limits and will therefore require a consent and permit from the GRCA once the development envelope is determined.

The EIS provides recommendations to ensure that natural heritage features and functions are not negatively impacted and, where applicable, recommends mitigation measures.

Although no wetland or watercourse features are present in association with the Subject Property, a wetland feature associated with the Irvine Creek Wetland Complex Provincially Significant Wetland (PSW) is present on adjacent lands. Existing GRCA wetland limit mapping was used for the offsite lands.

A 30 m setback from the floodplain limit was established from GRCA records.

Photo 1: Extent of Wetlands and GRCA Regulatory Limits



2.6 County of Wellington Official Plan

The project limits fall within the Prime Agricultural Lands as shown on Schedule A1 of the County of Wellington Official Plan.

The lands immediately north of the project limits are classified as Core Greenlands. Areas identified under the “Core” Greenlands designation contain:

- Provincially significant wetlands;
- All other wetlands;
- Habitat of endangered or threatened species and fish habitat; and
- Hazardous lands.

The Greenlands designation includes other significant natural heritage features such as habitat, areas of natural and scientific interest, streams and valleylands, woodlands, environmentally sensitive areas, ponds, lakes and reservoirs and natural links.

This EIS is also intended to demonstrate that there will be no negative impacts to the Greenlands features and their functions.

2.7 County of Wellington Forest Conservation By-Law 5115-09

The County Wellington Forest Conservation By-Law 5115-09 regulates the removal of trees within woodlots greater than 1.0 ha as well as an unforested corridors within the area that are equal to or less than 30 m that meet the following density criteria:

- 1,000 trees of any size, per hectare (405 trees, of any size, per acre);
- 750 trees, measuring over 5 cm in diameter, per
- Hectare (304 trees, measuring over 2 inches in diameter, per acre);
- 500 trees, measuring over 12 cm in diameter, per hectare (202 trees, measuring over 4.7 inches in diameter, per acre); or
- 250 trees, measuring over 20 cm in diameter, per hectare (101 trees, measuring over 7.9 inches in diameter, per acre).

A tree preservation plan has been completed by Burnside as part of a different scope of this project.

3.0 Background Information Review

The following documents were reviewed to assess the environmental constraints to, and opportunities for the proposed development:

- Aerial photography (multiple years from GRCA database);
- The Ministry of Natural Resources and Forestry (MNRF) Natural Heritage Information Centre (NHIC) database to identify records of rare wildlife species on, and in the vicinity of the Site;
- GRCA's Regulation 150/06 Mapping;
- NRVIS data provided on the GRCA's Grand River Watershed Viewer online mapping site to identify provincially significant wetlands, valleylands, ANSIs and watercourses;
- The County of Wellington Official Plan;
- MNRF Natural Heritage Areas online mapping interface;
- The Ontario Breeding Bird Atlas (OBBA), 2001-2005 for records of birds breeding in the area; and,
- The Ontario Reptile and Amphibian Atlas (ORAA), for records of reptiles and amphibians in the area.

The results of the background data review are presented in Table 3.1. Based on the review, the following features are, or may be, present within 120 m of the Site:

- Irvine Creek Wetland Complex;
- Colonial Waterbird Nesting Area;
- Significant Wildlife Habitat (Waterfowl Stopover & Staging Areas (Aquatic), Bat Maternity Colonies, Turtle Wintering Areas, Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs), Deer Yarding Areas, Deer Winter Congregation Areas, Amphibian Breeding Habitat (Woodland), Terrestrial Crayfish, Special Concern and Rare Wildlife Species); and,
- Habitat of endangered and threatened species.

Records of avifauna, mammals, reptiles and amphibians in the broad region are outlined Table 3.1 below

Table 3.1: Potential Natural Heritage Features in Vicinity of the Site

Feature	Existing Records	Data Source
Features of Provincial Significance		
Significant Wetlands Ecoregion 6E	Irvine Creek Wetland Complex - Provincially Significant Wetland (PSW).	NHIC, GRCA GRIN mapping, MNRF data package
Significant Woodlands	No records identified	MNRF Woodlands Mapping (as presented on GRCA GRIN mapping),
Significant Valleylands	No records identified	GRCA GRIN mapping
Significant Wildlife Habitat Ecoregion 7E	**Seasonal Concentrations of Animals:** • (Waterfowl Stopover & Staging Areas (Aquatic) • Bat Maternity Colonies • Turtle Wintering Areas • Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) • Deer Yarding Areas • Deer Winter Congregation Areas **Rare Vegetation Communities:** • No records identified. **Specialized Habitat for Wildlife:** • Amphibian Breeding Habitat (Woodland) **Habitats for Species of Conservation Concern:** • Terrestrial Crayfish • Special Concern and Rare Wildlife **Animal Movement Corridors:** • No records identified	NHIC, OBBA
Significant Areas of Natural and Scientific Interest	No records identified.	NHIC, GRCA GRIN mapping
Habitat of Endangered and Threatened Species	Records identified for Threatened and Endangered species of reptiles and amphibians, birds, mammals and vegetation.	NHIC, OBBA, ORAA

3.1 Natural Heritage Information Centre database

The Natural Heritage Information Centre (NHIC) database, maintained by the MNRF was accessed to search for records of provincially significant plants, vegetation communities and all forms of wildlife within the subject lands and the surrounding areas. The database provides data for 1 km x 1 km blocks. The subject lands and study area vicinity (i.e., within 120 m of the site) falls within one km square (square no. 17NJ4941). The search revealed one record for Eastern Meadowlark (*Sturnella magna*) and Bobolink (*Dolichonyx oryzivorus*), the search also identified Irvine Creek Wetland Complex PSW.

3.2 Ontario Breeding Birds Atlas

A review of the Ontario Breeding Bird Atlas (OBBA) square 17NJ44 identified records of 178 bird species in the vicinity of the site. The relative rarity[2] of each species is identified in Table 3.2.

Table 3.2: Provincial S-Ranks of Bird Species Recorded in the Vicinity[3][3] of the Site

Rarity Ranking (SRank)*	Number of Species
S5 (S5, S5B, S5N)	94
S4 (S4, S4B, S4?B, S4S5B)	58
S3 (S3, S3B)	11
S2 (S2B)	7
S1(S1, S1B, S1?, S1M)	2
SNA	6

*S1- Critically Imperiled
S2- Imperiled
S3- Vulnerable
S4- Apparently Secure
S5- Secure
SNA- Not applicable, not suitable for conservation activities

Most of the bird species in the area are common, secure and not at risk. Species ranked S3 and lower are considered to be vulnerable. Based on a review of OBBA records, 20 species ranked S3 or lower were identified as being present within the vicinity of the study area. Twelve species are listed under the ESA as Special Concern (Barn Swallow – *Hirundo rustica*; Short-eared Owl – *Asio flammeus*; Eastern Wood-pewee – *Contopus virens*; Evening Grosbeak – *Coccothraustes vespertinus*; Grasshopper Sparrow – *Ammodramus savannarum*; Common Nighthawk – *Chordeiles minor*; Golden-winged Warbler – *Vermivora chrysoptera*; Bald Eagle Haliaeetus leucocephalus; Peregrine

2 Rarity based on NatureServe rankings for provincial/state rarity (SRank).

3 Based on OBBA 10x10km square covering the site.

Falcon - *Falco peregrinus;* Olive-sided Flycatcher - *Contopus cooperi;* Wood Thrush - *Hylocichla mustelina;* Canada Warbler - *Cardellina canadensis*).

Eight species are listed as Threatened (Bobolink – *Dolichonyx oryzivorous*; Bank Swallow – *Riparia riparia*; Least Bittern – *Ixobrychus exilis*; Eastern Whip-poor-will - *Antrostomus vociferus*; Louisiana Waterthrush - Parkesia *motacilla*; Chimney Swift - *Chaetura pelagica*; Eastern Meadowlark – *Sturnella magna;* Cerulean Warbler, *Setophaga cerulea*).

Two species are listed under the ESA as endangered (Acadian Flycatcher – *Empidonax virescens*; Red-headed Woodpecker – *Melanerpes*). Threatened and Endangered species, as well as habitats that support them, are protected in Ontario.

Of the 20 species listed, suitable habitat is present within the Subject Lands for one Threatened species and one species of Special Concern, specifically:

- Barn Swallow – Special Concern; and,
- Red-headed Woodpecker – Endangered;

Suitable habitat was also present within the study area but not the subject lands for two species of special concern, specifically:

- Canada Warbler – Special Concern; and,
- Golden-winged Warbler – Special Concern;

Further information regarding the habitat requirements for each species is discussed in greater detail in Section 7.5.2.

3.3 Ontario Reptile and Amphibian Atlas

Records of reptiles and amphibians were obtained from the NHIC and ORAA databases for SAR listed under the ESA. No records for species identified as Endangered, Threatened, or Special Concern were identified as for square 17NJ44. One federally listed species of Special Concern, Midland Painted Turtle (*Chrysemys picta marginata*) was identified as being potentially present.

Habitat for this species, if present within the study area, would be limited to the PSW located approximately 25 m from the limit of development

3.4 Grand River Conservation Authority Mapping

GRCA online mapping was used to identify regulated areas including floodplains, watercourses, and wetland systems within the study area. Approximately 25% of the subject site falls within the GRCA regulatory limits. Wetlands are identified near the north and northeast of the site.

4.0 Field Methodologies

Field investigations were conducted July 19, 2022 and January 6, 2023. The purpose of field investigations was to verify whether the features identified in the background data review are present and, if so, to confirm their boundaries and characterize them.

Burnside ecology staff conducted a site investigation to identify and map vegetation communities. All communities onsite and immediately adjacent to the property lands were reviewed to characterize their composition based on Lee et. al, 1998 and the Vegetation Type List of the Southern Ontario Ecological Land Classification (Lee, May 2008). The limits of these communities are shown on Figure 2.

The limit of the offsite wetland as identified in GRCA boundary was reviewed in comparison to the site conditions from the Study Area and the road ROW. The limit appeared accurate, and the limit has been incorporated into the current investigation's mapping.

4.1 Incidental Wildlife Observation

Observations and calls by wildlife of birds and mammals were documented when encountered.

No targeted wildlife investigations were completed (i.e., breeding bird surveys, marsh monitor protocol) due to limited habitat provided by the annual row croplands.

5.0 Existing Conditions

5.1 Site Description

The study area is located on a 7.97 ha parcel of farmland located within the Township of Centre Wellington. The site sits northeast of the boundary for the Town of Fergus on Gartshore Street. The site is bounded by Gartshore Street to the northeast, agricultural lands to the west and southwest, Harper Crescent Park to the south, a municipal well located directly northeast, and a municipal water tower located south. There is an existing farmhouse and seven barns on the property. Located within the southeast corner of the site is a plantation of a variety of deciduous and coniferous trees that are proposed to be preserved and made into an arboretum.

The surrounding land use is primarily residential and agriculture, with riparian corridors and isolated wooded areas.

The Burnside investigation identified four ecosites within and immediately adjacent to the proposed development area.

5.2 Physiography

5.2.1 Soils and Topography

The Ontario Ministry of Agriculture, Food and Rural Affairs AgMaps identifies the site as being comprised of Harriston Loam throughout the majority of the property. Harriston Loam are described as well drained, glacial tills derived from the underlying limestone strata (Hoffman et al. 1963).

A geotechnical report was prepared by JLP Services Inc. on December 19, 2022. Based on the findings detailed in the report, the topsoils throughout all the bores throughout the property consist of sandy silt with trace gravel and scattered organic inclusions. The depth pf topsoils varied throughout the Subject Property, ranging from 200 – 250 mm thick. The topsoils are underlain by sandy silt till or silty sands.

The site drainage patterns are discussed in greater detail below and the FSR.

5.2.2 Site Surface Drainage Pattern

The existing site has an overall high point near the southeast corner of the property. The result is that the entire site drains from southeast to northwest via overland flow to the adjacent agricultural property. External drainage areas are negligible as the road runoff is conveyed by the municipal ROW.

5.3 Ecological Land Classification

Assignment of ELC codes on vegetation communities that are heavily influenced by disturbance and management can be difficult and may result in subjectivity associated with the classification. A description of each community is provided below.

Annual Row Crops (OAGM1)

Row crops make up the majority of the property and comprise the main field that is approximately 6.7 ha. Soy was the crop during the 2022 growing year.

Rural Property (CVR_4) and Agricultural Buildings (IAGM1)

The residential and agricultural operations portion of the property is found at the southeast corner of the site. It is occupied by the residence, barn and outbuildings. Manicured turf is found throughout the settled area with open grown trees including Thornless honey-locust (*Gledistia triacanthos 'inermis'*), Eastern cottonwood (*Populus deltoides*), Red pine (*Pinus resinosa*) and White spruce (*Picea glauca*).

The tree collection is also included with this community. It is comprised of a wide variety of specimen trees with gardens in the groundlayer. Refer to the arborist report (also by Burnside) for the species found within this area.

Fencerow (TAGM5)

There are two hedgerows that are identified in this investigation: one at the south limit and the other located west of the barn.

The hedgerow on the south limit is located offsite to the current Study Area but is on Township lands associated with the water tower. It is dominated by a single row of mature Sugar maple (*Acer saccharum*) trees with DBH range of 50 to 82 cm are found at the east limit of the feature. Immature (10-25 cm) trees are found at the west limit where Norway maple (*Acer platanoides*) and Sugar maple are codominant. European buckthorn (*Rhamnus cathartica*) and Choke cherry (*Prunus virginiana*) are found growing densely in the groundlayer and understory.

The hedgerow growing west of the barn is a sparse double row of trees that are found on the limits of a tractor path. Black cherry (*Prunus serotina*) is the dominant species with lesser associates of European mountain-ash (*Sorbus aucuparia*) and Sugar maple. The trees are mid-aged, with DBH's ranging mainly from 20 to 36 cm. Cool season grasses are found throughout the feature with Smooth Brome (*Bromus inermis*) as the dominant species.

Willow Mineral Deciduous Thicket Swamp (SWTM3-1)

This offsite wetland is located north of the property on private lands. The wetland limit from GRCA's mapping appeared consistent with what the ecologist observed in the field so that limit is being used to delineate this feature. The wetland is dominated by shrubs: mainly Conegall (Missouri) willow (*Salix eriocephala*) with lesser associates of Red osier dogwood (*Cornus sericea*). Reed canary grass (*Phalaris arundinacea*) dominates the groundlayer throughout the feature. The feature has dense masses of shrubs with openings where the reed canary grass is exclusively found.

5.4 Incidental Wildlife

The following species were documented visually or by call during site investigations:

- Dark-eyed junco *(Junco hyemalis*);
- American Crow *(Corvus brachyrhynchos)*; and,
- Grey Squirrel *(Sciurus carolinensis).*

It is anticipated that wildlife tolerant of agriculture operations including Raccoon (*Procyon lotor*), Eastern Coyote (*Canis latrans*), American Skunk (*Mephitis mephitis*), and Virginia Opossum (*Didelphis virginiana*) use the site for foraging and habitat. Bats including SAR and non-SAR species may also use the swamp features and structures for maternal roosting.

6.0 Provincially Significant Natural Heritage Features

6.1 Provincially Significant Wetlands

The Irvine Creek Wetland Complex is located immediately beyond the Study Area.

6.2 Significant Woodlands

No significant woodlands are present within the Study Area. Areas north and east of the site, associated with the Irvine Creek Wetland Complex, may be considered Significant Woodlands.

6.3 Significant Valleylands

There are no Significant Valleylands within 120 m of the site.

6.4 Significant Areas of Natural and Scientific Interest

There are no Areas of Natural and Scientific Interest within 120 m of the site.

6.5 Significant Wildlife Habitat

According to the Natural Heritage Reference Manual (MNR, 2010) and Significant Wildlife Habitat Technical Guide (MNR, 2000), there are four types of Significant Wildlife Habitat ("SWH"), as follows:

- Habitats of Seasonal Concentrations of Animals;
- Rare Vegetation Communities / Specialized Habitats;
- Habitats of Species of Conservation Concern; and,
- Animal Movement Corridors.

Significant Wildlife Habitat (SWH) is designated at the local planning level (i.e., municipality). Local designations occur because conditions and features vary widely between municipalities and what is important and unique in one area may be common and secure in another. One municipality, the County of Brant, is an example that has broadly defined SWH as areas *"consisting of one or more of the following*:

- *"habitat areas that provide for seasonal concentrations of animals;*
- *wildlife movement corridors;*
- *rare vegetation communities or specialized habitats for wildlife; and/or*
- *habitats for species of conservation concern".*

SWH has not been identified on schedule mapping in the Centre Wellington or Wellington County OPs. The assessment completed as a part of the study will use broad habitat descriptions from the Significant Wildlife Habitat Technical Guide (SWHTG) and the SWHTG Ecoregion 6E Criterion Schedule (MNRF, 2015).

Based on Burnside's review of background information and field data, there are no candidate or confirmed SWH features associated within the Subject Lands. This is due to the fact that the majority of the site consists of active agricultural lands and lack of natural cover.

Within habitats adjacent to the subject lands, four other Candidate SWH features have been identified. Again, no studies to confirm the presence of SWH Features were carried out on these lands. A summary of the SWH features within the Technical Guide as they relate to this investigation are provided in Appendix A. The Candidate SWH features identified in the areas adjacent to the Study Area include:

- Waterfowl Stopover & Staging Areas (Aquatic) – Moderate Potential;
- Bat Maternity Colonies – Moderate Potential;
- Turtle Wintering Areas – Low Potential;
- Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) – Moderate Potential;
- Deer Yarding Areas – Confirmed present;
- Deer Winter Congregation Areas – Moderate Potential;
- Amphibian Breeding Habitat (Woodland) – Moderate Potential;
- Terrestrial Crayfish – Moderate Potential; and,
- Special Concern and Rare Wildlife Species.

All of these habitats are associated with the Irvine Creek Wetland Complex north and east of the Subject Property.

6.5.1 Waterfowl Stopover & Staging Areas (Aquatic) – Moderate Potential

The swamp communities and watercourse associated with Irvine Creek Wetland Complex could function as a Waterfowl Stopover & Staging Area. Targeted studies to confirm the presence/absence of aggregations of waterfowl or benthic invertebrate studies were not included within the scope of work for this EIS.

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.2 Bat Maternity Colonies

The presence / absence of this feature was not able to be confirmed as passive acoustic monitoring was not included in the scope of work. Candidate Bat Maternity Habitat (BMH) may occur within the SWTM3-1 community or other parts of the Irvine Creek Wetland Complex. These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.3 Turtle Overwintering Areas

The swamp communities and watercourse associated with the Irvine Creek Wetland Complex could provide suitable overwintering habitat for Snapping Turtle and Midland Painted Turtle. Targeted studies to confirm the presence/absence of overwintering turtles, dissolved oxygen surveys, or turtle basking surveys were not completed as a part of this EIS. No incidental turtle observations of turtles were made during field observations.

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.4 Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)

The swamp components of the Irvine Creek Wetland Complex that contain live or dead trees or shrubs for nesting could provide suitable overwintering habitat.

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.5 Deer Yarding & Winter Congregation Areas

The Irvine Creek Wetland Complex has been identified by the MNRF as a White-tailed Deer Wintering Area (Stratum 2).

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.6 Amphibian Breeding Habitat (Woodland)

Deciduous swamp and thicket swamps are present adjacent to the subject lands and could constitute amphibian breeding habitat. Graminoids, shrubs, and fallen organic debris were also present, providing calling sites and substrates for egg laying. Amphibian call surveys were not required within the scope of the EIS.

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.7 Terrestrial Crayfish

Marshes and swamp and thicket swamps are present adjacent to the subject lands and could constitute terrestrial crayfish habitat. No chimneys were seen during site investigations.

These features are not located within the proposed development limits and will not be directly impacted by construction activities. Potential indirect impacts and mitigation measures are discussed in Section 9.

6.5.8 Habitat for Species of Conservation Concern – Special Concern and Rare Wildlife Species

Canada Warbler and Golden-winged Warbler

Suitable habitat for Canada Warbler and Golden-winged Warbler is present in association with the thicket swamp community. Canada Warbler prefers wet coniferous, deciduous and mixed forest and swamp types, with a dense shrub layer and is also known to occur within thicket swamps. This species nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest. Similarly, Golden-winged Warbler generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility rights-of-way, or recently logged areas including thicket swamps (Cadman et al. 2007).

Overall, there is moderate potential for Canada Warbler and Golden-winged Warbler to be supported within the off-site thicket swamp. This community contains a dense shrub layer.

Direct impacts to the swamp communities will be avoided as no off-site works are proposed.

6.6 Significant Habitat of Endangered and Threatened Species & Species of Special Concern

Burnside's background review revealed the potential for SAR in the site and vicinity. Under the ESA, species listed as Threatened and Endangered are afforded species and habitat protection. Although species of Special Concern are not afforded individual protection or habitat protection, management plans and in some cases recovery strategies are completed. As part of the SAR screening table, potential for Special Concern species and their habitat was evaluated within the site.

All findings can be found in the SCC and SAR screening table in Appendix B of this report. There is potential for SAR to be supported within the wetland and forest communities. No SAR are confirmed to inhabit the site based on the findings of the surveys completed. The table below summarizes the Endangered and Threatened and found to have candidate habitat within the site.

Table 6.1: Historical Species at Risk and Species of Special Concern with Habitat Present on the Site

Species	Scientific Name	Status	Habitat
Candidate			
Barn Swallow	*Hirundo rustica*	SC	CVR_4
Red-headed Woodpecker	*Melanerpes erythrocephalus*	END	SWTM3-1
Eastern Small-footed Myotis	*Myotis leibii*	END	CVR_4, SWTM3-1
Little Brown Myotis	*Myotis lucifugus*	END	CVR_4, SWTM3-1
Northern Myotis	*Myotis septentrionalis*	END	CVR_4, SWTM3-1
Tri-colored Bat	*Perimyotis subflavus*	END	CVR_4, SWTM3-1

Habitat for the remaining SAR identified in Appendix B are not present within the Study Area. Note that federally listed species that are not listed as SAR under the ESA are not included within Table 6.1, but are included in Appendix B.

Barn Swallow

Based on the OBBA records, Barn Swallows have been observed nesting within the site vicinity. Barn Swallows are well documented to nest on the outside of buildings adjacent to open areas including wetlands, river shorelines, and meadows. These open areas are used as foraging habitat (Heagy et al. 2014).

The house and barns are adjacent to suitable foraging habitat, and it is acknowledged there is potential for Barn swallow to be nesting within the subject lands. No Barn Swallow nests were observed on or within the barn or buildings at the time of site investigations.

SAR Bats

In Ontario, all four of SAR Myotis species have been documented to utilize anthropogenic structures as maternal roosting and day roosting habitat. Little Brown Myotis and Northern Myotis typically roost in mature cavity trees with cracks, cavities, fissures, or loose bark which it uses to shelter itself and its young, forming maternity colonies in clusters of trees in proximity. Little Brown Myotis in particular are well documented to utilize anthropogenic structures such as houses, sheds, buildings, and bridges. In comparison, only one confirmed Northern Myotis roost has ever been documented in Ontario (Humphrey & Fotherby, 2019). Eastern Small-footed Myotis typically roost in rocky outcroppings have been documented to utilize anthropogenic structures including barns, sheds, guardrails, and culverts.

The barn may provide suitable roosting habitat for SAR bats. Numerous entry points are visible throughout the barn; however, no evidence of use by bats (i.e., grease and guano stains near potential entry points) was observed by Burnside ecologists during the field investigation. Suitable foraging habitat is abundant within the surrounding lands. Burnside biologists did not observe any evidence of SAR bat occupancy such as grease or guano stains near entry points or within the barn, house or outbuildings.

Suitable maternity roosting habitat is available within the surrounding lands. SAR bats are well documented to switch between different roost trees throughout the active season and between years. It is likely that if potential roosting habitat is removed, bats will seek out available roosts in the forested lands surrounding the Subject Lands in the future. Mitigation measures to avoid potential impacts to SAR bats and their habitat are discussed in greater detail in Section 9.

7.0 Proposed Development

The project proposes an Operations Centre for the Township of Centre Wellington. The project is proposed to occur in two phases. The operations building will include a phase one gross floor area (GFA) of 3,560 m^2 (38,320 ft^2). It also contains a 250 m^2 (2,702 ft^2) vehicle storage pole barn and a single greenhouse of 124 m^2. Phase 2 includes 1,226 m^2 (13,197 ft^2) of additional GFA in the operations building as well as a 1,951 m^2 (21,000 ft^2) salt and storage shed including interior loading. Phase 2 will also include an additional 250 m^2 (2,691 ft^2) of GFA to the operations building. A second greenhouse directly adjacent to the primary greenhouse will be constructed in Phase 2. The development will cover most of the site and include an operations building, greenhouses, vehicle storage, pole barn, salt and sand shed, bunkers, bins, and ample outdoor parking. There is no intention to accommodate snow storage or snow disposal, all snow storage is strictly related to snow kept on site. There are three proposed entrances to the site, which are all located along Gartshore Street. The north portion of the site is within the GRCA regulation limit.

The house and associated tree collection will remain, but the barn and outbuildings will be removed to accommodate the new construction. The removal of trees is required to accommodate the south and central accesses, grading around the periphery and redevelopment of the internal parts of the site. Trees will also be removed with the Gartshore Street ROW to accommodate onsite grading, underground servicing and the central access.

Stormwater that currently is directed from the southeast towards the northwest will be collected and directed toward a proposed SWM facility using surface drainage and storm sewers. The outlet for the SWM facility will be directed toward the Gartshore Street ROW.

7.1 Natural Feature Protection and Enhancement

A 30 m buffer has been applied to the Irvine Creek PSW, as shown on Figures 2 and 3. Due to the proposed development, there will be some grading that encroaches this buffer. A total area of 228 m^2 will be impacted and enhancement in this area is recommended. It is understood that the property that contains the wetland is proposed for redevelopment so onsite enhancement should be coordinated with offsite enhancement plans.

The tree collection, most of the south hedgerow and a portion of the open grown trees around the rural residential yard will be retained and protected by tree protection fence (as illustrated in the arborist report).

8.0 Potential Ecological Impacts and Mitigation Measures

The proposed development has the potential to impact the natural heritage features summarized in Sections 5.0 and 6.0 of this report.

Potential impacts to these features can be categorized as:

- Direct (within the footprint of the development);
- Indirect (adjacent to the development but affected by spin-off effects); or
- Induced (a consequence of changes in human behaviours in response to the new development).

The most significant direct impact may be interpreted as the removal of vegetation associated with the rural property and the removal of the existing barn and outbuildings.

Effects on natural features that may occur that are further discussed:

- Loss or disturbance to migratory birds or their nests, wildlife habitat including potential Barn Swallow and SAR bat habitat, because of land clearing and development activities;
- Construction impacts, including erosion / sedimentation and unintentional encroachment into the retained natural features;
- Disruption of flow contributions and quality to wetland;
- Effects on wildlife because of lighting; and,
- Effects on wildlife from noise.

8.1 Wetlands

No direct effects to the PSW are present outside of the development envelope. Potential indirect impacts to wildlife are assessed in further detail in Table 9.1 below.

8.2 Significant Wildlife Habitat

All confirmed and candidate significant wildlife habitat features are found in association with the adjacent PSW complex, outside of the proposed development envelope. All potential indirect effects can be readily mitigated using industry standard construction practices. Potential indirect impacts to wildlife are assessed in further detail in Table 9.1 below.

8.3 Significant Habitat of Endangered and Threatened Species & Species of Special Concern

Impacts to potential candidate Barn Swallow and SAR bat habitat are anticipated with the proposed development. There is currently no evidence to indicate use of anthropogenic structures on-site by any SAR wildlife species but provided on-site

structures remain in-tact, there is potential for the barn to be used by SAR bats or Barn Swallows. Mitigation measures are discussed in greater detail in Table 9.1 below.

8.4 Summary of Potential Impacts to Natural Heritage Features & Proposed Mitigation Measures and Monitoring Activities

Potential impacts proposed mitigation and monitoring activities are presented and summarized below in Table 8.1.

Table 8.1: Summary of Potential Negative Impacts and Recommended Mitigation

Activity	Potential Impact	Duration (D), Geographic Extent (GE) and Magnitude (M) of the Impact	Proposed Mitigation
Land Clearing within the Development Envelope	Loss of or disturbance to migratory birds or their nests	D: Short-term, occurring only once. GE: Limited to open-grown trees within maintained grassy area M: Low, bird habitat in the development envelope is minimal; disturbance would not affect birds at the population level; however, disturbance of bird nests is in contravention of the MBCA.	Land clearing and barn / building removal should be completed outside of the breeding bird season (Nesting Zone C1 core breeding window, or when 41-100% are predicted to be nesting for all habitat types, is late March to August 31). If this is not possible, a bird specialist should survey the site prior to clearing to confirm that no active nests of migratory birds are present. Any active nests should be fenced and left undisturbed until young have fledged, as determined by a qualified biologist. All tree pruning and removals should be carried out by a qualified tree service under the direction of a certified arborist. Additional plantings will be completed to offset the loss of existing trees within the development envelope. Proposed plantings will consist of native tree and shrub species that will offer both habitat and a food source for birds and other wildlife species.
	Loss of wildlife habitat	D: Short-term, occurring only once. GE: Limited to the development envelope. M: Low for urban tolerant wildlife. Wildlife habitat within the Subject Lands is limited. Removal of existing features will have a negligeable effect on commonly occurring wildlife species.	Any buildings that will be removed or altered during site developments should be inspected for nests prior to alteration. If any potential nests are found, the nest should be inspected by an avian biologist to confirm the species identity. All tree removal to occur through fall, winter and early spring months (i.e., September 1 to March 31) to avoid impacts to SAR bats. None of the trees slated for removal on-site have been identified as potential bat maternity habitat. Additional plantings will be completed to offset the loss of existing trees within the development envelope. Proposed plantings will consist of native tree and shrub species that will offer both habitat and a food source for birds and other wildlife species.
	Loss of candidate Species at Risk bat habitat associated with anthropogenic structures	D: Short-term, occurring only once. GE: Limited to the development envelope. M: Low, no evidence of bat roosting at this time. Low for Barn Swallow, no evidence of nesting. No evidence of use by bats was observed during Burnside's 2022 site visit.	Barn and outbuilding demolitions should occur outside of the bat active window (April 1 – September 30 of any given year). Further consultation with the MECP is recommended to ensure compliance with the *ESA.* Should the barn and outbuilding remain unused into the summer months, exclusion measures to prevent use by wildlife should be considered. Measures should be in place prior to the Barn Swallow active window (early May – July) and bat active window. The MNRF's *Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures* (2017) should be consulted regarding bets management practices to prevent Barn Swallow nesting during the breeding bird window.

Activity	Potential Impact	Duration (D), Geographic Extent (GE) and Magnitude (M) of the Impact	Proposed Mitigation
	Impacts to wetlands	D: Short-term, occurring during grading for road construction and long-term, due to adjacent residential occupancy. GE: Impacts could extend beyond the development envelope. M: Low due to existing intensive use by row crop agriculture.	A mainly 30 m buffer will be applied to the offsite wetland feature to reduce impacts (only minor grading encroachments are required).
Clearing and Construction Activities	Construction impacts, including erosion / sedimentation and unintentional encroachment into the retained natural features.	D: Short-term during construction phase only. GE: Impacts could extend beyond the development envelope. M: Moderate. Significant fill is being imported to create the subdivision.	Erosion and sediment control fencing should be placed along the limit of disturbance to prevent siltation. Fencing should be continuous across the entire length of the work zone to avoid gaps where sediment could escape. Fencing should be maintained and regularly monitored for the duration of construction and until such time as lands are re-vegetated and stabilized and then it should be removed. All stockpiles, equipment and work areas should be maintained outside of the fenced area.
Alterations to Hydrological Regimes through Creation of Impervious Surfaces and Water Quality and Quantity from Stormwater	Disruption of flow contributions and quality to wetland	D: Long-term. GE: Impacts could extend beyond the development envelope. M: Moderate if wetland function is disrupted.	Existing stormwater flow is directed northwest across the site, not towards the offsite wetland. The proposed stormwater collected onsite and will be directed to an enhanced quality SWMP and will be discharged to the Gartshore Street ROW to eventually connect with the Irvine Creek Wetland Complex.
Lighting	Lighting from the operation center may cause potential disruption wildlife.	D: On-going in evening. GE: Could potentially extend into natural areas, affecting the patterns of nocturnal wildlife. M: Moderate since houses will back onto retained natural features.	Lighting within the compound should be directed downward and away from the natural features.
Noise	Impacts of construction noise on wildlife	D: Short term, during construction phase only. GE: Impacts confined to areas within direct vicinity of site. M: Low, noise anticipated to occur during daylight hours.	Environmental noise will be reduced through the standard operating practices and conformity with noise by-law requirements. The inspector will ensure that all operational plans and construction timing associated with noise reduction are being followed. Wildlife in the area is anticipated to be habituated to the noise of the farm operations and the road network and the proposed work is not anticipated to add significantly to it.

9.0 Compliance with Applicable Policies

Table 9.1 demonstrates how the proposed development predominantly complies with applicable federal, provincial, County and GRCA policies respecting natural heritage and natural hazard features. In cases where compliance is not feasible based on the interpretation of the policies, discussion on how concessions may be applied are provided to accommodate the proposed development.

Table 9.1: Compliance of Proposed Development with Policies

Feature	Applicable Policies	Policy Intent	How Addressed
Migratory Birds	Migratory Birds Convention Act, 1994	Migratory birds and their nests should not be killed or disturbed.	Land will be cleared and demolition of structures will be completed outside of the breeding season, which generally occurs early April to the end of August, in order to avoid disturbance to nests. If this is not possible, a pre-construction nest survey will be completed no greater than two days prior to the proposed site preparation and clearing activities by a qualified biologist. If nesting species are identified, an appropriate species-specific buffer will be applied until the nest is no longer active.
Provincially Significant Wetlands	PPS (2020)	Section 2.1.4 of the PPS identifies that development and site alteration shall not be permitted within Provincially Significant Wetlands in Ecoregions 5E, 6E, and 7E.	The PSW will not be directly impacted by the proposed development. It is anticipated that indirect impacts resulting from construction will not have any significant or long-term impacts on the adjacent PSW and will be effectively mitigated through the implementation of ESC measures and environmental monitoring.
Protection of Habitat of Endangered Species and Threatened Species & Species of Special Concern	Section 2.1.8 of the Provincial Policy Statement (2020), ESA (2007)	Development and site alteration not to be permitted in habitat of endangered species and threatened species and Species of Special Concern, except in accordance with provincial and federal requirements.	No endangered, threatened or SC species were observed; however, there is potential for on-site structures, in particular the barn, to support SAR bats and Barn Swallow. Erosion and sediment control fences will deter wildlife (including snakes and turtles), away from construction. In the event that wildlife is observed within the construction limits, a qualified biologist and the MECP should be contacted to confirm identification and to advise on next steps. The animal should be allowed to leave the site and under no circumstances should they be approached. Exclusion measures to prevent bat roosting and barn swallow nesting should be installed outside of the bat active window / barn swallow nesting window to prevent establishment of either species and additional permitting requirements under the *ESA* (2007). Structures that are to be removed should be inspected for evidence of bird nesting. If nests are suspected to be from barn swallows, the nests should be inspected and identified by an avian biologist. If any barn swallow nests are found that will be impacted by development, the

Feature	Applicable Policies	Policy Intent	How Addressed
			project should be registered with the MECP, and applicable compensation measures should be discussed. All outbuilding demolitions should take place outside of the bat active window (April 1 – September 30).
Conservation Authority Regulated Lands	GRCA Ontario Regulation 150/06	GRCA regulates a portion of the subject lands	A permit will be acquired by the proponent to carry out work within the regulated lands. Encroachment into the off-site wetland buffer is not required for the proposed development. Buffer plantings will be coordinated with the adjacent development.
Core Greenlands, specifically Wetlands, Habitats of Endangered or Threatened Species, Fish Habitat, and Hazardous Lands Greenlands Including Woodlands, Streams and Valleylands	County of Wellington Official Plan	Development is not permitted in significant wetlands or the significant habitat of endangered or threatened species except in accordance with provincial and federal requirements. Development and site alteration are not allowed in fish habitat except in accordance with provincial and federal regulations. As per the County OP, "G*enerally, development shall be directed away from areas in which conditions exist which would pose risks to public health and safety or property caused by natural hazards".* This EIS is also intended to demonstrate that there will be no negative impacts to the Greenlands features and their functions.	Development is occurring outside of the Core Greenlands feature. Provided all mitigation measures can be adhered to, indirect impacts to Greenland features and their functions can be effectively mitigated. Confirmed SAR habitat is not present within the project limits. Although works are taking place within hazard lands, a permit is being sought from the GRCA to ensure compliance with O. Reg 150/06.
County Tree By-law	County of Wellington Forest Conservation By-Law 5115-09	The removal of trees within woodlots greater than 1 ha is regulated based on tree density.	No woodland removal is proposed.

10.0 Conclusions

The development is proposed to replace croplands and the rural residential/farm operations area with the works yard. Retention of trees within the tree collection, south hedgerow and around the rural residential area is proposed. Development is buffered from the natural heritage functions of the wetland, so impacts are not anticipated if mitigation measures are implemented as described.

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Figures

Study Area

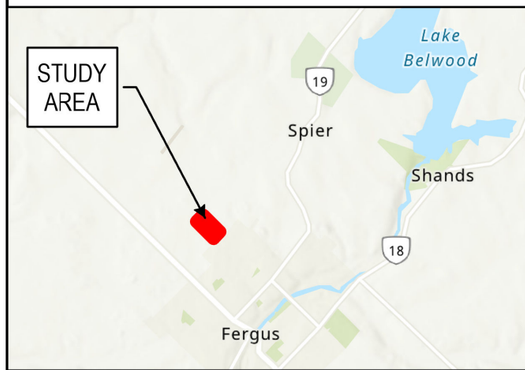

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Figure Title

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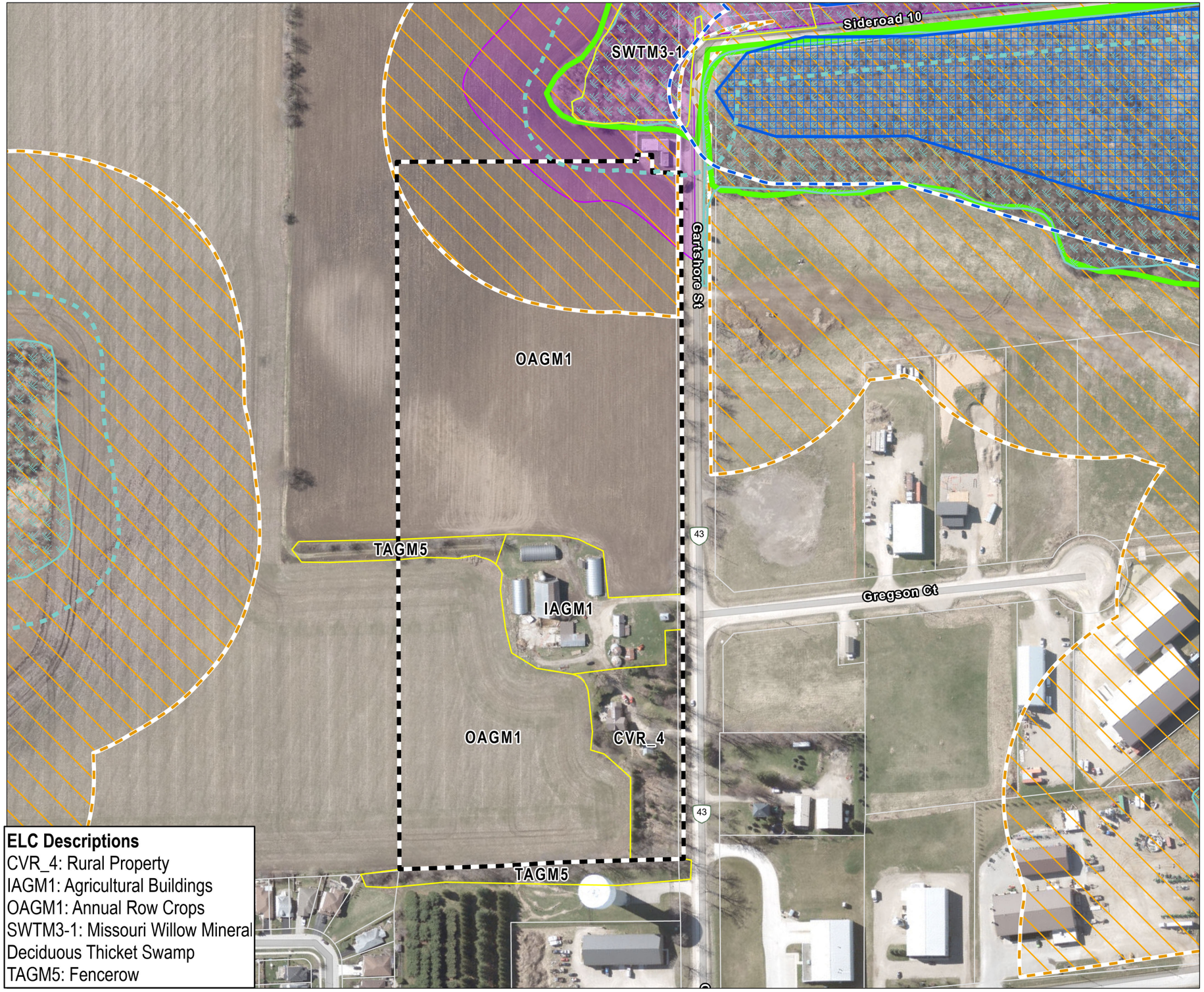

ELC Descriptions
CVR_4: Rural Property
IAGM1: Agricultural Buildings
OAGM1: Annual Row Crops
SWTM3-1: Missouri Willow Mineral Deciduous Thicket Swamp
TAGM5: Fencerow

- Wetland (GRCA)
- Wetland 30m Buffer
- GRCA Regulation Limit
- White-tailed Deer Wintering Area (Stratum 2)
- Natural Heritage System Area (Growth Plan for the Greater Golden Horseshoe)
- Estimated Floodplain (GRCA)
- Floodplain 30m Setback
- Ecological Land Classification
- Study Area

Sources:

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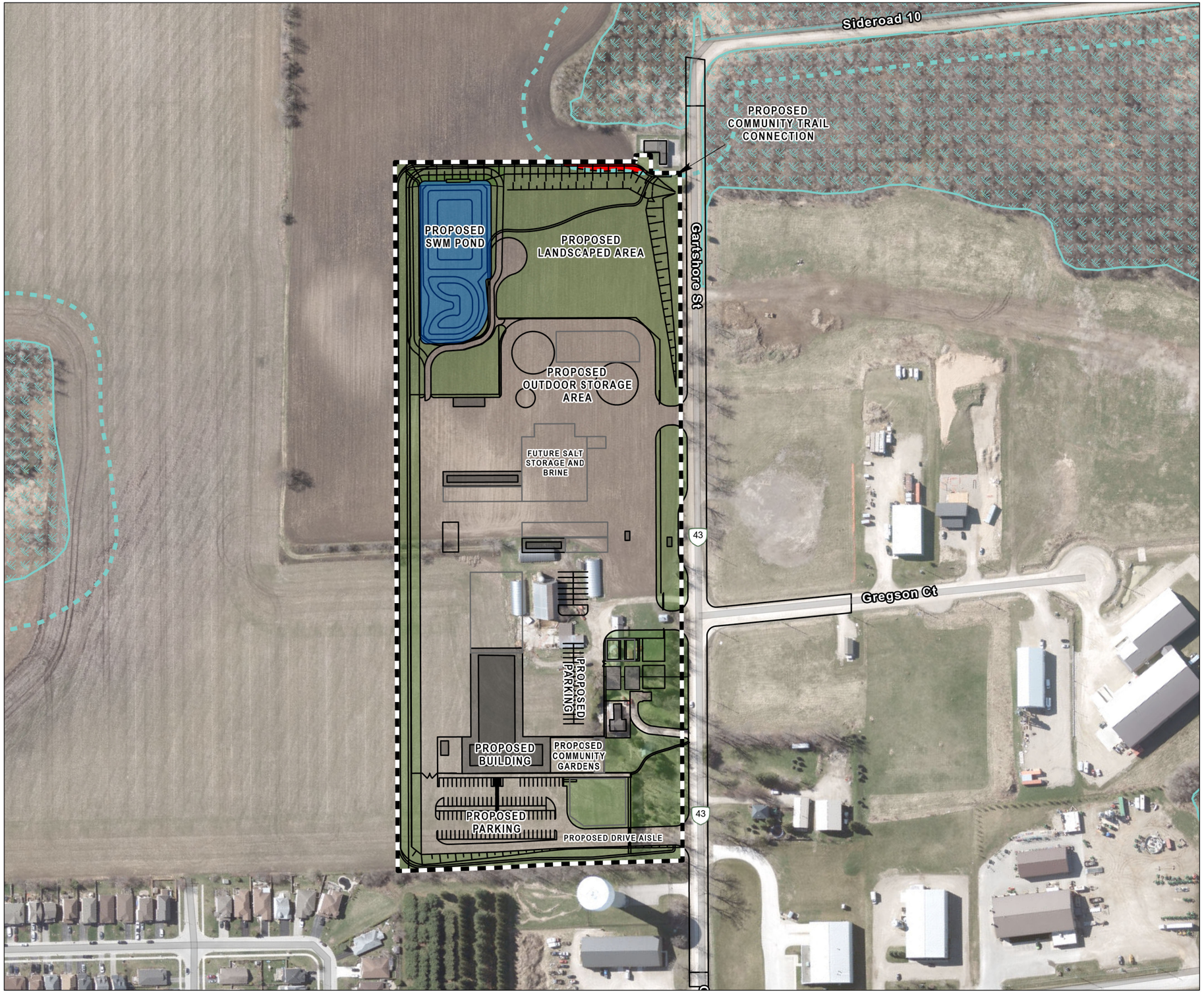

Proposed Development

Wetland (GRCA)

Wetland 30m Buffer

Wetland Buffer Enchroachment ($228m^2$)

Proposed Sod Areas

Study Area

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Figure Title

CENTRE WELLINGTON OPERATIONS CENTRE SCOPED EIS

PROPOSED DEVELOPMENT

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Appendix A

Significant Wildlife Habitat Screening Table

Project Name: Centre Wellington Operations Centre EIS

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Project Number: 300055234.0000

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	**Habitat Criteria**	**Presence of Candidate Habitat in the Study Area (within 120 m of the Project)**	**Wildlife Species**	**Defining Criteria**	**Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)**
Table 1.1: Seasonal Concentration Areas of Animals						
Waterfowl Stopover & Staging Areas (Terrestrial) **<u>Rationale</u>**: Habitat important to migrating waterfowl.	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these ecosites.	Fields with sheet water during Spring (mid-March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available.	No potential: • Suitable ecosite to support this feature is not present.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects. • Any mixed species aggregations of 100 or more individuals required. • The flooded field ecosite habitat plus a 100-300 m radius area, dependent on local site conditions and adjacent land use is the SWH. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • **SWHMiST Index #7** provides development effects and mitigation measures.	N/A
Waterfowl Stopover & Staging Areas (Aquatic) **<u>Rationale:</u>**	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and SWM ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify.	No potential: • Suitable ecosite to support this feature is not present. • Offsite wetlands may provide suitable stopover areas but will not be impacted by the proposed development	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup	**Studies carried out & verified presence of:** • Aggregations of 100 or more of listed species for 7 days, results in >700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH. • The combined area of the Ecological Land Classification	Low potential in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.		• These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water).		Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback Ruddy Duck	(ELC) ecosites and a 100 m radius area is the SWH. • Wetland area and shorelines associated with sites identified within the SWHTG Appendix K are SWH. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • **SWHMiST Index #7** provides development effects and mitigation measures.	
Shorebird Migratory Stopover Area **<u>Rationale</u>**: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	• Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. • Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. • Sewage treatment ponds and storm water ponds do not qualify as a SWH.	No potential: • Suitable ecosite to support this feature is not present.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin	**Studies confirming:** • Presence of 3 or more of listed species and >1000 shorebird use days during spring or fall migration period (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period). • Whimbrel stop briefly (<24 hrs.) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100 m radius area. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects".	N/A

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
					• **SWHMiST Index #8** provides development effects and mitigation measures.	
Raptor Wintering Area **Rationale**: Sites used by multiple species, a high number of individuals and used annually are most significant.	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class; Forest: FOD, FOM, FOC. Upland: CUM; CUT; CUS; CUW. Bald Eagle: Forest community Series: FOD, FOM, FOC, SWD, SWM or SWC on shoreline areas adjacent to large rivers or adjacent to lakes with open water (hunting area).	• The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. • Raptor wintering sites (hawk/owl) need to be > 20 ha, with a combination of forest and upland. • Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands. • Field area of the habitat is to be wind swept with limited snow depth or accumulation. • Eagle sites have open water, large trees and snags available for roosting.	No potential: • Study area lacks suitably large upland communities to support overwintering raptors	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl **Special Concern:** Short-eared Owl Bald Eagle	**Studies confirm the use of these habitats by:** • One or more Short-eared Owls or; One or more Bald Eagle or; At least 10 individuals and two of the listed hawk/owl species. • To be significant a site must be used regularly (3 in 5 years) for a minimum of 20 days by the above number of birds. • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects." • **SWHMiST Index #10 and #11** provides development effects and mitigation measures.	N/A
Bat Hibernacula **Rationale**:	**Bat Hibernacula may be found in these ecosites:**	• Hibernacula may be found in caves, mine shafts, underground	No potential: • Suitable ecosite to support this feature is not present.	Big Brown Bat Tri-coloured Bat	• All sites with confirmed hibernating bats are SWH. • The habitat area includes a 200 m radius around the	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Bat hibernacula are rare habitats in all Ontario landscapes.	CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	foundations and Karsts. • Active mine sites should not be considered as SWH. • The locations of bat hibernacula are relatively poorly known.			entrance of the hibernaculum for most development types and 1000 m for wind farms. • Studies are to be conducted during the peak swarming period (August to September). Surveys should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”. • **SWHMiST Index #1** provides development effects and mitigation measures.	
Bat Maternity Colonies **<u>Rationale:</u>** Known locations of forested bat maternity colonies are extremely rare in all Ontario landscapes.	Maternity colonies considered SWH are found in forested ecosites. **All ELC ecosites in ELC Community Series:** FOD FOM SWD SWM	• Maternity colonies can be found in tree cavities, vegetation and often in buildings (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario. • Maternity colonies located in Mature deciduous or mixed forest stands with >10 ha large diameter (>25 cm dbh) wildlife trees. • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3 or class 1 or 2. • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest	No potential: • Suitable ecosite to support this feature is not present. BMC may be supported within the off-site PSW complex/	Big Brown Bat Silver-haired Bat	• Maternity Colonies with confirmed use by: – >10 Big Brown Bats – >5 Adult Female Silver-haired Bats • The area of the habitat includes the entire woodland, or a forest stand ELC ecosite or an ecoelement containing the maternity colonies. • Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects”. • **SWHMiST Index #12** provides development effects and mitigation measures.	Moderate potential within off-site swamp. No potential within Subject Property.

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
		areas with at least 21 snags/ha are preferred.				
Turtle Wintering Areas **<u>Rationale:</u>** Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	Snapping and Midland Painted Turtles. **ELC Community Classes:** SW, MA, OA and SA **ELC Community Series:** FEO and BOO For Northern Map Turtle: Open water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	• For most turtles, wintering areas are in the same general area as their core habitat. Water must be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH.	No potential: • Suitable ecosite to support this feature is not present. TWA may be supported within the off-site PSW complex.	Midland Painted Turtle **<u>Special Concern:</u>** Northern Map Turtle Snapping Turtle	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (September–October) or spring (March–May). • Congregation of turtles is more common where wintering areas are limited and therefore significant. • **SWHMiST Index #28** provides development effects and mitigation measures for turtle wintering habitat.	Low potential in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.
Reptile Hibernaculum **<u>Rationale</u>**: Generally, sites are the only known sites in the area. Sites with the highest number of individuals are most significant.	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice, Cave, and Alvar sites may be directly related to these habitats.	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural or naturalized locations. The existence of features that go below frost line; such as rock	No potential • Candidate reptile hibernacula were not observed during field investigations	**<u>Snakes</u>**: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake **<u>Special Concern</u>**: Milksnake Eastern Ribbonsnake	**Studies confirming:** • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (e.g., foundation or rocky slope)	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
	Observations or congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and ecosites: FOC1 and FOC3.	piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line. • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock groundcover. • Five-lined Skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures.		**<u>Lizard: Special Concern:</u>** (Southern Shield population): Five-lined Skink	on sunny warm days in Spring (April/May) and Fall (September/October). • **Note**: If there are Special Concern Species present, then site is SWH. • **Note:** Sites for hibernation possess specific habitat parameters (e.g., temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population (i.e., strong hibernation site fidelity). Other critical life processes (e.g., mating) often take place near hibernacula. The feature in which the hibernacula is located plus a 30 m radius area is the SWH. • **SWHMiST Index #13** provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for Skink is significant. • SWHMiST Index #37 provides development effects and mitigation measures for five-lined Skink wintering habitat.	
Colonially - Nesting Bird Breeding Habitat (Bank & Cliff) **<u>Rationale</u>:** Historical use and number of	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles. Cliff faces, bridge abutments, silos, barns.	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed permitted aggregate area. • Does not include man-made	No potential: • Suitable ecosite to support this feature is not present	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	**Studies confirming:** • Presence of 1 or more nesting sites with 8 or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow population are declining in Ontario.	**Habitat found in the following ecosites:** CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation.			• A colony identified as SWH will include a 50 m radius habitat area from the peripheral nests. • Field surveys to observe and count swallow nests are to be completed during the breeding season. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #4** provides development effects and mitigation measures.	
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs) **<u>Rationale:</u>** Large colonies are important to local bird population, typically sites are only known colony in area and are used annually.	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15 m from ground, near the top of the tree.	No potential: • Suitable ecosite to support this feature is not present Moderate potential within offsite wetlands	Great Blue Heron Black-crowned Nigh-Heron Great Egret Green Heron	**Studies confirming:** • Presence of 2 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300 m radius or extent of the Forest ecosite containing the colony or any island <15.0 ha with a colony is the SWH. • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells. • **SWHMiST Index #5** provides development effects and mitigation measures.	Moderate potential in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.
Colonially - Nesting Bird Breeding Habitat (Ground) **<u>Rationale;</u>** Colonies are important to	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1;50,000 NTS map).	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found	No potential: • Suitable ecosite to support this feature is not present	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	**Studies confirming:** • Presence of > 25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern. • Presence of 5 or more pairs for Brewer's Blackbird.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
local bird population, typically sites are only known colony in area and are used annually.	Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird). MAM1 – 6 MAS1 – 3 CUM CUT CUS	loosely on the ground in low bushes in close proximity to streams and irrigation ditches within farmlands.			• Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150 m radius area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0 ha with a colony is the SWH. • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #6** provides development effects and mitigation measures.	
Migratory Butterfly Stopover Areas **<u>Rationale:</u>** Butterfly stopover areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Combination of ELC Community Series; need to have present one Community Series from each land class. <u>Field</u>: CUM CUT CUS <u>Forest</u>: FOC FOD FOM CUP Anecdotally, a candidate site for butterfly stopover will have a history of butterflies being observed.	• A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present and will be located within 5 km of Lake Erie or Ontario. • The habitat is typically a combination of field and forest and provides the butterflies with a location to rest prior to their long migration south. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing	No potential • Site is not located within 5km of Lake Ontario	Painted Lady Red Admiral <u>Special Concern</u> Monarch	S**tudies confirm:** • The presence of Monarch Use Days (MUD) during fall migration (August/October). MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day, significant variation can occur between years and multiple years of sampling should occur. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD. • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • **SWHMiST Index #16** provides development effects and mitigation measures.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
		shelter are requirements for this habitat. • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes.				
Landbird Migratory Stopover Areas **<u>Rationale:</u>** Sites with a high diversity of species as well as high numbers are most significant.	**All ecosites associated with these ELC Community Series:** FOC FOM FOD SWC SWM SWD	• Woodlots >10 ha in size and within 5 km of Lake Ontario. • If woodlands are rare in an area of shoreline, woodland fragments 2-5 ha can be considered for this habitat. • If multiple woodlands are located along the shoreline those Woodlands <2 km from Lake Ontario are more significant. • Sites have a variety of habitats; forest, grassland and wetland complexes. • The largest sites are more significant. • Woodlots and forest fragments are important habitats to migrating birds, these features located along the shore and located within 5 km of Lake Ontario are Candidate SWH.	No potential • Site is not located within 5km of Lake Ontario	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.ec.gc.ca/nature/default.asp?lang=En&n=421B7A9D-1 All migrant raptors species: *Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997.* Schedule 7: Specially Protected Birds (Raptors)	**Studies confirm:** • Use of the habitat by >200 birds/day and with >35 spp with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (April/May) and fall (August/October) migration using standardized assessment techniques. Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects”. • **SWHMiST Index #9** provides development effects and mitigation measures.	N/A

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Deer Yarding Areas **<u>Rationale:</u>** Winter habitat for deer is considered to be the main limiting factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.	**Note:** MNRF to determine this habitat. **ELC Community Series** providing a thermal cover component for a deer yard would include: FOM FOC SWM SWC **Or these ELC ecosites:** CUP2 CUP3 FOD3 CUT	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20 cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30 cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is	Not present within Subject Property Off-site PSW has been identified by the MNRF as a White-tailed Deer Wintering Area (stratum 2).	White-tailed Deer	**No Studies Required:** • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40 cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH. • Deer Yards are mapped by MNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by MNRF will be available at local MNRF offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations. • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area, then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST Index #2 provides development effects and mitigation measures.	Confirmed present in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
		located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%. • MNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual". • Woodlots with high densities of deer due to artificial feeding are not significant.				
Deer Winter Congregation Areas **<u>Rationale:</u>** Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid	**All Forested ecosites with these ELC Community Series:** FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50 ha may also be used.	• Woodlots will typically be >100 ha in size. Woodlots <100 ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands. • If deer are constrained by snow	Not present within Subject Property • Off-site PSW has been identified by the MNRF as a White-tailed Deer Wintering Area (stratum 2).	White-tailed Deer	**Studies confirm:** • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNRF. • Studies should be completed during winter (January/February) when >20 cm of snow is on the ground using aerial survey techniques, ground or road surveys. or a pellet count deer density survey.	Moderate potential in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
the impacts of winter conditions.		depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 100 ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha. • Woodlots with high densities of deer due to artificial feeding are not significant.			• If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area, then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • **SWHMiST Index #2** provides development effects and mitigation measures.	
Table 1.2.1: Rare Vegetation Communities						
Cliffs and Talus Slopes **Rationale:** Cliffs and Talus Slopes are extremely rare habitats in Ontario.	**Any ELC ecosite within Community Series:** TAO CLO TAS CLS TAT CLT	• A Cliff is vertical to near vertical bedrock >3 m in height. • A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	Not present		• Most cliff and talus slopes occur along the Niagara Escarpment. • Confirm any ELC Vegetation Type for Cliffs or Talus Slopes. • **SWHMiST Index #21** provides development effects and mitigation measures.	N/A
Sand Barren **Rationale;** Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.	**ELC ecosites:** SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed	• Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and	Not present		• A sand barren area >0.5 ha in size. • Confirm any ELC Vegetation Type for Sand Barrens. • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic sp.). • **SWHMiST Index #20** provides development effects and mitigation measures.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
	(SBT1). Tree cover always ≤ 60%.	barren to tree covered, but less than 60%.				
Alvar **<u>Rationale;</u>** Alvars are extremely rare habitats in Ecoregion 6E.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 **Five Alvar Indicator Species:** *Carex crawei* *Panicum philadelphicum* *Eleocharis compressa* *Scutellaria parvula* *Trichostema brachiatum* These indicator species are very specific to Alvars within Ecoregion 6E.	• An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plants. Undisturbed alvars can be phyto- and zoogeographically diverse, supporting many uncommon or are relict plant and animal species. Vegetation cover varies from patchy to barren with a less than 60% tree cover. • Alvar is particularly rare in Ecoregion 6E where the only known sites are found in the western islands of Lake Erie.	Not present		**Field studies that identify:** • An Alvar site > 0.5 ha in size. • Four of the five Alvar Indicator Species at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses. • **SWHMiST Index #17** provides development effects and mitigation measures.	N/A

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Old Growth Forest **<u>Rationale;</u>** Due to historic logging practices and land clearance for agriculture, old growth forest is rare in the Ecoregion 6E.	**Forest Community Series:** FOD FOC FOM SWD SWC SWM	• Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Not present		**Field Studies will determine:** • If dominant trees species are >140 years old, then the area containing these trees is SWH. • The forested area containing the old growth characteristics will have experienced no recognizable forestry activities (cut stumps will not be present). • The area of forest ecosites combined or an eco-element within an ecosite that contains the old growth characteristics is the SWH. • Determine ELC vegetation types for the forest area containing the old growth characteristics. • **SWHMiST Index #23** provides development effects and mitigation measures.	N/A
Savannah **<u>Rationale:</u>** Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	• A Savannah is a tallgrass prairie habitat that has tree cover between 25–60%.	Not present		**Field studies confirm:** • No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. • One or more of the Savannah indicator species listed in Appendix N should be present. **Note**: Savannah plant spp. list from Ecoregion 6E should be used. • Area of the ELC ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic sp.). • **SWHMiST Index #18** provides development effects and mitigation measures.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Tallgrass Prairie **<u>Rationale:</u>** Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	• No minimum size to site. Site must be restored or a natural site. Remnant sites such as railway Right of Ways (ROW) are not considered to be SWH. • A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	Not present		**Field studies confirm:** • One or more of the Prairie indicator species listed in Appendix N should be present. **Note:** Prairie plant spp. list from Ecoregion 6E should be used. • Area of the ELC ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover is exotic sp.). • **SWHMiST Index #19** provides development effects and mitigation measures.	N/A
Other Rare Vegetation Communities **<u>Rationale:</u>** Plant communities that often contain rare species which depend on the habitat for survival.	• Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG. • Any ELC ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	• Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	Not present		• ELC ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in Appendix M. • The MNRF/Natural Heritage Information Centre (NHIC) will have up to date listing for rare vegetation communities. **Field studies should confirm:** • If an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG. • Area of the ELC Vegetation Type polygon is the SWH. • **SWHMiST Index #37** provides development effects and mitigation measures.	N/A
Table 1.2.2: Specialized Habitats for Wildlife considered Significant Wildlife Habitat						
Waterfowl Nesting Area **<u>Rationale;</u>**	**All upland habitats located adjacent to these wetland**	• A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a	No potential • Subject Lands do not contain a wetland feature or	American Black Duck Northern Pintail Northern Shoveler Gadwall	**Studies confirmed:**	N/A

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	**ELC ecosites are Candidate SWH:** MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 Note: includes adjacency to Provincially Significant Wetlands (PSW).	wetland (>0.5ha) and any small wetlands (0.5ha) within 120 m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40 cm dbh) in woodlands for cavity nest sites.	upland communities to support waterfowl	Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	• Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. • **SWHMiST Index #25** provides development effects and mitigation measures.	
Bald Eagle & Osprey Nesting, Foraging & Perching Habitat **<u>Rationale:</u>** Nest sites are fairly uncommon in Eco-region 6E and are used annually by these species. Many suitable nesting locations	**ELC Forest Community Series:** FOD FOM FOC SWD SWM and SWC (directly adjacent to riparian areas – rivers, lakes, ponds and wetlands.	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy.	No potential • Forested communities are not present within the Subject lands • Off-site wetland may support bald eagle and osprey nesting but is not located close to a large watercourse, pond, or lake	Osprey **Special Concern** Bald Eagle	**Studies confirm the use of these nests by**: • One or more active Osprey or Bald Eagle nests in an area. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH, maintaining undisturbed shorelines with	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
may be lost due to increasing shoreline development pressures and scarcity of habitat.		• Nests located on man-made objects are not to be included as SWH (e.g., telephone poles and constructed nesting platforms).			large trees within this area is important. • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. Area of the habitat from 400-800 m is dependent on-site lines from the nest to the development and inclusion of perching and foraging habitat. • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid-March to mid-August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #26** provides development effects and mitigation measures.	
Woodland Raptor Nesting Habitat **<u>Rationale:</u>** Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	May be found in all forested ELC ecosites. **May also be found in:** SWC SWM SWD and CUP3	• All natural or conifer plantation woodland/forest stands >30 ha with >10ha of interior habitat. Interior habitat determined with a 200 m buffer. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees.	No potential within Subject Lands • Forested habitats are not present within the Subject Lands • The offsite PSW lacks the necessary interior forest habitat	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	**Studies confirm:** • Presence of 1 or more active nests from species list is considered significant. • Red-shouldered Hawk and Northern Goshawk – A 400 m radius around the nest or 28 ha area of habitat is the SWH (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest). • Barred Owl – A 200 m radius around the nest is the SWH.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
		Species such as Coopers Hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest.			• Broad-winged Hawk and Coopers Hawk– A 100 m radius around the nest is the SWH. • Sharp-Shinned Hawk – A 50 m radius around the nest is the SWH. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • **SWHMiST Index #27** provides development effects and mitigation measures.	
Turtle Nesting Areas **<u>Rationale:</u>** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	**Exposed mineral soil (sand or gravel) areas adjacent (<100 m) or within the following ELC ecosites:** MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of	No potential • On-site soils are used for row-cropping during growing season rendering the site unsuitable for turtle nesting	Midland Painted Turtle <u>Special Concern Species:</u> Northern Map Turtle Snapping Turtle	**Studies confirm:** • Presence of 5 or more nesting Midland Painted Turtles. • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100 m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method.	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
		marshes, lakes, and rivers are most frequently used.			• **SWHMiST Index #28** provides development effects and mitigation measures for turtle nesting habitat.	
Seeps and Springs **<u>Rationale</u>:** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Seeps/Springs are areas where ground water comes to the surface. Often, they are found within headwater areas within forested habitats. Any forested ecosite within the headwater areas of a stream could have seeps/springs.	• Any forested area (with <25% meadow/field/ pasture) within the headwaters of a stream or river system. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species.	Not present • Seeps and springs not observed during site investigations	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	**Field Studies confirm:** • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat. • **SWHMiST Index #30** provides development effects and mitigation measures.	N/A
Amphibian Breeding Habitat (Woodland) **<u>Rationale:</u>** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.	All ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to	• Presence of a wetland, pond or woodland pool (including vernal pools) >500 m^2 (about 25 m diameter) within or adjacent (within 120 m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be	No potential within the Subject Property. Offsite PSW may provide suitable breeding habitat to support amphibian breeding (moderate).	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	**Studies confirm:** • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230 m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland	Moderate potential in off-site wetland. Studies to confirm presence / absence were not included in the scope of work for this project.

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	**Habitat Criteria**	**Presence of Candidate Habitat in the Study Area (within 120 m of the Project)**	**Wildlife Species**	**Defining Criteria**	**Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)**
	reduced risk to migrating amphibians.	used as breeding habitat.			to the woodland is to be included in the habitat. • **SWHMiST Index #14** provides development effects and mitigation measures.	
Amphibian Breeding Habitat (Wetlands) **<u>Rationale;</u>** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	**ELC Community Classes:** SW MA FE BO OA and SA. Typically, these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g., Bull Frog) may be adjacent to woodlands.	• Wetlands >500 m^2 (about 25 m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation.	Not present • Wetland communities are not present within the Subject Lands • Off-site wetlands are swamp communities and do not meet the criteria to be considered amphibian breeding habitat (wetlands)	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	**Studies confirm:** • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3 or; Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • **SWHMiST Index #15** provides development effects and mitigation measures.	N/A
Woodland Area-Sensitive Bird Breeding Habitat **<u>Rationale</u>:** Large, natural blocks of mature	**All ecosites associated with these ELC Community Series:** FOC FOM	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs. old) forest stands or woodlots >30 ha.	No potential • Woodlands are not present within the Subject Lands • Offsite PSW complex lacks interior forest habitat that meets the minimum criteria described in Table 1.2.2	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler	**Studies confirm:** • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • **Note**: any site with breeding Cerulean Warblers or Canada	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	FOD SWC SWM SWD	• Interior forest habitat is at least 200 m from forest edge habitat.		Ovenbird Scarlet Tanager Winter Wren **Special Concern:** Cerulean Warbler Canada Warbler	Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #34** provides development effects and mitigation measures.	
Table 1.3: Habitat for Species of Conservation Concern considered Significant Wildlife Habitat						
Marsh Breeding Bird Habitat **Rationale;** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 **For Green Heron:** All SW, MA and CUM1 sites	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water.	No potential • Suitable vegetation community is not present within Study Area	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	**Studies confirm:** • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes breeding by any combination of 5 or more of the listed species. • **Note**: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #35** provides development effects and mitigation measures.	N/A
Open **Country Bird Breeding** Habitat	CUM1 CUM2	• Large grassland areas (includes natural and cultural	No potential	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow	**Field Studies confirm:**	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Rationale; This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.		fields and meadows) >30 ha. • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e., no row cropping or intensive hay or livestock pasturing in the last 5 years). • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.	• Suitable vegetation community is not present within the Study Area	Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	• Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST Index #32** provides development effects and mitigation measures.	
Shrub/Early Successional Bird Breeding Habitat **Rationale;** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	• Large field areas succeeding to shrub and thicket habitats >10 ha in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e., no row-cropping, haying or live-stock pasturing in the last 5 years).	No potential • Thicket communities within the Study Area are not sufficiently large to meet the minimum criteria	**Indicator Spp:** Brown Thrasher Clay-coloured Sparrow **Common Spp.** Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-breasted Chat Golden-winged Warbler	**Field Studies confirm:** • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as SWH. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
significantly over the past 40 years based on CWS (2004) trend records.		• Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species. • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands.			and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects". • **SWHMiST cxlix Index #33** provides development effects and mitigation measures.	
Terrestrial Crayfish **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.	• Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for Terrestrial Crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed.	No potential within the Subject lands. Moderate potential in association with the off-site PSW within the Study Area	Chimney or Digger Crayfish (*Fallicambarus fodiens*) Devil Crayfish or Meadow Crayfish (*Cambarus Diogenes*)	**Studies Confirm:** • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites. • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. **Note** the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult. • **SWHMiST Index #36** provides development effects and mitigation measures.	Not present • Terrestrial Crayfish Chimneys were not observed within the off-site wetlands during field investigations.
Special Concern and Rare Wildlife Species	All plant and animal Element Occurrences (EO) within a 1 or 10 km grid.	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or	No potential for Special Concern and Rare Wildlife Species within the Subject Property.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the NHIC.	**Studies Confirm:** • Assessment/inventory of the site for the identified Special Concern or rare species needs	Moderate potential. Targeted surveys to confirm presence / absence were not included in the scope of this project.

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
Rationale: These species are quite rare or have experienced significant population declines in Ontario.	Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.	provincially Rare species; linking candidate habitat on the site needs to be completed to ELC ecosites.	Moderate potential for Special Concern and Rare Wildlife Species to supported within the off-site PSW.		to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g., specific nesting habitat or foraging habitat. • **SWHMiST Index #37** provides development effects and mitigation measures.	
Table 1.4.1: Animal Movement Corridors						
Amphibian Movement Corridors **Rationale;** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Corridors may be found in all ecosites associated with water. Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.	• Movement corridors between breeding habitat and summer habitat. • Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat–Wetland) of this Schedule.	No potential. • Amphibian Breeding Habitat–Wetland is not present	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. • Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant. • Corridors should have at least 15 m of vegetation on both sides of waterway or be up to 200 m wide of woodland habitat and with gaps <20 m. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat. • **SWHMiST Index #40** provides development effects and mitigation measures.	N/A

Significant Wildlife Habitat Screening in the Study Area – Ecoregion 6E Criteria (2015)

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	**Habitat Criteria**	**Presence of Candidate Habitat in the Study Area (within 120 m of the Project)**	**Wildlife Species**	**Defining Criteria**	**Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)**
Deer Movement Corridors **<u>Rationale:</u>** Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH from Table 1.1 of this schedule. • A deer wintering habitat identified by the MNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges).	Not present. • Stratum 2 deer habitat occurs within all forested areas of the Study Area. Any movement corridors are located outside of the Study Area.	White-tailed Deer	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas. • Corridors should be at least 200 m wide with gaps <20 m and if following riparian area with at least 15 m of vegetation on both sides of waterway. • Shorter corridors are more significant than longer corridors, SWHMiST Index #39 provides development effects and mitigation measures.	N/A
Table 1.5.1: Significant Wildlife Habitat Exceptions for Ecodistricts within EcoRegion 6E						
6E-14 Mast Producing Areas **<u>Rationale</u>:** The Bruce Peninsula has an isolated and distinct population of black bears. Maintenance of large woodland tracts with mast-producing tree species is	**All Forested habitat represented by ELC Community Series**: FOM FOD	• Woodland ecosites >30 ha with mast-producing tree species, either soft (cherry) or hard (oak and beech). • Black bears require forested habitat that provides cover, winter hibernation sites, and mast-producing tree species. • Forested habitats need to be large enough to provide cover and protection for black bears.	No potential. • Suitable vegetation community is not present within the Study Area	Black Bear	**All woodlands >30 ha with a 50% composition of these ELC Vegetation Types are considered significant:** FOM1-1 FOM2-1 FOM3-1 FOD1-1 FOD1-2 FOD2-1 FOD2-2 FOD2-3 FOD2-4 FOD4-1 FOD5-2 FOD5-3 FOD5-7	N/A

Habitat	CANDIDATE - Significant Wildlife Habitat			CONFIRMED - Significant Wildlife Habitat		
	Ecological Land Classification Ecosite Codes	Habitat Criteria	Presence of Candidate Habitat in the Study Area (within 120 m of the Project)	Wildlife Species	Defining Criteria	Presence of Confirmed Significant Wildlife Habitat in the Study Area (within 120 m of the Project)
important for bear.					FOD6-5 SWHMiST Index #3 provides development effects and mitigation measures.	
6E- 17 **Lek** **<u>Rationale</u>:** Sharp-tailed grouse only occur on Manitoulin Island in Ecoregion 6E, Leks are an important habitat to maintain their population.	CUM CUS CUT	• The Lek or dancing ground consists of bare, grassy or sparse shrubland. There is often a hill or rise in topography. • Leks are typically a grassy field/meadow >15 ha with adjacent shrublands and >30 ha with adjacent deciduous woodland. Conifer trees within 500 m are not tolerated. • Grasslands (field/meadow) are to be >15 ha when adjacent to shrubland and >30 ha when adjacent to deciduous woodland. • Grasslands are to be undisturbed with low intensities of agriculture (light grazing or late haying). • Leks will be used annually if not destroyed by cultivation or invasion by woody plants or tree planting.	No potential. • Site is not located on Manitoulin Island	Sharp-tailed Grouse	• Studies confirming Lek habitat are to be completed from late March to June. • Any site confirmed with sharp-tailed grouse courtship activities is considered significant. • The field/meadow ELC ecosites plus a 200 m radius area with shrub or deciduous woodland is the Lek habitat. • SWHMiST cxlix Index #32 provides development effects and mitigation measures.	N/A

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

SAR Screening Table

COMMON NAME	SCIENTIFIC NAME	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present on Site?	Species Observed?
Birds									
Acadian Flycatcher	Empidonax virescens	S2S3B	END	END	END	1	Generally requires large areas of mature, undisturbed forest; avoids the forest edge; often found in well wooded swamps and ravines.7	No potential. Suitable habitat is absent from the Study Area.	N/A
Bald Eagle	Haliaeetus leucocephalus	S2N,S4B	SC	NAR	NAR	No schedule	Prefers deciduous and mixed deciduous forest and habitat close to water bodies such as lakes and rivers. They roost in "supercanopy" trees such as pine.7	No potential. Suitable habitat is absent from the Study Area.	N/A
Bank Swallow	Riparia riparia	S4B	THR	THR	THR	1	Prefers open habitats including, farmland, lake/river shorelines, grasslands, and wetlands. Nests in exposed earthen banks along shorelines and in artificial sites such as gravel pits.7	No potentenital. Exposed earthen banks are not present.	N/A
Barn Swallow	Hirundo rustica	S4B	SC	SC	SC	1	Prefers farmland, lake/river shorelines, wooded clearings, urban populated areas, rocky cliffs, and wetlands. Nests inside or on exterior of buildings; under bridges and in road culverts; on rock faces, and in caves, etc.8	Moderate potential. Suitable nesting habitat present in association with on-site buildings.	No. The interiror and exterior of all barns as well as the exterior of additional outbuildings were examined for evidence of Barn Swallow nesting. Although no evidence was found, there is potential for Barn Swallows to nest on and / or within buildings in the future. Suitable foraging habitat is present within the Study Area.
Bobolink	Dolichonyx oryzivorus	S4B	THR	THR	THR	1	Generally prefers open grasslands and hay fields for nesting, typically featuring relatively tall vegetation. Sometimes uses large fields of winter wheat and rye in southwestern Ontario. Sensitive to vegetation structure and composition. Positively associated with high grass-to-forb ratios; moderate litter depth; tolerate wetter portions of fields compared to Eastern Meadowlark (EAME) and more likely to nest closer to field centres rather than field margins. Lower tolerance to presence of patches of bare ground. Appear to prefer larger fields than EAME.9	No potential. Suitable habitat not present.	N/A
Canada Warbler	Cardellina canadensis	S4B	SC	THR	THR	1	Generally prefers wet coniferous, deciduous and mixed forest types, with a dense shrub layer. Nests on the ground, on logs or hummocks, and uses dense shrub layer to conceal the nest.7	No potential to be supported within the Subject Lands. Moderate potential to be supported within the adjacent Thicket Swamps within the Study Area.	N/A
Chimney Swift	Chaetura pelagica	S4B,S4N	THR	THR	THR	1	Historically nested in large hollow trees, other tree cavities and cracks in cliffs. Currently, most are found in developed areas in large, uncapped chimneys. Proximity to lakes is also a preferred habitat feature as they will forage for flying insects close to water.7	No potential. Chimneys on-site are not suitable to support Chimney Swift nesting.	N/A
Common Nighthawk	Chordeiles minor	S4B	SC	SC	THR	1	Nests in open habitats, in forests and in urban areas. It prefers rock outcrops, alvars, sand barrens, bogs, fens, and in forests, openings created by clearcuts and burns. In southern Ontario, grasslands, agricultural fields, gravel pits, prairies, and alvars and at airports. In cities, it nests mostly on flat, graveled roofs but occasionally on railways and footpaths.7	No potential. Suitable habitat not present.	N/A
Eastern Meadowlark	Sturnella magna	S4B	THR	THR	THR	1	Generally prefers grassy pastures, meadows and hay fields. Prefers moderately tall grass with abundant litter cover, a high proportion of grass cover, moderate forb density, low proportions of shrub and woody vegetation cover, and low percent of bare ground. Prefers to nest in drier sites and frequently nests around field margins.9	No potential. Suitable habitat not present.	N/A
Eastern Whip-poor-will	Antrostomus vociferus	S4B	THR	THR	THR	1	Generally prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred. In Ontario, its preferred habitats include rock or sand barrens with scattered trees, savannahs, old burns in a state of early forest succession, and open conifer plantations.7	No potential. Suitable habitat not present.	N/A

COMMON NAME	SCIENTIFIC NAME	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present on Site?	Species Observed?
Eastern Wood-pewee	Contopus virens	S4B	SC	SC	SC	1	Prefers open space near the nest in the form of forest edges, clearings, roadways, and water. Does not require large areas of woods but occurs less frequently in woodlots surrounded by development than in those without.7	No potential to occur within the Subject Lands. Moderate potential to occur within off-site PSW within the Study Area.	No
Golden-winged Warbler	Vermivora chrysoptera	S4B	SC	THR	THR	1	Generally prefer areas of early successional vegetation, found primarily on field edges, hydro or utility right-of-ways, or recently logged areas.7	No potential to be supported within the Subject Lands. Moderate potential to be supported within the adjacent Thicket Swamps within the Study Area.	No
Grasshopper Sparrow	Ammodramus savannarum	S4B	SC	SC	SC	1	Prefers drier, sparsely vegetated grasslands, particularly rough or unimproved pastures with scattered forb and shrub growth, at least 30 ha in size. It will occasionally also use cultivated hayfields and cereal crops.7	No potential. Suitable habitat is not present wihtin the Study Area.	No
Least Bittern	Ixobrychus exilis	S4B	THR	THR	THR	1	Most frequently found in marshes of at least 5 ha, although much smaller marshes, including sites such as cattail stands along creeks and farm ponds partially filled with cattail, may be used occasionally. Breeding sites typically dominated by cattail, but also sometimes bulrush, grasses, horsetail, and willow. Nests usually close to edge of a stand of vegetation or near openings such as muskrat trails, although may be as far as 45 m from open water.7	No potential. Suitbale habitat is not present within the Subject Lands or Study Area.	N/A
Louisiana Waterthrush	Parkesia motacilla	S3B	THR	THR	SC	1	Generally inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps.7	No potential. Mature forests are absent from the Study Area.	N/A
Olive-sided Flycatcher	Contopus cooperi	S4B	SC	SC	THR	1	Generally prefers natural forest edges and openings. The breeding habitat usually consists of mixed forest adjacent to rivers or wetlands. This species commonly nests in conifers such as White and Black Spruce, Jack Pine and Balsam Fir.10	No potential within the Study Area, Mixed-wod forests are absent from the Study Area.	No
Peregrine Falcon	Falco peregrinus	S3B	SC	NAR	SC	1	Nests on cliffs near water bodies, or at urban sites such as tall buildings, bridges, and smokestacks.7	No potential within the Study Area, suitable nesting habitat is absent.	N/A
Red-headed Woodpecker	Melanerpes erythrocephalus	S4B	END	END	THR	1	Breeds in open woodland and woodland edges, especially oak savannah and riparian forest. These habitats can occur in parks, golf courses, cemeteries and private woodlands. Existence of large, dead, weathered trees or live trees with large dead branches are an important characteristic of habitat.7	Low potential to occur within Subject Lands.	No. Suitable large dead trees were not observed in the Study Area during the arborist reports. Unlikely to be breeding within the Subject Lands.
Short-eared Owl	Asio flammeus	S2N,S4B	SC	SC	SC	1	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields.7	No potential. Suitable habitat is not present within the Subject Lands or Study Area.	N/A
Wood Thrush	Hylocichla mustelina	S4B	SC	THR	THR	1	Inhabits and breeds in woodlands ranging from small (3 ha) and isolated to large and contiguous. The presence of tall trees and a thick understorey are usually prerequisites for site occupancy.7	No potential to occur within the Study Area. Adjacent PSW that occurs within the Study Area lacks tall trees.	No.
Mammals									
Eastern Small-footed Myotis	Myotis leibii	S2S3	END	END	No status	No schedule	Overwintering habitat: Caves and abandoned mines. According to the Recovery Strategy for the Eastern Small-footed Myotis in Ontario, summer / roosting habitats used by the species in Ontario are poorly understood, but elsewhere in its range it primarily roosts in open, sunny rocky habitats, and, occasionally, in buildings. Summer roosts for this species are believed to be located in close proximity to their hibernacula (i.e., less than 100 m). The species' preference for rocky habitats in summer may limit an individual's home range to those rocky areas which also contain hibernacula (i.e., karst areas and Canadian Shield areas containing abandoned mines with adits).16	Moderate potential. Known to utilize buildings including barns as roosting habitat.	No.

COMMON NAME	SCIENTIFIC NAME	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present on Site?	Species Observed?
Little Brown Myotis	Myotis lucifugus	S4	END	END	END	1	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius. Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).15	Moderate potential. Known to utilize buildings including barns as roosting habitat. Suitable habitat is also present in association with the adjacent Provincially-Significnat Wetlands	No.
Northern Myotis	Myotis septentrionalis	S3	END	END	END	1	Overwintering habitat: Caves and mines that remain above 0 Maternal Roosts: Often associated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)15	Moderate potential. Known to utilize buildings including barns as roosting habitat. Suitable habitat is also present in association with the adjacent Provincially-Significnat Wetlands	No.
Tri-colored Bat	Perimyotis subflavus	S3?	END	END	END	1	Overwintering habitat: Deepest parts of caves and mines where temperature is the least variable. Maternal Roosts: Less is known about roosts of Tri-colored Bats. Most roost sites found within forested habitats. May roost in clumps of dead foliage and lichens. In more anthropogenically modified landscapes, maternity roosts may be barns or similar human-made structures.15	Moderate potential. Known to utilize buildings including barns as roosting habitat. Suitable habitat is also present in association with the adjacent Provincially-Significnat Wetlands	No.
Reptiles									
Midland Painted Turtle	Chrysemys picta marginata	S4	NAR	SC	NAR	No schedule	Generally prefers waterbodies such as ponds, marshes, lakes and slow-moving creeks that have a soft bottom and provide abundant basking sites and aquatic vegetation.14	No potential within Subject Lands. May occur in association with the adjacent PSW within the Study Area.	No.
Vegetation									
American Chestnut	Castanea dentata	S1S2	END	END	END	1	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.20	Low potential. Suitable soils present.	Not observed.
American Ginseng	Panax quinquefolius	S2	END	END	END	1	Grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock).20	No potential. Suitable habitat not present within the Study Area.	N/A
Butternut	Juglans cinerea	S2?	END	END	END	1	Butternut grows best in rich, moist and well-drained soils or limestone gravel sites. They are less commonly found in dry, rocky and sterile soils. They generally grow alone or in small groups in deciduous forests that are commonly comprised of Basswood, Black Cherry, Beed, Black Walnut, Elm, Hemlock, Hickory, Oak, Red Maple, Sugar Maple, Poplar, White Ash and Yellow Birch.6 In Ontario, they can be found throughout the southern Ontario, south of the Canadian Shield.10	Low potential. Suitable soils present.	Not observed.
Hill's Pondweed	Potamogeton hillii	S2S3	SC	SC	0	0	Occurs in cold, clear, alkaline water. Often found within open channels of wetlands, streams, ponds, beaver ponds, near springs. Found in areas where water tends to collect.24	No potential to occur within the Subject Lands.Low potential to occur within association with PSW within the Study Area.	No
Smooth yellow false foxglove	Aureolaria flava	S2?	THR	No status	No status	No schedule	Dry, sandy, open woodlands and savannas. Often associated with White Oak, Hickory, and Pine.21	No potential. Suitable is not present within the Study Area.	N/A

Project Name: Centre Wellington Operations Centre EIS
Project Number: 300055655.0000

COMMON NAME	SCIENTIFIC NAME	Provincial S-RANK[1]	Provincial SARO Status[2]	COSEWIC[3]	Federal SARA Status[3]	Federal SARA Schedule[4]	Habitat Description	Habitat Present on Site?	Species Observed?

[1]S-Ranks (provincial)

Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario.

(Provinical Status from MNR Biodiversity Explorer September 2012)

S1 Critically Imperiled - Critically imperiled in the nation or state/province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the state/province.

S2 Imperiled - Imperiled in the nation or state/province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or state/province.

S3 Vulnerable - Vulnerable in the nation or state/province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.

[2]SARO *Endangered Species Act, 2007*

(provincial status from MNR December 2014)

The provincial review process is implemented by the MNR's Committee on the Status of Species at Risk in Ontario (COSSARO).

EXT Extinct - A species that no longer exists anywhere.

EXP Extirpated - A species that no longer exists in the wild in Ontario but still occurs elsewhere.

END Endangered - A species facing imminent extinction or extirpation in Ontario which is a candidate for regulation under Ontario's Endangered Species Act (ESA) (END-R designations are no longer relevant as species are covered under new ESA April 2009)

THR Threatened - A species that is at risk of becoming endangered in Ontario if limiting factors are not reversed.

SC Special Concern (formerly Vulnerable) - A species with characteristics that make it sensitive to human activities or natural events.

NAR Not at Risk - A species that has been evaluated and found to be not at risk.

DD Data Deficient (formerly Indeterminate) - A species for which there is insufficient information for a provincial status recommendation.

[3]SARA (Federal *Species at Risk Act*) Status and Schedule (includes COSEWIC Status)

The Act establishes Schedule 1, as the official list of wildlife species at risk. It classifies those species as being either Extirpated, Endangered, Threatened, or a Special Concern. Once listed, the measures to protect and recover a listed wildlife species are implemented.

EXT Extinct - A wildlife species that no longer exists.

EXP Extirpated - A wildlife species that no longer exists in the wild in Canada, but exists elsewhere in the wild.

END Endangered - A wildlife species that is facing imminent extirpation or extinction.

THR Threatened - A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

SC Special Concern - A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

[4]SARA Schedule

Schedule 1: is the official list of species that are classified as extirpated, endangered, threatened, and of special concern.

Schedule 2: species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

Schedule 3: species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

The Act establishes Schedule 1 as the official list of wildlife species at risk. However, please note that while Schedule 1 lists species that are extirpated, endangered, threatened and of special concern, the prohibitions do not apply to species of special concern.

Species that were designated at risk by COSEWIC prior to October 1999 (Schedule 2 & 3) must be reassessed using revised criteria before they can be considered for addition to Schedule 1 of SARA. After they have been assessed, the Governor in Council may on the recommendation of the Minister, decide on whether or not they should be added to the List of Wildlife Species at Risk.

[5]Habitat Present on Site

Determination of suitability of the site to be support each species based on 'Key Habitats Used By Species'.

Yes - Specific habitat present and species and / or evidence observed;

Likely – The whole study area or portions of it contain conditions that could support the species;

Unlikely – Few similarities between study area conditions and preferred habitat exist;

No - Specific habitat not present and species and / or evidence not observed

[6]Species Observed

Reported sighting of species during fall field investigations by RJB biologists

Additional Sources:

Sources:

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[8] Species at Risk Public Registry http://www.sararegistry.gc.ca

[9] McCracken, J.D. et al. 2013. Recovery Strategy for the Bobolink (Dolichonyx oryzivorus) and Eastern Meadowlark (Sturnella magna) in Ontario .Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario, viii + 88 pp.

[10] MNR SARO List Species Descriptions (http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/MNR_SAR_CSSR_SARO_LST_EN.html)

[11] COSEWIC Species Assessment Report

[12] Naughton, Donna. 2012. *The Natural History of Canadian Mammals.* Canadian Museum of Nature and University of Toronto Press, Toronto, + 784 pp

[13]Farrar, John Laird, 2017, *Trees in Canada*, Natural Resources Canada | Canada Forest Services, and, Fitchenry &Whiteside Limited, pp.238 - 239

[14]Ontario Nature Reptile and Amphibian Atlas (https://ontarionature.org/programs/citizen-science/reptile-amphibian-atlas/species/)

[15]Environment Canada. 2015.Recovery Strategy for Little Brown Myotis (Myotis lucifugus), Northern Myotis (Myotis septentrionalis) and Tri-colored Bat (Perimyotis subflavus) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. Ix + 110 pp.

16Humphrey, C. 2017. Recovery Strategy for the Eastern Small-footed Myotis (Myotis leibii) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Ministry of Natural Resources and Forestry, Peterborough, Ontario. vii + 76 pp.

[17]Department of Fisheries and Oceans (DFO) Aquatic Species at Risk found online at: http://www.dfo-mpo.gc.ca/species-especes/sara-lep/identify-eng.html.

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[19]Harding, J.H., 1997. Amphibians and Reptiles of the Great Lakes Region. The University of Michigan Press. Ann Arbor, Michigan

[20]MNRF. 2018. City of Niagara Falls Species at Risk Table. Guelph District.

[21]Michigan Flora found online at https://michiganflora.net/search.aspx

[22]Natural Heritage Information Centre (https://www.ontario.ca/page/get-natural-heritage-information)

R.J. Burnside & Associates Limited

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

Cultural Heritage Evaluation Report
965 Gartshore Street
Site Development - Operations Centre
Township of Centre Wellington
Lots 17–18
Concession 16
Geographic Township of Nichol
Wellington County, Ontario

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HR-414-2022
ARA File #2022-0233

19/01/2023

EXECUTIVE SUMMARY

Under a contract awarded in June 2022 by R.J. Burnside, Archaeological Research Associates Ltd. carried out a Cultural Heritage Evaluation Report for the property located at 965 Gartshore Street in the Township of Centre Wellington, Ontario. The study area is approximately 42.02 ha (103.83 ac). Specifically, the study area is located in the Township of Centre Wellington at 965 Gartshore Street, located on part of Lots 17 and 18, Concession 16 in the Geographic Township of Nichol, Wellington County.

This Cultural Heritage Evaluation Report will evaluate the property for Cultural Heritage Value or Interest (CHVI) and identify any heritage attributes deemed worthy of conservation under the *Ontario Heritage Act.*

The subject property was found to meet criteria outlined in O. Reg. 569/22. The property can therefore be considered to have CHVI. The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm; however, it contains a designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property. The structures of interest in the cultural heritage landscape include: the Gothic revival farmhouse, the bank barn, and the poured concrete silo beside the barn, the laneways that evolved over the course of time linking the farm's structures, and the tree-lined driveway.

As the property has a proposed development plan, a Heritage Impact Assessment should be undertaken to identify impacts to the cultural heritage value and heritage attributes of the subject property.

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ABBREVIATIONS

ARA – Archaeological Research Associates Ltd.
BHR – Built Heritage Resource
CHER – Cultural Heritage Evaluation Report
CHV – Cultural Heritage Value
CHVI – Cultural Heritage Value or Interest
CHL – Cultural Heritage Landscape
HIA – Heritage Impact Assessment
MCM – Ministry of Citizenship and Multiculturalism
MTO – Ministry of Transportation
OHA – Ontario Heritage Act
OP – Official Plan
O. Reg. – Ontario Regulation
PPS – Provincial Policy Statement
TOR – Terms of Reference

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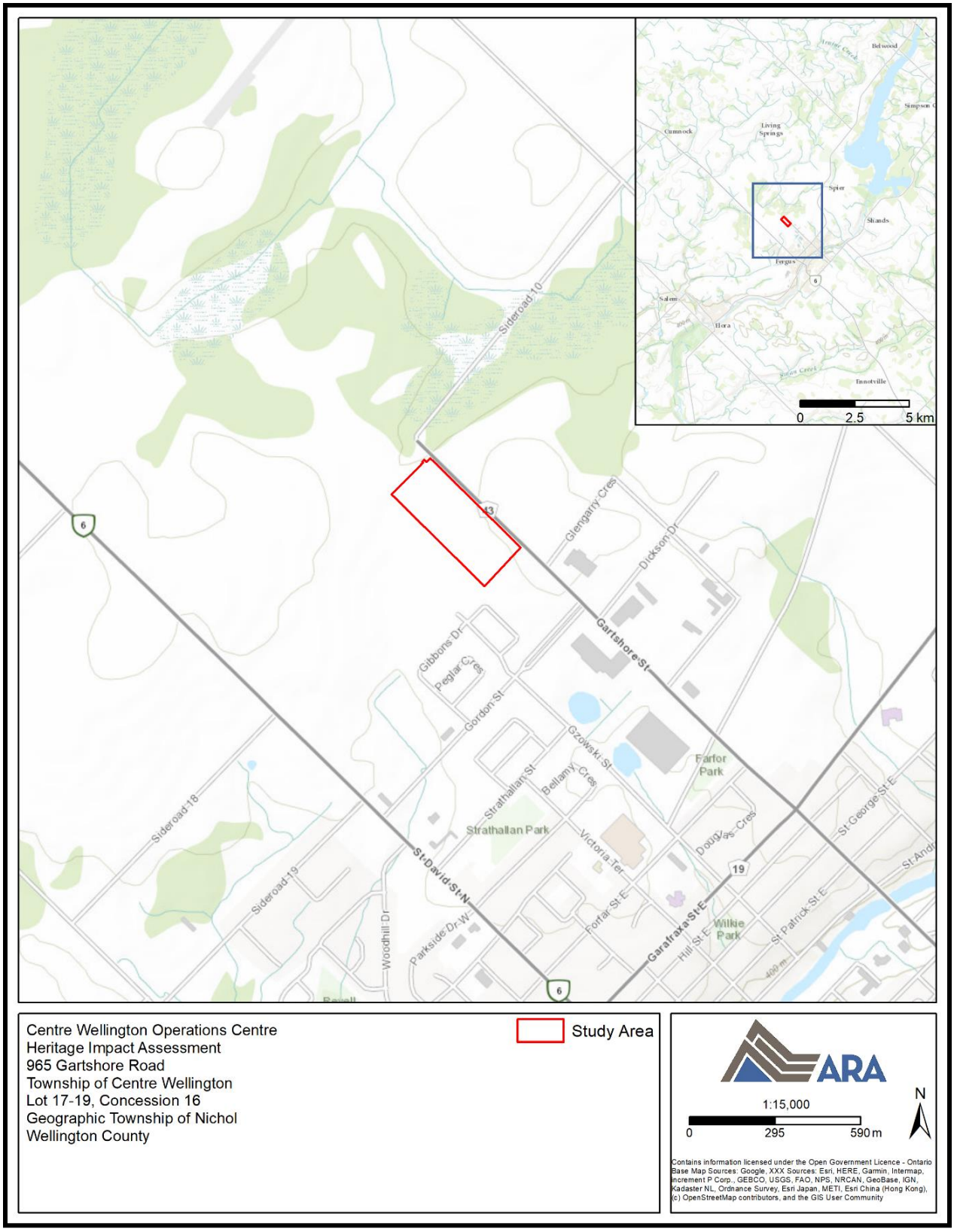
Two-page Curriculum Vitae (CV) for key team members that demonstrate the qualifications and expertise necessary to preform cultural heritage work in Ontario are provided in Appendix B.

1.0 PROJECT CONTEXT

Under a contract awarded in June 2022 by R.J. Burnside, Archaeological Research Associates Ltd. (ARA) carried out a Cultural Heritage Evaluation Report (CHER) for the property located at 965 Gartshore Street in the Township of Centre Wellington, Ontario. The study area is approximately 8.09 ha (Map 1). In legal terms, the study area comprises Parts 1–2, Plan 61R-22127, which fall on part of Lots 17–18, Concession 16 in the Geographic Township of Nichol, Wellington County. The Crown obtained these lands from the Mississaugas as part of a much larger purchase in 1784, but there were uncertainties relating to the area involved. The extent of the cession was clarified during the Between the Lakes Purchase (Treaty 3) in 1792. The Haldimand Proclamation of 1784 granted a tract of land along the Grand River to Six Nations, and the clarifying Simcoe Patent (Treaty 4) was issued in 1793.

The purpose of this assessment is to determine if 965 Gartshore Street possesses cultural heritage value or interest (CHVI). CHVI is determined through the evaluation of the property against the criteria of the formerly named "O. Reg. 9/06". Since the drafting of this report in November 2022, on December 15, 2022, Ontario Regulation 569/22 was released and came into force January 1, 2023, the property is now evaluated according to the criteria outlined in 569/22. This CHER documents the results of the research, site visit and evaluation of the property and provides a recommendation as to its heritage significance. This assessment was conducted in accordance with the aims of the *Provincial Policy Statement* (2020), the *Ontario Heritage Act*, R.S.O. 1990, c. O.18, *Standards and Guidelines for Conservation of Historic Places in Canada* (Parks Canada 2010), and MCM's *Ontario Heritage Toolkit* series (2006), the *County of Wellington Official Plan* (2022), and *Municipal Official Plan* (Township of Centre Wellington 2013 Consolidation).



Map 1: Study Area in the Township of Centre Wellington
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

2.0 LEGISLATION AND POLICY REVIEW

The framework for this assessment report is provided by federal guidelines, provincial environmental, heritage and planning legislation, and policies as well as regional and local municipal Official Plans (OP) and guidelines.

2.1 Federal Guidelines

At the national level, *The Standards and Guidelines for Conservation of Historic Places in Canada* (Parks Canada 2010) provides guidance for the preservation, rehabilitation and restoration of historic places, including cultural heritage landscapes (CHLs) and built heritage resources (BHRs). Such guidance includes the planning and implementation of heritage conservation activities.

2.2 Provincial Policies and Guidelines

2.2.1 Planning Act

Section 2 of the Ontario *Planning Act* indicates that a council of a Municipality have regard for matters of provincial interest such as: "(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest" (Government of Ontario 1990). Section 3 of the *Planning Act* directs a municipal Council's decisions to be consistent with the *Provincial Policy Statement* (PPS 2020).

2.2.2 The Provincial Policy Statement

The *Provincial Policy Statement* (PPS 2020) contains a combined statement of the Province's land use planning policies. It provides the provincial government's policies on a range of land use planning issues including cultural heritage outlined. As outlined in Section 2.0 on Wise Use of and Management of Resources: "Ontario's long-term prosperity, environmental health, and social well-being depend on conserving biodiversity, protecting the health of the Great Lakes, and protecting natural heritage, water, agricultural, mineral and cultural heritage and archaeological resources for their economic, environmental and social benefits" (MMAH 2020:24). The PPS 2020 promotes the conservation of cultural heritage resources through detailed polices in Section 2.6, such as "2.6.1 Significant built heritage resources and significant cultural heritage landscapes shall be conserved" and "2.6.3 Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property except where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved." (MMAH 2020:31).

2.2.3 Ontario Heritage Act

The *Ontario Heritage Act* (*OHA*), R.S.O. 1990, c.018 is the guiding piece of provincial legislation for the conservation of significant cultural heritage resources in Ontario. The *OHA* gives provincial and municipalities governments the authority and power to conserve Ontario's heritage. The *OHA* has policies which address individual properties (Part IV), heritage districts (Part IV), and allows municipalities to create a register of non-designated properties which may have cultural heritage value or interest (Section 27).

To objectively identify cultural heritage resources, Ontario Regulation 569/22 made under the OHA sets out nine criteria for determining CHVI. The criteria set out in the regulation were developed to identify and evaluate properties for designation under the OHA. Best practices in evaluating properties that are not yet protected employ O. Reg. 569/2206 to determine if they have CHVI. These criteria are as follows:

1. *The property has design value or physical value because it is a rare, unique, representative or early example of a style, type, expression, material or construction method.*

2. *The property has design value or physical value because it displays a high degree of craftsmanship or artistic merit.*

3. *The property has design value or physical value because it demonstrates a high degree of technical or scientific achievement.*

4. *The property has historical value or associative value because it has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community.*

5. *The property has historical value or associative value because it yields, or has the potential to yield, information that contributes to an understanding of a community or culture.*

6. *The property has historical value or associative value because it demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.*

7. *The property has contextual value because it is important in defining, maintaining or supporting the character of an area.*

8. *The property has contextual value because it is physically, functionally, visually or historically linked to its surroundings.*

9. *The property has contextual value because it is a landmark.*

If a potential cultural heritage resource is found to meet any two of these criteria, it can then be considered to have CHVI.

The *OHA* provides three key tools for the conservation of BHRs and CHLs. It allows for protection as:

1. A single property (i.e., farmstead, park, garden, estate, cemetery), a municipality can designate BHRs and CHLs as individual properties under Part IV of the *OHA*.

2. Multiple properties or a specific grouping of properties may be considered a CHL, as such, a municipality can designate the area as a Heritage Conservation District (HCD) under Part V of the *OHA*.
3. Lastly, a municipality has the authority to add an individual or grouping of non-*OHA* designated property(ies) (often called "listed" properties) of heritage value or interest on their Municipal Heritage Register.

An *OHA* designation provides the strongest heritage protection available for conserving cultural heritage resources. Per the *OHA*, the *Ontario Heritage Toolkit* series (2006) was also consulted as part of the evaluation of this CHER.

2.3 Municipal Policies

2.3.1 County of Wellington Official Plan

The regional official plan, the *County of Wellington Official Plan* (2022 Consolidation), addresses cultural heritage resources, with one of the OP recognizing that "cultural heritage and archaeological resources form an important and in many cases highly visible part of the community fabric" (County of Wellington 2022 Consolidation:31). In Section 4.1 entitled "Cultural Heritage and Archaeological Resources" the OP broadly states: "The policies of this Plan, in conjunction with the Ontario Heritage Act, provide a framework for the protection and enhancement of cultural heritage resources in Wellington" (County of Wellington 2022 Consolidation:31). Policy 4.1.5 indicates that:

> a) *Significant built heritage resources and significant cultural heritage landscapes shall be conserved. Conserved means the identification, protection, use and/or management of heritage and archeological resources in such a way that their heritage values, attributes and integrity are retained. This may be addressed through a conservation plan or heritage impact assessment in accordance with Section 4.6.7* (County of Wellington 2022 Consolidation:33).

Detailed policies continue into Section 4.1 and the County supports local municipalities following the same goals and conservation of cultural heritage resources, as Policy 4.1.5 also states: "Wellington will encourage the conservation of significant built heritage resources through heritage designations and planning policies which protect these resources" (County of Wellington OP 2022 Consolidation:34).

As identified by the Centre Wellington Planner, the subject property was suspected to be located adjacent to or within the special policy area of Wellington Place Lands (Nichol), which lies between Fergus and Elora. A cultural heritage landscape has also been identified within the special policy area, located to the west. After reviewing the extent of the special policy area as outlined in Section 9.2.4, PA1-1 of the OP and Schedule A1-1, the subject property was determined not to be within or adjacent to its boundaries (County Wellington 2022 Consolidation:115).

2.3.2 Township of Centre Wellington Official Plan

The *Township of Centre Wellington Official Plan* (2013 Consolidation) is the primary tool to guide land use, growth and development within the Township of Centre Wellington. The importance of cultural heritage resource conservation within the Township is evident as within Section B.4 Major Goals, one of the goals supporting the *Official Plan* is: "Protect the unique cultural heritage resources of the community" (Township of Centre Wellington 2013 Consolidation:4). Additionally, goals and objectives specific to the Township regarding cultural heritage resources include:

1. *To protect the Township's heritage resources from neglect, deterioration, demolition, alteration, redevelopment or changes in use which threaten their existence or integrity.*
2. *To encourage and support the functional and economic use of heritage buildings.*
3. *To identify, protect and enhance natural areas.*
4. *To encourage public awareness and appreciation of the heritage resources of the Township and of the value of protecting these resources to both residents and visitors* (Policy C.2.1) (Township of Centre Wellington 2013 Consolidation:5).

Further policy guidance is provided throughout Section C.2, including criteria and procedures for designation, heritage easements, demolition and documentation of designated buildings, parking exemptions, etcetera (Township of Centre Wellington 2013 Consolidation). Policy C.2.20 also provides direction for legislative authority pertaining to the goals of the Township's heritage conservation objectives (Township of Centre Wellington 2013 Consolidation).

2.3.3 Heritage Impact Assessment (HIA) Terms of Reference (TOR)

The *County of Wellington Official Plan* provides guidance for impact assessments within Section 4.6 (2022 Consolidation:43). Following the evaluation and recommendations of this CHER, a provisional Heritage Impact Assessment (HIA) may be required. To measure various impacts and to propose methods of reducing or eliminating negative impacts, the *County of Wellington Official Plan* includes terms of reference (TOR) in Subsection 4.6.7 Heritage Impact Assessment and Conservation Plan (2022 Consolidation:46). The following structure for HIAs is recommended within the *Official Plan*:

> *A heritage impact assessment and conservation plan may be required to determine if any significant cultural heritage resources are impacted by a development proposal.*
>
> *A heritage impact assessment is a study to determine if any significant cultural heritage resources are impacted by a development proposal, whether the impacts can be mitigated, and by what means.*
>
> *A heritage impact assessment will generally be required to contain:*
> *a) Historical research, site analysis and evaluation*

b) *Identification of the significance and heritage attributes of the cultural heritage resources*
c) *Description of the proposed development or site alteration*
d) *Assessment of development or site alteration impact*
e) *Consideration of alternatives, mitigation and conservation methods. Methods to minimize or avoid a negative impact on a significant cultural heritage resource include, but are not limited to:*
    ii. *alternative development approaches*
    iii. *isolating development and site alteration from significant built and natural features and vistas*
    iv. *design guidelines that harmonize mass, setback, setting, and materials*
    v. *limiting height and density*
    vi. *allowing only compatible infill and additions*
    vii. *reversible alterations*
    viii. *buffer zones, and*
    ix. *site plan control*
f) *Implementation and monitoring*
g) *Summary statement and conservation recommendations* (2022:46-47).

2.4 Policy Conclusions

Federal guidance, provincial legislation and policies of the *County of Wellington Official Plan* (2022 Consolidation) and the *Township of Centre Wellington Official Plan* (2013 Consolidation) call for the conservation of cultural heritage resources, the maintaining of a register and the promotion of heritage resources. This CHER will address these cultural heritage policies as they relate to the proposed project. Dependent on the recommendations of this CHER, the above HIA TOR will be followed.

3.0 KEY CONCEPTS

The following concepts require clear definition in advance of the methodological overview and proper understanding is fundamental for any discussion pertaining to cultural heritage resources:

- **Cultural Heritage Value or Interest** (CHVI), also referred to as Heritage Value, is identified if a property meets one of the criteria outlined in O. Reg. 569/22 namely historic or associate value, design or physical value and/or contextual value. Provincial significance is defined under *Ontario Heritage Act (OHA) O. Reg*. 10/06.
- **Built Heritage Resource** (BHR) can be defined in the *PPS* as: "a building, structure, monument, installation or any manufactured or constructed part or remnant that contributes to a property's cultural heritage value or interest as identified by a community, including Indigenous community. Built heritage resources are located on property that has been designated under Parts IV or V of the *Ontario Heritage Act*, or that may be included on local, provincial and/or federal and/or international registers" (MMAH 2020:41).
- **Conserved** means "the identification, protection, management and use of built heritage resources, cultural heritage landscapes and archaeological resources in a manner that ensures their cultural heritage value or interest is retained. This may be achieved by the implementation of recommendations set out in a conservation plan, archaeological assessment, and/or heritage impact assessment that has been approved, accepted or adopted by the relevant planning authority and/or decision- maker. Mitigative measures and/or alternative development approaches can be included in these plans and assessments" (MMAH 2020:41–42).
- **Cultural Heritage Landscape** (CHL) is defined in the *PPS* as: "a defined geographical area that may have been modified by human activity and is identified as having cultural heritage value or interest by a community, including an Aboriginal community. The area may involve features such as structures, spaces, archaeological sites or natural elements that are valued together for their interrelationship, meaning or association. Examples may include, but are not limited to, heritage conservation districts designated under the *Ontario Heritage Act*; villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways, viewsheds, natural areas and industrial complexes of heritage significance; and areas recognized by federal or international designation authorities (e.g., a National Historic Site or District designation, or a UNESCO World Heritage Site)" (MMAH 2020:42).
- **Heritage Attributes** are defined as: "the principal features or elements that contribute to a protected heritage property's cultural heritage value or interest, and may include the property's built, constructed, or manufactured elements, as well as natural landforms, vegetation, water features, and its visual setting (e.g., significant views or vistas to or from a protected heritage property)." (MMAH 2020:44-45).
- **Protected Heritage Property** is defined as "property designated under Parts IV, V or VI of the Ontario Heritage Act; property subject to a heritage conservation easement under Parts II or IV of the Ontario Heritage Act; property identified by the Province and prescribed public bodies as provincial heritage property under the Standards and Guidelines for Conservation of Provincial Heritage Properties; property protected under federal legislation, and UNESCO World Heritage Sites" (MMAH 2020:49).

- **Significant** in reference to cultural heritage is defined as: "resources that have been determined to have cultural heritage value or interest. Processes and criteria for determining cultural heritage value or interest are established by the Province under the authority of the Ontario Heritage Act" (MMAH 2020:51).

Key heritage definitions from the *County of Wellington Official Plan* are as follows:

- **Built heritage** is defined as "many buildings and structures, either individually or in groups, which are considered to be architecturally or historically significant to the community, county, province or country" (2022 Consolidation:31).
- **Cultural Heritage Landscapes** are defined as a "geographical area of heritage significance which has been modified by human activities and is valued by a community. It involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples may include, but are not limited to, heritage conservation districts designated under the Ontario Heritage Act, and villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways and industrial complexes of cultural heritage value. For cultural heritage landscapes to be significant, they must be valued for the important contribution they make to our understanding of a place, an event, or a people" (2022 Consolidation:31).

4.0 CONSULTATION

BHRs and CHLs are broadly referred to as cultural heritage resources. A variety of types of recognition exist to commemorate and/or protect cultural heritage resources in Ontario. As part of consultation ARA reviews relevant online sources and databases to determine if the subject property is recognized.

The Minister of the Environment and Climate Change, on the advice of the Historic Sites and Monuments Board of Canada (HSMBC), makes recommendations to declare a site, event or person of national significance. The National Historic Sites program commemorates important sites that had a nationally significant effect on, or illustrates a nationally important aspect of, the history of Canada. A National Historic Event is a recognized event that evokes a moment, episode, movement or experience in the history of Canada. National Historic People are people who are recognized as those who through their words or actions, have made a unique and enduring contribution to the history of Canada. The Parks Canada's online *Directory of Federal Heritage Designations* captures these national commemorations as well as lists Heritage Railway Stations, Federal Heritage Buildings and Heritage Lighthouses. Another form of recognition at the federal level is the Canadian Heritage Rivers System program. It is a federal program to recognize and conserve rivers with outstanding natural, cultural and recreational heritage. It is important to note that federal commemoration programs do not offer protection from alteration or destruction. The subject property does not appear on these lists (Parks Canada 2022).

The Ontario Heritage Trust (OHT) operates the Provincial Plaque Program that has over 1,250 provincial plaques recognizing key people, places and events that shaped the province. Additionally, properties owned by the province may be recognized as a "provincial heritage property" (MCM 2010). The subject property is not commemorated with an OHT plaque (OHT 2021). It does not appear that the subject property is subject to an OHT or municipal easement. The list of properties designated by the MCM under Section 34.5 of the *OHA* was consulted and the property is not included in this list.

Under *Section 27* of the *OHA*, a municipality must keep a Municipal Heritage Register. A Municipal Heritage Register lists designated properties as well as other properties of cultural heritage value or interest in the municipality. Properties on this Register that are not formally designated are commonly referred to as "listed." Listed properties are flagged for planning purposes and are afforded a 60-day delay in demolition if a demolition request is received. Protected properties are those protected by Part IV (individual properties) or Part V (Heritage Conservation District) designation under the *OHA*. Once designated, a property cannot be altered or demolished without the permission of the local council. MCM's current list of Heritage Conservation Districts was consulted. The subject property is not listed, designated or part of a Heritage Conservation District.

At project commencement, ARA contacted the County of Wellington Manager of Planning and the Township of Centre Wellington's Planner responsible for heritage to inquire about the site-specific scope of work required for the HIA. The County of Wellington responded indicating the relevant sections of the Official Plan which have been summarized in Section 2.3. The Township planner indicated that there is a CHL inventory for the Township, however "It does not specifically identify

this property within or adjacent to any significant CHLs". Regarding the municipal heritage register, the planner noted:

> *…the Heritage Committee (in consultation with myself) is working on adding non-designated properties to the Municipal Register. This is an ongoing project that has been stalled due to the pandemic, but I can confirm that the three properties immediately adjacent to the north and west (6611 and 6581 Highway 6 and 968 St. David St. N.) are proposed to be added. The property across the street at 950 Gartshore Street will also be reviewed in due course. These might not impact the current CHER for this property as these adjacent properties have not been officially added to the Register and won't be proposed to be added until at least next spring, but can give you some further context surrounding the property. The subject property itself has not yet been reviewed for addition to the Municipal Register but the CHER would be expected to yield further information in this regard.*

According to the mapping provided by the proponent to ARA, the rear lands appear to have been severed from 965 Gartshore, creating a buffer between the property and 6611 and 6581 Highway 6 and 968 St. David Street North. As such, these properties do not appear to be adjacent.

5.0 HISTORIC CONTEXT

The site history of the subject property was constructed using background information obtained from aerial photographs, historical maps (i.e., illustrated atlases), archival sources (i.e., historical publications, census records, land registry records), and published secondary sources (online and print). Given COVID 19 restrictions and the limited time frame for the production of this report, there is always the possibility that additional historical information exists but may not have been identified.

As discussed in Section 1.0, the study area is located in Lots 17 and 18, Concession 16 in the Geographic Township of Nichol, Wellington County. In an attempt to reconstruct the historic land use of the subject property and its context, ARA examined three historical maps documenting past residents, structures (e.g., homes, businesses, and public buildings) and features during the 19th century, one topographical map from the early 20th century, and two aerial images from both the mid-20th century and modern day. Specifically, the following resources were consulted:

- Leslie and Wheelock's *Map of the County of Wellington, Canada West* (1861)
- *Nichol Township* from Walker and Miles' *Topographical and Historical Atlas of the County of Wellington, Ontario* (1877) (MU 2001);
- *Nichol and Pilkington Townships* from the Historical Atlas Publishing Co.'s *Wellington County* (1906) (Historic Map Works 2022)
- A topographic map from 1935 (OCUL 2022);
- An aerial image from 1954 (U of T 2022); and
- A modern aerial image.

Furthermore, ARA completed a summary of land transactions for the subject property to understand the land ownership history (see Table 3).

5.1 Pre-Contact

The Pre-Contact history of the region is lengthy and rich, and a variety of Indigenous groups inhabited the landscape. Archaeologists generally divide this vibrant history into three main periods: Palaeo, Archaic and Woodland. Each of these periods comprise a range of discrete sub-periods characterized by identifiable trends in material culture and settlement patterns, which are used to interpret past lifeways. The principal characteristics of these sub-periods are summarized in Table 1.

Table 1: Pre-Contact Settlement History
(Wright 1972; Ellis and Ferris 1990; Warrick 2000; Munson and Jamieson 2013)

Sub-Period	Timeframe	Characteristics
Early Palaeo	9000–8400 BC	Gainey, Barnes and Crowfield traditions; Small bands; Mobile hunters and gatherers; Utilization of seasonal resources and large territories; Fluted points
Late Palaeo	8400–7500 BC	Holcombe, Hi-Lo and Lanceolate biface traditions; Continuing mobility; Campsite/Way-Station sites; Smaller territories are utilized; Non-fluted points
Early Archaic	7500–6000 BC	Side-notched, Corner-notched (Nettling, Thebes) and Bifurcate traditions; Growing diversity of stone tool types; Heavy woodworking tools appear (e.g., ground stone axes and chisels)

Sub-Period	Timeframe	Characteristics
Middle Archaic	6000–2500 BC	Stemmed (Kirk, Stanly/Neville), Brewerton side- and corner-notched traditions; Reliance on local resources; Populations increasing; More ritual activities; Fully ground and polished tools; Net-sinkers common; Earliest copper tools
Late Archaic	2500–900 BC	Narrow Point (Lamoka), Broad Point (Genesee) and Small Point (Crawford Knoll) traditions; Less mobility; Use of fish-weirs; True cemeteries appear; Stone pipes emerge; Long-distance trade (marine shells and galena)
Early Woodland	900–400 BC	Meadowood tradition; Crude cord-roughened ceramics emerge; Meadowood cache blades and side-notched points; Bands of up to 35 people
Middle Woodland	400 BC–AD 600	Saugeen tradition; Stamped ceramics appear; Saugeen projectile points; Cobble spall scrapers; Seasonal settlements and resource utilization; Post holes, hearths, middens, cemeteries and rectangular structures identified
Middle/Late Woodland Transition	AD 600–900	Princess Point tradition; Cord roughening, impressed lines and punctate designs on pottery; Adoption of maize horticulture at the western end of Lake Ontario; Oval houses and 'incipient' longhouses; First palisades; Villages with 75 people
Late Woodland (Early)	AD 900–1300	Glen Meyer tradition; Settled village-life based on agriculture; Small villages (0.4 ha) with 75–200 people and 4–5 longhouses; Semi-permanent settlements
Late Woodland (Middle)	AD 1300–1400	Uren and Middleport traditions; Classic longhouses emerge; Larger villages (1.2 ha) with up to 600 people; More permanent settlements (30 years)
Late Woodland (Late)	AD 1400–1600	Pre-Contact Neutral tradition; Larger villages (1.7 ha); Examples up to 5 ha with 2,500 people; Extensive croplands; Also hamlets, cabins, camps and cemeteries; Potential tribal units; Fur trade begins ca. 1580; European trade goods appear

Although Iroquoian-speaking populations tended to leave a much more obvious mark on the archaeological record and are therefore emphasized in the Late Woodland entries above, it must be understood that Algonquian-speaking populations also represented a significant presence in southern Ontario. Due to the sustainability of their lifeways, archaeological evidence directly associated with the Anishinaabeg remains elusive, particularly when compared to sites associated with the more sedentary agriculturalists. Many artifact scatters in southern Ontario were likely camps, chipping stations or processing areas associated with the more mobile Anishinaabeg, utilized during their travels along the local drainage basins while making use of seasonal resources. This part of southern Ontario represents the ancestral territory of various Indigenous groups, each with their own land use and settlement pattern tendencies.

5.2 Post-Contact

The arrival of European explorers and traders at the beginning of the 17th century triggered widespread shifts in Indigenous lifeways and set the stage for the ensuing Euro-Canadian settlement process. Based on current knowledge, the cultural heritage resource located within the Study Area is tied to the history of the initial settlement and growth of Euro-Canadian populations in Nichol Township. Accordingly, this historical context section spans the early Euro-Canadian settlement history through to the present (see Table 2). Documentation for this period is abundant, ranging from the first sketches of Upper Canada and the written accounts of early explorers to detailed township maps and lengthy histories.

Table 2: Post-Contact Settlement History
(Smith 1846; Coyne 1895; Lajeunesse 1960; Cumming 1972a, 1972b; Ellis and Ferris 1990; Surtees 1994; AO 2015)

Historical Event	Timeframe	Characteristics
Early Exploration	Early 17th century	Brûlé explores southern Ontario in 1610; Champlain travels through in 1613 and 1615/1616, encountering a variety of Indigenous groups (including both Iroquoian-speakers and Algonquian-speakers); European goods begin to replace traditional tools

Historical Event	Timeframe	Characteristics
Increased Contact and Conflict	Mid- to late 17th century	Conflicts between various First Nations during the Beaver Wars result in numerous population shifts; European explorers continue to document the area, and many Indigenous groups trade directly with the French and English; 'The Great Peace of Montreal' treaty established between roughly 39 different First Nations and New France in 1701
Fur Trade Development	Early to mid-18th century	Growth and spread of the fur trade; Peace between the French and English with the Treaty of Utrecht in 1713; Ethnogenesis of the Métis; Hostilities between French and British lead to the Seven Years' War in 1754; French surrender in 1760
British Control	Mid- to late 18th century	*Royal Proclamation* of 1763 recognizes the title of the First Nations to the land; Numerous treaties subsequently arranged by the Crown; First land cession under the new protocols is the Seneca surrender of the west side of the Niagara River in 1764; The Niagara Purchase (Treaty 381) in 1781 included this area
Loyalist Influx	Late 18th century	United Empire Loyalist influx after the American Revolutionary War (1775–1783); British develop interior communication routes and acquire additional lands; Between the Lakes Purchase completed with the Mississaugas in 1784 and confirmed in 1792 (Treaty 3); Haldimand Proclamation of 1784 grants land to Six Nations (the Haldimand Tract), clarified by the Simcoe Patent (Treaty 4) in 1793; *Constitutional Act* of 1791 creates Upper and Lower Canada
County Development	Late 18th to early 19th century	Became part of York County's 'West Riding' and the expansive Kent County in 1792; Additional land cessions included the Nottawasaga Purchase (Treaty 18) and Ajetance Purchase (Treaty 19) in 1818, the Huron Tract Purchase (Treaty 29) in 1827 and the Saugeen Tract Purchase (Treaty 45½) in 1836; Wellington District and Waterloo County created in 1840; Wellington County created after the abolition of the district system in 1849
Township Formation	Early 19th century	Nichol was originally Block 4 of the Haldimand Tract; Named after Colonel Nichol from the War of 1812; Granted to Colonel Clark for military service and patented to him in 1807; Southern half of Nichol sold to W. Gilkison in 1832; A. Fergus(s)on and J. Webster purchased 2,981 ha near Fergus in 1834; Earliest settlers included the Flewellings, Boys, Scotts, Dows, Cunninghams, Metcalfes, Elmslies and Mutries prior to 1830; The Wilsons, Beatties, Cattenachs and Beattys arrived from 1830–1833; G. Elmslie, A. Watt and other Scottish immigrants purchased properties ca. 1834; Population reached 134 in 1834
Township Development	Mid-19th to early 20th century	Population of Nichol reached 1,019 by 1842; Most settlers were from Scotland; 8,289 ha taken up by 1846, with 2,182 ha under cultivation; 2 grist mills and 4 saw mills in operation at that time; By 1871, the unincorporated parts of Nichol contained 499 dwellings, 509 families and 2,737 inhabitants; Traversed by the Wellington, Grey & Bruce Railway (1870/1872) and Credit Valley Railway Elora Branch (ca. 1880); Communities at Aboyne, Alma, Barnett (Ennotville), Cumnock, Elora, Fergus, Kinnettles and Salem

5.2.1 Town of Fergus

Augustus Jones, surveying along the baseline which is now the dividing line between Nichol, Garafraxa and Eramosa Townships, reached the future townsite of Fergus, on the Grand River, in 1792. Jones described the area as consisting of high riverbanks covered in hemlock and cedar, with the river being approximately 100 feet across in that area (Thorning 1995). During the early 19th century, predominately Scottish settlers such as lawyer Adam Fergusson and politician James Webster arrived in the area and began to clear the forests for agricultural and settlement purposes. The first house in Fergus, then called Little Falls, was a crude log shanty raised by James Webster north of St. Andrew Street on December 20, 1833. A surveyor arrived to lay out the village lots and streets in 1834, and a hotel, church, and school were constructed shortly after. The main street, named after St. Andrew, was roughly parallel to the Grand River (Templin 1933). The settlement's named was changed in 1836 to Fergus, after Adam Fergusson. Early local industries in Fergus also

relied heavily on the Grand River, including a grist mill (1835), a sawmill, a lime kiln, a grain-drying kiln, a distillery, two tanneries, and a piggery (Fergus-Elora News Express 2016).

Fergus was incorporated as a village in 1857, although the main street was apparently a ramshackle collection of residences and businesses well into the mid-19th century. Residents utilized the waterpower of the Grand River to generate local electric power, and the Scottish settlers in Fergus lined the main roads with solidly built limestone buildings (Fergus-Elora News Express 2016). In 1870 the Wellington, Grey, and Bruce Railway provided an economic boost to the town, which was continued in 1880 when the Credit Valley Railway also built a station in Fergus (Welch & Payne 2012).

The 20th century saw continued and sustained growth in Fergus, with the Beatty Brothers' farm equipment manufacturing plant located near what was then the outskirts of town in the early 1900s; the firm would go on to become a major manufacturer and distributor of household appliances worldwide, and continues to do business as A.O. Smith, an American-based water heater supplier (Welch & Payne 2012). In 1952 Fergus was incorporated as a town, and later amalgamated into the Township of Centre Wellington in 1999.

5.3 Subject Property

The land surrounding and including what is now 965 Gartshore Street was part of a larger landholding granted to the Honourable Thomas Clark by the Crown on April 17, 1807. The patent was known as "Block 4 on the Grand River," and consisted of 28,512 acres initially belonging to "the Sachems, Principal Chiefs, and Warriors of the Mohawks of Six Nations of Indians" (LRO #61). In October 1834 Clark sold 13,864 acres of Block 4 to the Honourable Adam Ferguson and James Webster, who owned what would become Lots 17 and 18 of Concession 16 together until 1841 when James Webster sold all of Lot 17 and the north half of Lot 18, along with other lands, to Adam Ferguson.

Adam Ferguson retained ownership over Lot 17 until 1845 and Lot 18 until 1847 when he sold both lots to Edward Ford, Senior, a Scottish farmer and smith. Edward Ford, Sr, sold 48 acres of Lot 18 to his son, Edward Ford, Junior, in 1847 on the same day Ford Senior bought Lot 18. Edward Ford, Junior, was born in 1820 in Aberdeen, Scotland, and immigrated with his parents Edward Senior (1794–1857) and Isobel Ford (1797–1862) to Upper Canada. Edward Ford, Junior married Elizabeth Barnet in 1848 in Fergus, Ontario and the couple had six surviving children: Edward III, Isabella, Emma Elizabeth, Thomas P., Emery, William Barnet "W.B.," and James G. Edward Ford, Junior died in 1876 and is buried in Fergus, along with his wife Elizabeth (d. 1873). The 1861 Census lists the Ford family as living in a one-storey log house at the time, and Edward worked as a farmer. Leslie and Wheelock's 1861 *Map of the County of Wellington, Canada* situates the study area within the historic landscape, and indicates that Edward Ford was the owner of half of both Lots 17 and 18 within Concession 16 of Nichol Township. The parcel footprint remains the same in the 1877 Walker & Miles *Topographical and Historical Atlas of the County of Wellington, Ontario*; in both instances the northeast halves of Lots 17 and 18 are located on the southwest side of the historic Jones Baseline Road which marked the upper limits of the Six Nations Land Grant and no buildings/structures and/or orchards are notated on either lot (Map 2 and Map 3).

In 1875 Edward Ford took out a mortgage with the Hamilton Provincial Loan Society for $500, indicating there may have been a house constructed around this time. However, Edward Ford died in 1876, and Ford's descendants took out another mortgage in 1880, after the initial loan was discharged. In 1883 Edward Ford's descendants, with the exception of Edward Ford III, sold the northeast halves of Lots 17 and 18 to James and Emery Ford, two of Edward Ford Jr's sons (Edward Ford III did not sell his holdings to his brothers until 1916). The Ford family does not appear in the 1881 and 1891 Canada Census, but in 1901 James Ford, age 41, is listed as living with his wife Isabella (age 38), their children Lorne (age 17) and Wilfred (age 11), and his brother Emery (age 43), where both Ford brothers are detailed as farmers. The 1906 Map of Nichol Township in the Historical Atlas Publishing Company's *Wellington* County indicates both James and Emory Ford own 100 acres comprising both parts of Lot 17 and 18, with a structure indicated near the southern boundary of Lot 18. The Ford family's enumeration in the 1911 Census is very similar to that of 1901, although Lorne Ford is no longer living at home and Wilfred Ford, then aged 21, was working as a general store clerk. By 1921, Emery was no longer living with James, and genealogical data indicates he died between 1920 and 1925 in Ingelow, Manitoba, and left no known direct descendants. James Ford, then aged 61, continued to live with his wife Isabella (aged 63) and their son Wilfred, who was aged 30 and working as a farmer. Wilfred was married to Annie, aged 30, and the couple had an infant son named James A.L. Ford. The James Ford family lived in a six room brick house, likely the extant residential structure within the Study Area.

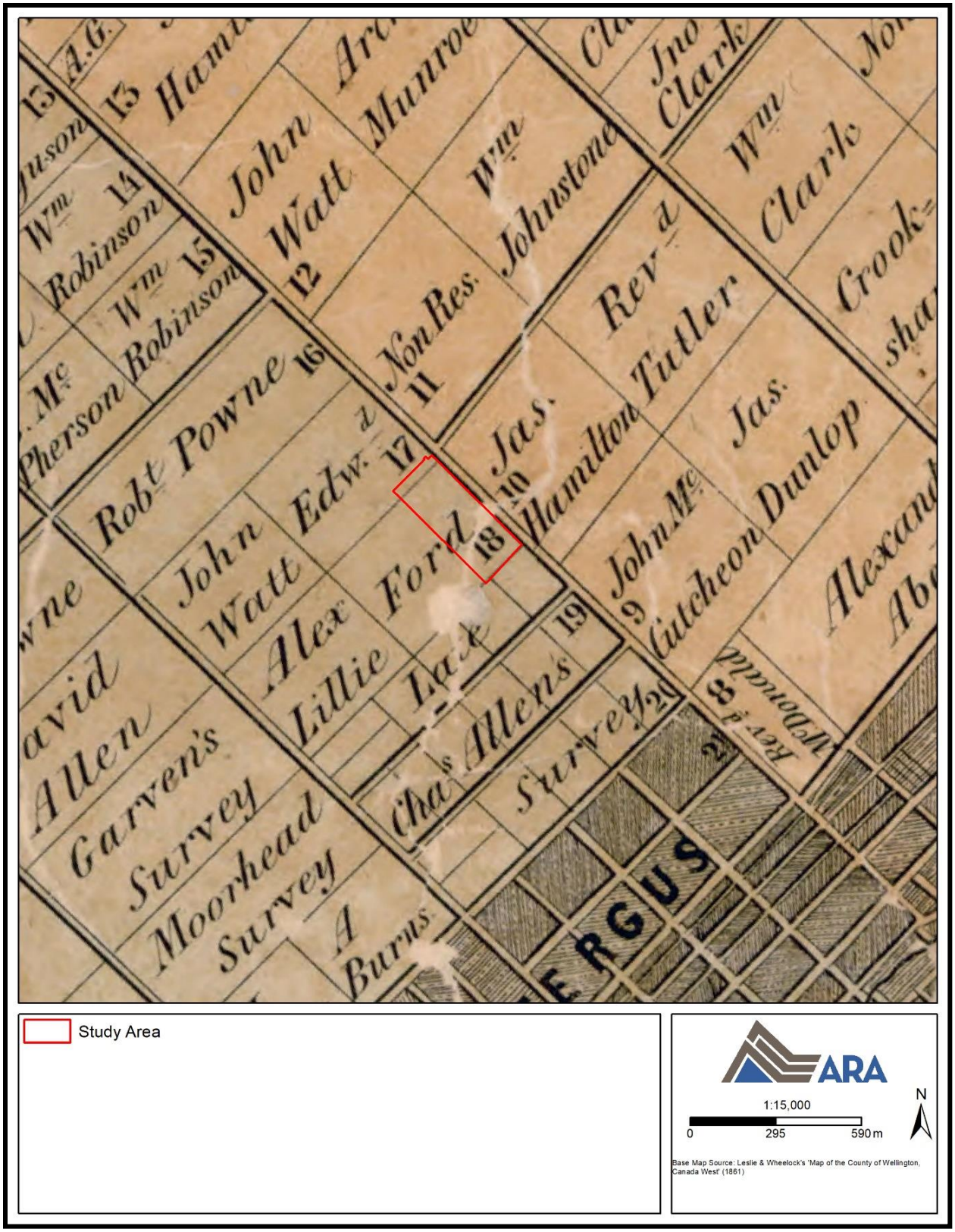
In 1922 Wilfred A. Ford sold the northeast halves of Lots 17 and 18 to his cousin Wilbert T. Ford, one of the sons of Edward Ford III and his wife Agnes MacQuillen. A 1935 topographic map shows two structures within the study area, likely the farmhouse and the barn. The barn is located to the north of what is assumed to be a residential structure, which faces northeast onto Gartshore Street, formerly the Jones Baseline Road (Map 4). On June 30, 1948, Wilbert T. Ford sold his entire land parcel to Charles and Mary Hallal, the first non-Fords affiliated with the Study Area in a century. The Hallals retained the property until 1952, when they granted it to Thomas Edwards. A 1954 aerial image illustrates that the building footprints and layout of the study area remained largely the same from the 1934 topographic map; what is assumed to be the farmhouse faces northeast onto Gartshore Street, and the barn lies on a northwest-southeast axis parallel to the road (Map 5).

In 1961, the Municipality of the Township of Nichol passed Bylaw No. 477, designating the Study Area as part of an urban development area on the outskirts of Fergus. In 1964, Thomas Edwards sold part of Lots 17 and 18 to Marius and Margje Key, who owned the property until 2016 when they sold to REC Farms, Inc. In 2021, REC Farms transferred the land to the Corporation of the Township of Centre Wellington for the construction of a new operation centre. A modern aerial photograph also indicates that the building footprints and layout of the study area has not changed markedly since the 1950s, although there appears to be additional outbuildings surrounding the barn. The farmhouse remains in the same location, as does the barn (Map 6).

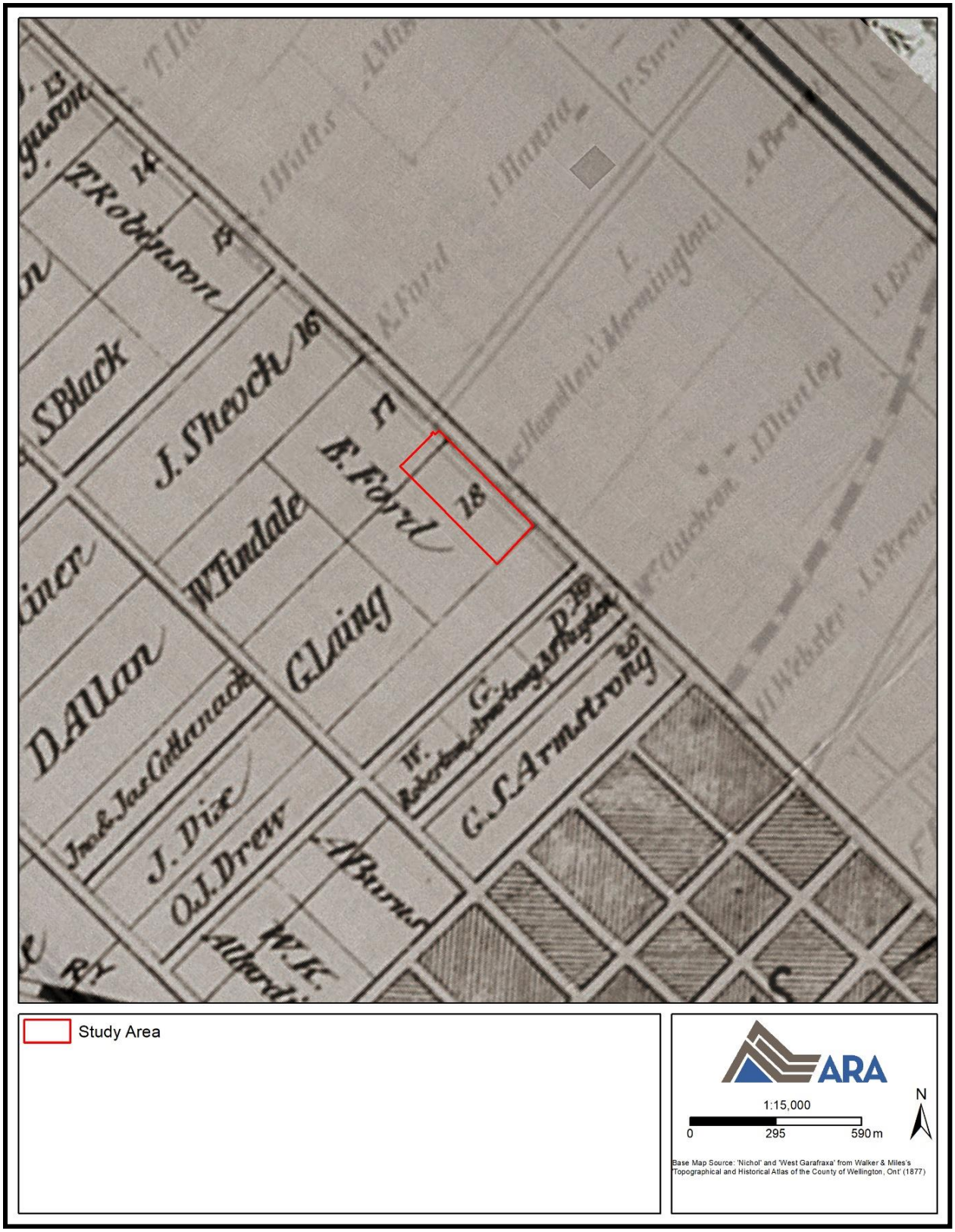
Table 3: Summary of Land Transactions for 965 Gartshore Street (LRO #61)

Instrument #	Instrument	Date	Grantor	Grantee	Comments
---	Patent	17 Apr 1807	Crown	Hon. Thomas Clark	Block 4 on Grand River, 28,512 acres
83	B&S	21 Oct 1834	Hon. Thomas Clark et ux	Adam Ferguson & James Webster	Part Block 4, 13,864 acres
212	B&S	3 Jun 1841	James Webster et ux	Hon. Adam Ferguson	All Lot 17, NE ½ Lot 18

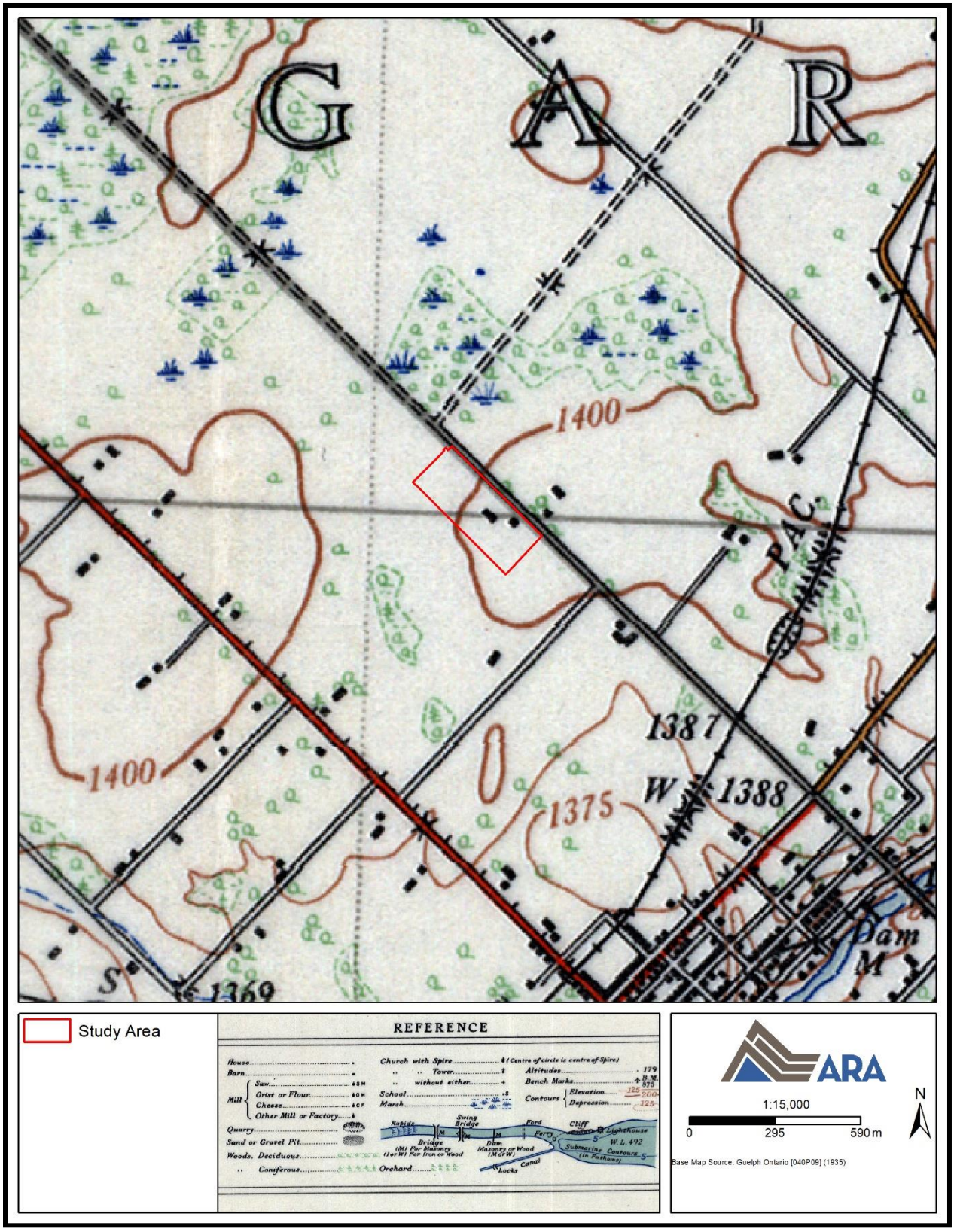
Instrument #	Instrument	Date	Grantor	Grantee	Comments
416	B&S	19 Nov 1845	Hon. Adam Ferguson	Edward Ford Sr	NE ½ Lot 17 (48 acres)
133	B&S	20 Nov 1847	Hon. Adam Ferguson	Edward Ford Sr	NE ½ Lot 18 (48 acres)
134	B&S	20 Nov 1847	Edward Ford Sr. et ux	Edward Ford Jr	NE ½ Lot 18 (48 acres)
1335	Mort.	23 Aug 1875	Edward Ford	Hamilton Provincial Loan Society	$500 (dis. 1880)
1962	Mort.	10 Aug 1880	Elizabeth Wise, James Ford, Emery Ford, William Wise	Exrs of James Mc[Illegible]	$650 (dis. 1884)
2329	B&S	18 May 1883	Alex [Illeg.] & [Ill] Ford, exrs of Edward Ford, dec'd	James & Emery Ford	NE ½ Lots 17 &18
2330	Grant	18 May 1883	Isabella Ford by W.J. O'Reilly	James Ford & Emery Ford	NE ½ Lots 17 & 18
5609	B&S	15 Jul 1916	Edward Ford, exr of Edward Ford (dec'd)	James Ford & Emery Ford	NE ½ Lots 17 & 18
6247	Grant	19 June 1922	James Ford	Wilbert T. Ford	NE ½ Lots 17 & 18
6248	Grant	19 Jun 1922	Wilfred A. Ford, admr of Emery Ford Estate, et al	Wilbert T. Ford	NE ½ Lots 17 & 18
8230	Grant	30 Jun 1948	Wilbert T. Ford et ux	Charles & Mary Hallal	NE ½ Lots 17 & 18
8720	Grant	26 Jun 1952	Charles & Mary Hallal	Thomas Edwards	NE ½ Lots 17 & 18
18288	By-Law No. 477	18 Jan 1961	Municipality of the Township of Nichol		All, By-Law to designate an urban development area
41591	Transfer	3 Sep 1964	Thomas Edwards	Maruis A. & Margje Key	NE ½ Lots 17 & 18, subject to vendor's lien
61R-4667	Plan Reference	5 Nov 1989	----	----	Part 1 as in No. 41591, sold to Public Utilities
WC483360	Transfer	3 Oct 2016	Marius A. & Margje Key	REC Farms Inc	Part Lots 17 & 18
WC564171	Transfer	28 Mar 2019	REC Farms Inc	2156598 Ontario Ltd, REC Farms Inc	Part Lots 17 & 18
61R-22127	Plan Reference	29 Nov 2021	-----	-----	Part Lots 17 & 18
WC656095	Transfer	1 Dec 2021	2156598 Ontario Ltd, Rec Farms Inc	The Corporation of the Township of Centre Wellington	Part Lot 17 & 18



Map 2: Study Area on Leslie and Wheelock's Map of the County of Wellington, Canada West, 1861
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; OHCMP 2019)

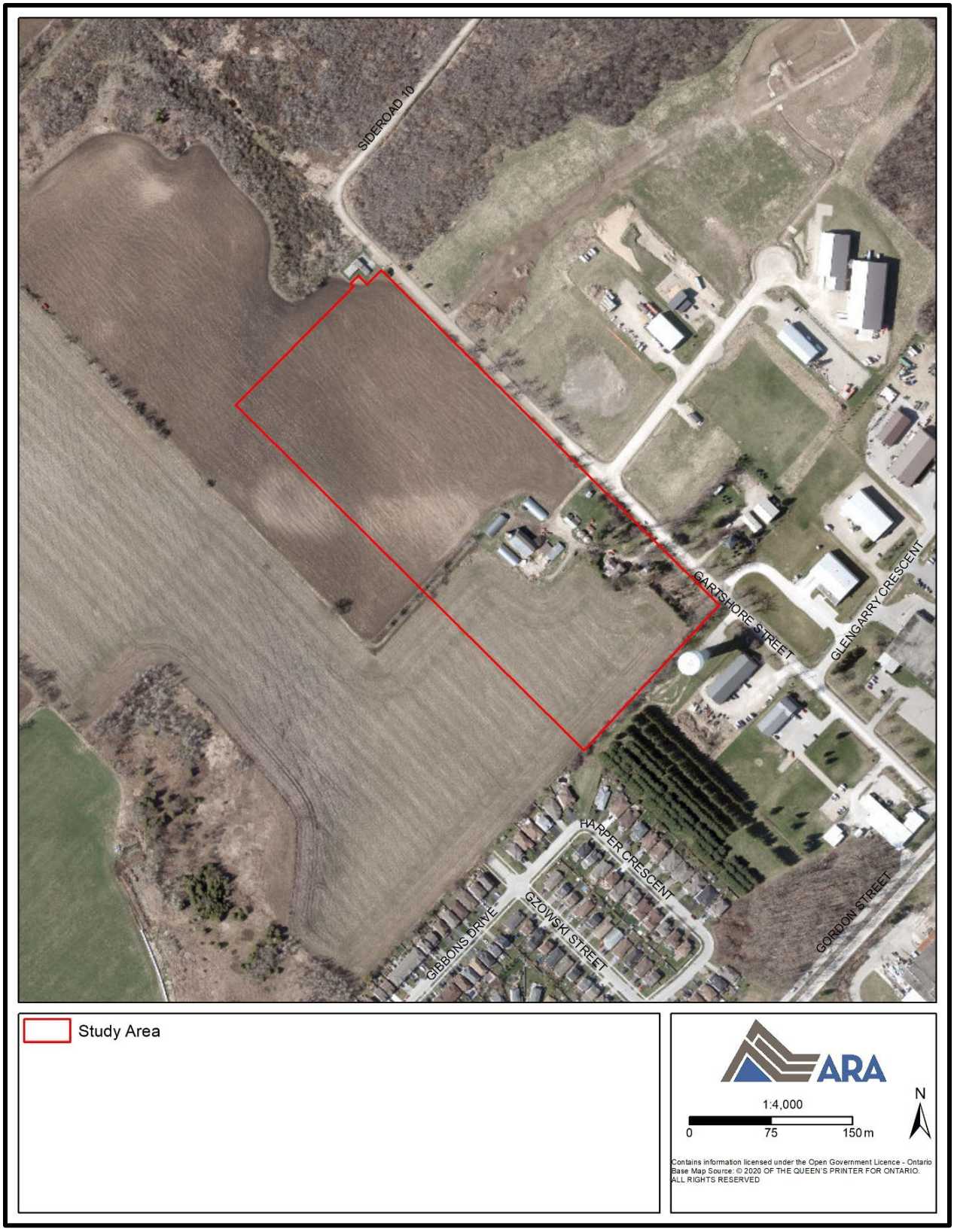


Map 3: Study Area on the 1877 *Illustrated Historical Atlas of Wellington County, Nichol Township*
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; MU 2001)



Map 4: Study Area on a 1935 Topographic Map
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri; OCUL 2022)

Map 5: Study Area on a 1954 Aerial Photograph
(Produced by ARA under license using ArcGIS® software by Esri, © Esri; U of T 2022)



Map 6: Study Area on a Modern Aerial Photograph
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

6.0 EXISTING CONDITIONS

The current configuration of the property at 965 Gartshore Street in the Township of Centre Wellington is described below.

6.1 Neighbourhood

The lots immediately to the north of the subject property, consists majorly of industrial and warehouse buildings and vacant plots of land. A singular residential property towards the northeast of the subject property at 950 Gartshore Street contains a red brick Edwardian style building (Image 3). Another visual link to the subject property can also be traced to the neighbouring property to the east, which is a solid concrete water tower (Image 2). The scale and the form of the tower makes it a local landmark for the community around Fergus. On the west side of the project location, beyond the agricultural fields, is an inconspicuous stone clad building, assumed to be a water service facility for the neighbourhood at 1019 Gartshore Street. Gartshore Street provides sole connection of the subject property to the neighbourhood through a dirt road (Image 1).

6.2 Subject Property

The property at 965 Gartshore Street is located on the south side of Gartshore Street, north of Gordon Street. The site visit was conducted on the entire property including landscape features such as mature trees and agricultural fields (Image 20–Image 22), the exterior (Image 5–Image 11) and interior (Image 23–Image 28) of the residential structure, and the exterior (Image 12–Image 19) and interior of the barn (Image 29–Image 32). At the time of the site visit, the subject property was occupied and was in use. The heat in the house was on as was the water and electricity. Due to access issues resulting from the cultivated agricultural fields, photographs could not be taken from the south extent of the property.

The one-and-a-half-storey brick farmhouse is estimated to have been built pre-1880 (LAC 1861a) and the one-storey frame, wooden siding clad rear addition was constructed later. A large rectangular bank barn is also located on the property to the southwest of the house. During the site visit, the agricultural fields were observed to be growing soybeans.

The subject property retains the historic residence, bank barn and cultivated agricultural fields as described above as well as mature trees, several outbuildings used for various purposes, multiple silos, and an animal pen. Modifications to the property include the introduction of wooden sheds, corrugated metal silos, multiple fabric covered Quonsets for storage space and the addition of landscaped gardens and shrubs (Image 22).

6.3 Buildings and Structures

A total of fifteen built structures are located on the subject property, including the residence and the barn, silos and outbuildings. Table 4 contains descriptions of all these structures. The following sections provide a more detailed description of the landscape features of the property, the residential structure and the barn (Sections 6.3.1 to 6.3.5). Map 7 displays the location of these buildings.

Map 7: Buildings on the Property
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

Table 4: Descriptions of Buildings at 965 Gartshore Street

Building No.	Name Given	Description of Building - Exterior	Photo
1	House	See section 6.3.2, 6.3.3	
2	Barn	See section 6.3.4, 6.3.5	

Building No.	Name Given	Description of Building - Exterior	Photo
3	Outbuilding No. 1 (Meat shop)	The one- storey gable roof structure serves as the meat shop on the farmstead. The roof exhibits corrugated metal cladding while the elevations are clad partially in shingles and partially in metal sidings. On the side elevations, the structure contains garage doors on one side and a wooden shed addition on the opposite.	
4	Outbuilding No. 2	The front gable roof structure is located northeast of the farmhouse. The shed is a wooden structure containing similar wood batons as the rear addition in the cottage.	

Building No.	Name Given	Description of Building - Exterior	Photo
5	Outbuilding No. 3 (Cadillac Coop)	The chicken coop is a recent addition to the farmstead. The design of the structure is that of a typical coop with a fenced open space and a wooden covered area.	
6	Silo 1 and 2	The two silos located on the farmstead are different in size but display similar materiality. The cylindrical shape is made of corrugated metal while the roof is clad in metal sheets. The joints of the corrugated metal display some signs of rust and wear over time. Both the silos rest on poured concrete foundations. The design aesthetics and materials of these signifies that they were later additions to the farmstead.	

Building No.	Name Given	Description of Building - Exterior	Photo
7	Outbuilding No. 4	The farm equipment storage building is a tensile fabric covered structure supported by trusses and is an intervention to the landscape that is modern.	
8	Outbuilding No. 5	The dilapidated shed is made of wooden logs and contains remnants of a mezzanine floor. Evidence of concrete troughs in the ruins indicates the structure was used likely as a space for animals.	

Building No.	Name Given	Description of Building - Exterior	Photo
9	Outbuilding No. 6	The open shed is supported on log columns and beams with a pitched metal clad roof. The structure was being used as storage for firewood at the time of the site visit.	
10	Outbuilding No. 7	Outbuilding 7 is used as a pigsty. Based on the materials is a modern addition to the farmstead. The structure is situated on an elevated plane with poured concrete foundations and corrugated metal sidings. Narrow vents are also located on each elevation for natural ventilation and sunlight.	

Building No.	Name Given	Description of Building - Exterior	Photo
11a	Outbuilding No. 8 and	There are two Quonset Hut-style buildings of similar construction. These two outbuildings (11a and 11b) are made of tensile fabric roof, supported by metal rib structure. The external structure is reinforced by angular wood buttressing. The enclosures are currently used as storage spaces.	
11b	Outbuilding No. 9	See 11a above.	
12	Silo 3	The poured concrete silo is attached to the barn at the northwest elevation. The cylindrical formwork of the concrete is visible on the surface of the silo and adds to the historic qualities of the barn. It is a towering structure beside the barn and adds to its verticality.	

6.3.1 Site Layout

The farmstead's core is centrally organized and is composed of a house, barn, outbuildings, silos and a chicken coop, connected by walkways and laneways. The dwelling is situated approximately at a 35 m setback from Gartshore Street and is accessed via a tree-lined, U-shaped driveway that extends beyond the west side of the dwelling. The U-shaped driveway branches off to a parking area parallel to the house and then continues towards the barn's banked entrance, on the west portion of the property, from there it connects the subject property back to Gartshore Street (Image 4; Map 6). Based on the 1954 aerial photograph it appears that the subject property has had the U-shape designed driveway along with most of the built structures within this core area, since at least the mid-1900s (Map 5).

The dwelling is situated on a rise of land that slopes slightly to the west where the barn is located. The concrete and stone rubble around the base of the barn points towards artificial elevation of the barn from the surrounding landscape (Image 19). This sloping elevation facilitates the construction of the bank barn's tiered access levels on the southeast elevation and is an important characteristic of a bank barn (Image 12). The vegetation surrounding the house appears to have been growing naturally with vines and bushes extending onto the elevations of the house, similar to the woodlots found towards the north and south of the house (Image 11).

6.3.2 Residence Exterior Description

The residence is a red brick one-and-half-storey, Gothic Revival "Ontario Cottage" built to a T-shaped plan with a side gable roof, on each end, with return eaves (Image 10). In Ontario, this house style dates from 1830 to the 1890s, and was championed by middle-class residents of small-town rural Ontario. There are three types of "Ontario Cottages" as outlined by McKendry: 1) hipped roof, 2) gable roof with one-and-a half storeys, and 3) gable roof with one-and-a-half storeys and a front central gable or peak interrupting the eaves (2016). McKendry also notes that the central gable in the "Ontario cottage" steepened over time and took on the proportions of the Gothic Revival style (2016).

The subject property is a gable roofed "Ontario Cottage" with a symmetrical façade, featuring three-bays with a centrally placed, gable peak, a pointed arch window and the remnants of a wooden finial (Image 5) (Fram 2003; UW 2009; see Section 7.2). The cottage majorly consists of red bricks as the construction material with buff brick details. The rear wing's addition is clad by wooden siding and stands in contrast with the construction material of the house (Image 9). The side elevations of the main portion of the house, are symmetrical with extruding bays that form the T-shaped plan. They each consist of two-bays featuring two rectangular window openings per storey (Image 7, Image 11). A single brick chimney remains on the southwest elevation. The downward sloping of the land to the west allowed for the inclusion of a basement hatch access through the foundation of the southwest elevation (Image 7).

The large rectangular window openings of the façade and side elevations exhibit buff bricks radiating voussoirs on the top, and quoins running along the height of the windows (Image 6). A window and door located on the southwest elevation with red brick radiating voussoirs and no buff brick quoins, are the exception. The windows also contain concrete sills which appear to be clad in aluminum. Some basement windows have been sealed with stone and covered on the exterior

with plywood boards (Image 28). The façade's large rectangular entryway features radiating buff brick voussoirs followed by chamfered wooden planks and is composed of a single glass door with wooden panels (Image 5).

The house also features dichromatic decorative brick masonry detailing with a red brick cross pattern laid within courses of buff brick, below the eaves and buff brick quoin details at each corner of the dwelling (Image 8, Image 11). The red bricks are laid evenly in the common bond pattern. The dichromatic band pattern of red brick and the buff brick is interrupted on the southwest elevation because of the chimney which appears to be in a different shade of red brick therefore is likely later addition (Image 7).

The symmetry of the southwest and northeast elevation in the T-shaped plan is interrupted by the wooden verandah and the glass storage compartment on the southwest elevation. The northwest elevation of the rear wing is obscured by a one-storey addition (Image 7). The brick was left exposed on the interior of this addition, though the door and window openings have likely been altered. The foundation of the one-storey addition is constructed of concrete (Image 26).

6.3.3 Residence Interior Description

The interior finishes of the residence have been significantly updated; however the original 19th century interior layout of the house appears to remain intact. The main floor consists of a centre hall leading to a large kitchen on the north with a family room beside it, and a living room on the south. The west side of the centre hall of the main floor features entrances to the rear addition of the house. The east side of the main hall includes a central staircase with access to the upper floor (Image 23). The main hall also features a centrally located fireplace made of metal (Image 24). Each of these rooms feature windows with wooden moldings and sill details. The basement access door is located on the north of main hall beside the family room. The original wood floorboards have been refinished in the living room. It is unclear if the remainder of the wood flooring in the original portion of the structure on the main level is replacement material. Through the entire residence, interior walls have been replaced with drywall. Much of the original wood trim details on the main floor also appear to not be original.

The central staircase, located adjacent to the front door, leads to the second-floor hallway and access to four rooms, including three bedrooms and one bathroom (Image 25). The staircase has been updated with replacement baseboards, wooden balusters, and carpeted treads. The door surrounds appear to be later replacements while the baseboards are simple and may be original. The bathroom, located at the rear south side of the second floor, has been renovated and features a ventilator and vaulted ceiling. The three small bedrooms also feature vaulted ceilings, classical window moldings and high wood trim. The second floor is carpeted with the exception of the bathroom, which is tiled.

The basement is unfinished and dry with access from the house via a separate staircase as well as from exterior through a hatch door on the southwest elevation. The basement is dugout beneath the entire T-shaped plan and is divided in two levels. Log beams and pillars support the foundations throughout the basement of the dwelling together with poured concrete retaining walls, on the lower level, that appear to have been added later as reinforcement (Image 27). Window openings

have been enclosed with a mixture of stone and mortar located on the northeast elevation (Image 28). The basement also houses the mechanical systems of the dwelling.

6.3.4 Barn Exterior Description

The barn is a two-storey, English/Central Ontario "Bank Barn" built to a rectangular plan with a side gambrel roof. In Ontario, these large barns date from 1870s to the 1880s and were championed by middle-class farmers of rural Ontario. There are three types of "Central Ontario Barns" as outlined by Kyles: 1) simple gable, 2) hipped gable, and 3) gambrel (2016a) (see Section 7.3).

The subject property is a gambrel roofed "Bank Barn" made of log and timber frame and trusses (Image 29). The upper level of the barn is used for storage of hay while the lower level is used as pen for the animals. The superstructure of the barn is placed upon rubblestone foundation, located on, what appears to be an artificially elevated piece of land (Image 12). The materials used for the superstructure consists of vertical wooden boards while the substructure is made of rubble stone masonry which is reinforced in places by concrete patches. The corners of the foundation are reinforced by concrete block quoins (Image 13). The barn is also connected to a poured concrete silo on the northwest elevation through metal ties on the top and concrete buttressing at the base (Image 14). The purpose of the connection was unclear, but it can be assumed to be providing structural support due to the external connections at various levels.

The barn is accessed through a ramp leading to the main sliding barn doors on the northeast elevation, thereby creating direct access to the storage bank on the upper level (Image 19). For access to the lower level, sliding barn door and a double panel nine-lite door are located on the southeast elevation in the stone foundation (Image 18). The large rectangular window openings of the first and second storey of the barn exhibit wooden sills with wooden moldings and lintels (Image 16). Most of the windows in the substructure are horizontally placed while those in the superstructure are vertical.

6.3.5 Barn Interior Description

The structure of the upper level is supported on log pillars and beams which in turn are connected to the ceiling through timber trusses (Image 29–Image 30). Visual evidence of logs being hand hewn is found on some of the beams and pillars. The trusses supporting the ceiling consists of split half logs with bark residuals on their surface, emanating the rustic qualities of the bank barn. Some of the window openings are boarded up on the southwest elevation, using similar material as the vertical wooden boards used on the exterior elevations of the barn. Plywood tiles have been used to cover the floor of the upper level (Image 29).

The superstructure of the barn is supported by load-bearing rubble-stone walls, hand hewn log beams and pillars located in the substructure. These solid wooden columns are reinforced at foundation with concrete pads (Image 32). The substructure houses the farm animals and consists of elevated platforms divided into smaller pens. The base of these platforms is made of poured concrete while the railings are circular metal rods. The interior contains rectangular ventilators for natural light, which are set in deep wells due to the thick cross-section of the walls. The substructure of the barn was observed to be in use during the site visit with cows and pigs in their

respective stalls (Image 31). Both the levels are connected from the interior through a wooden staircase located towards the west of the pedestrian entrance on the lower level.

7.0 COMPARATIVE ANALYSIS

An examination of the history of farmsteads as CHL, with a focus on Ontario Cottages and their associative barns informs a comparative analysis of the subject property.

7.1 Ontario Farms

The historic Ontario farm typology follow similar patterns and typically includes the following features: main farmhouse, main barn, secondary barns/outbuildings, silo/s, entrance driveways which are framed (often with vegetation of pillars), a front yard, mature trees, rear or side fields, drive lanes, woodlot/s, and wind rows along property edges (ERA 2020). Specifically, Ontario farms can be described as:

> *Ontario's farms are the creations of immigrants of varied backgrounds who often showed distain, if not outright hostility, for their neighbours. The landscape mirrors this outlook: no residential farm villages, a system of public roads that bypass farm buildings, and private lanes leading to them. Building sites varied with local conditions but tended to be set well back on the lots. Here was privacy, freedom from the "disagreeable necessity" of gazing at one's neighbour, and security from passers-by helping themselves to the orchard or kitchen garden* (McIlwraith 1997:241).

When compared against the typical characteristics of Ontario farms, the subject property displays many of the features and therefore can be considered a representative Ontario farm landscape (see Table 5).

Table 5: Characteristics of Ontario Farms

Characteristics (adapted from McIlwraith 1997; Shearer 2012; Williams 2014)	965 Gartshore Street Characteristics
Centralized 'farmstead' composed of clustered grouping of houses, barns, and ancillary buildings, connected by walkways and laneways	Yes
Farmstead landscape may include remnants of nearby kitchen gardens and orchards	No
Farmstead framed by trees and perennial plantings to provide shelter from sun and wind	No
Farmstead placed on raised setting where possible	Yes
Entrance driveway leading to farmstead, often lined with mature trees	Yes
If present, farmstead placed near natural water source	No
Farmstead set back from roadway with farmhouse placed nearest to road	Yes
Barn positioned into slope for allow for two storey exterior access	Yes
Outbuildings, possible adapted retrofit of early log shanties	No – modern
Drive lanes providing access to barn/outbuildings	Yes
Paddock, placed in proximity to barn and outbuildings	No
Silo	Yes
Rear fields, connected to farmstead through drive lanes	Yes
Rear woodlot	No
Wind rows along property edge, placed with consideration to prevailing wind direction	No

7.2 Gothic Revival Architecture

There are three types of "Ontario Cottages" as outlined by McKendry: 1) hipped roof, 2) gable roof with one-and-a half storeys, and 3) gable roof with one-and-a-half storeys and a front central gable or peak interrupting the eaves (2016). McKendry also notes that the central gable in the

"Ontario cottage" steepened over time and took on the proportions of the Gothic Revival style (2016). The prevalence of these styles in Ontario's countryside is related to the pattern's promotion in publications like The Canada Farmer in 1864 (Mikel 2004:60; see Figure 9) and by American architects, A.J. Downing, J.C. Loudon and A.J. Davis (Fram 2003:25).

The Canadian Farmer 1864 article, "A Cheap Farm House" provides a set of design guidelines for the construction of a house to accommodate large families. The article notes these buildings "… can be built with brick walls…the appearance of the house shown in the above engraving might be considerably improved by the addition of a verandah" (see Figure 2) (Brown 1864:340). This design became known as the "Gothic Revival Cottage" (Kyles 2016b). In 1865, the Canadian Farmer publication included a design for a "A Two-Storey Farm House". With these plans available, many of these building types were constructed during the 19th through 20th century throughout Ontario. The buildings were constructed using local materials (stone, brick, or clapboard), gables and central gable peak, various window shapes and sizes, three or five bay façades. The flexible plan allowed for individual stylistic elements to be added (i.e., verandahs, cornices, decorative wood trim etc.) (Brown 1865).

Many gothic revival houses feature dichromatic brickwork. Richie in his 1979 article *Notes on Dichromatic Brickwork in Ontario* details that dichromatic brickwork became popular in the 19th century in England which influenced its use in Ontario beginning in the 1870s. The most typical combination is yellow or buff brick detailing on red brick, however this combination reverses in regions where "clay brickmaking normally burned to a yellow colour, in which case red bricks provide the colour contrast" (Richie 1979:60). The detailing is typically found at the corners, around door and windows openings as well as in decorative band/patterns (Richie 1979). Riche notes "Its application in many cases did not require any great skill on the part of the bricklayer (1979:61).

When examined against the typical characteristics of the Ontario Gothic Revival/Ontario Cottage style as outlined in *Ontario Architecture* (Kyles 2016b), *Ontario Architectural Style Guide* (UW 2009), *The Canada Farmer* (Brown 1864), and McKendry's discussion of the type (2016), the farmhouse in the study area exhibits many of the characteristics of the style and can therefore be considered a representative example of an Ontario Gothic Revival structure (Table 6).

Table 6: Characteristics of Ontario Gothic Revival (Ontario Cottage)

Characteristics (adapted from the Brown 1864, UW 2009, Kyles 2016a, and McKendry 2016)	965 Gartshore Street Characteristics
1 ½ storeys	Yes
L-shaped or T-shaped plan	Yes
Rear kitchen wing at the back	Yes
Three bedrooms	Yes
Symmetrical	Yes
Gable roof with central gables	Yes
Window in central gable	Yes
Details including curved and turned woodwork on finials, vergeboard, verandahs and entrances	No
Dichromatic brickwork	Yes
Central entranceway, often with sidelights and transom	Yes – door has been replaced but open remains

The Centre Wellington's Heritage Register contains various designated and listed heritage properties belonging to Ontario Gothic Revival architecture style (source). Constructed mostly during the 1860s, these buildings belong to the residential and religious building type. Further, the Wellington County Museum and Archies contains a collection of photographs described as "Examples of Dichromatic Brickwork in Fergus and Elora" which lists 29 buildings within the area that have dichromatic brick detailing (2009). As such, both gothic revival buildings, as well as buildings with dichromatic brickwork are common within Centre Wellington.

7.3 Central Ontario Barn

The property also contains a Central Ontario Barn. Also referred to as "bank barns", these structures were often built into the side of a hill, or bank, allowing both the upper and lower floors to be accessed from ground level, with one access at the top of the hill and the other at the bottom. Often the ground floor in a bank barn is used as stables for cattle, horses and other livestock. One side of the barn is then "banked" so that there is a ramp for wagons or tractors to drive up to the mow (Kyles 2016a). Typical features of this barn style are described by Ennals as:

> *…usually about 40-50 feet in width and 60-100 feet in length. It is a wooden structure placed upon a stone foundation wall about 10 feet in height, and can have either a gable or a gambrel roof. Thus there are two storeys - a lower stable area and an upper space which combines crop storage, implement storage, and working space. Access to the ground floor is provided by doorways leading to the farmyard, and entry to the upper level is by means of an earthen ramp leading to a large door in the long side. This type of barn is frequently called a bank barn in southern Ontario. The barn is often set into a slope so that direct entry into the upper level can be obtained from the top of the slope. (Where no slope was available, an earth ramp was created which gave entry to the upper level.)* (1972:256).

When examined against the typical characteristics of the English or Central Ontario Barn styles as outlined by Shannon Kyles on Ontario Architecture (2016a) and Peter Ennals' discussion of the Central Ontario Barn type (1972; see Figure 4 and Table 7), the barn on the property meets multiple characteristics of the style and can be considered a representative example.

Table 7: Characteristics of the English/Central Ontario Barn

Characteristics (adapted from Ennals 1972; Kyles 2016a)	965 Gartshore Street Characteristics
Large, two storeys	Yes
Two mows at right angles	No
Wooden structure on stone foundation	Yes
Gable or gambrel roof	Yes
Ramp leading to large door on long side	Yes
Set into a slope (bank barn) with large door on long side	Yes
Timber or Lumber frame construction	Yes

Figure 1: Historical Ontario Farmsteads
(Illustration form Perth County Historical Atlas, 1879)

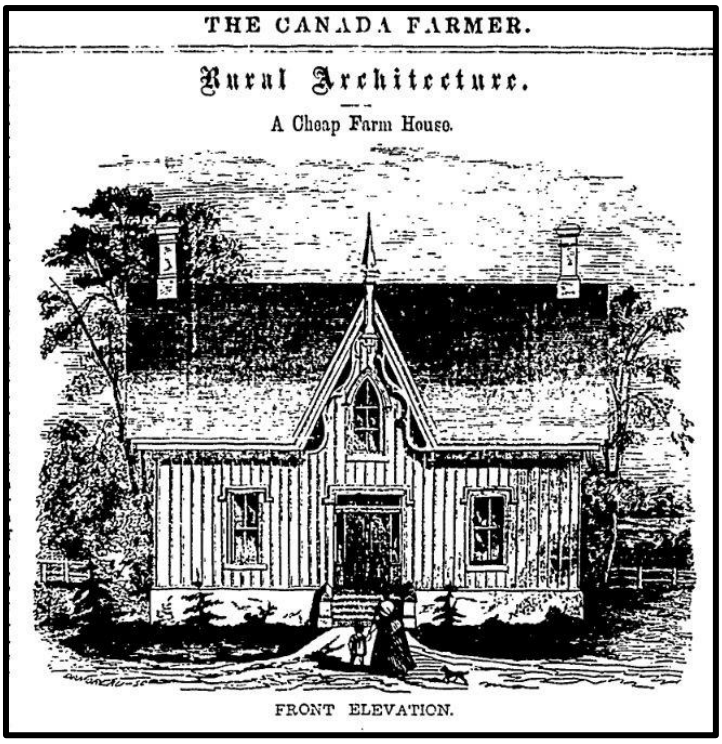


Figure 2: "A Cheap Farm House" The Canada Farmer
(Brown 1864:340)

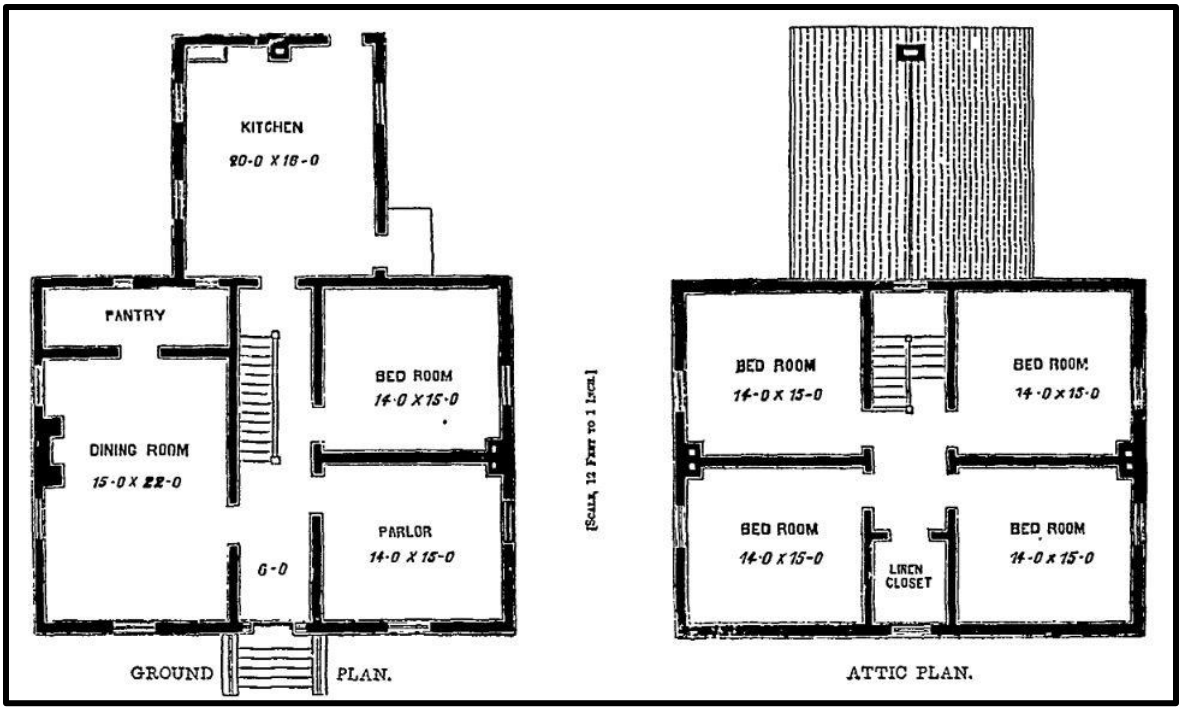


Figure 3: A Cheap Farm House - Floor plans The Canada Farmer
(Brown 1864:341)

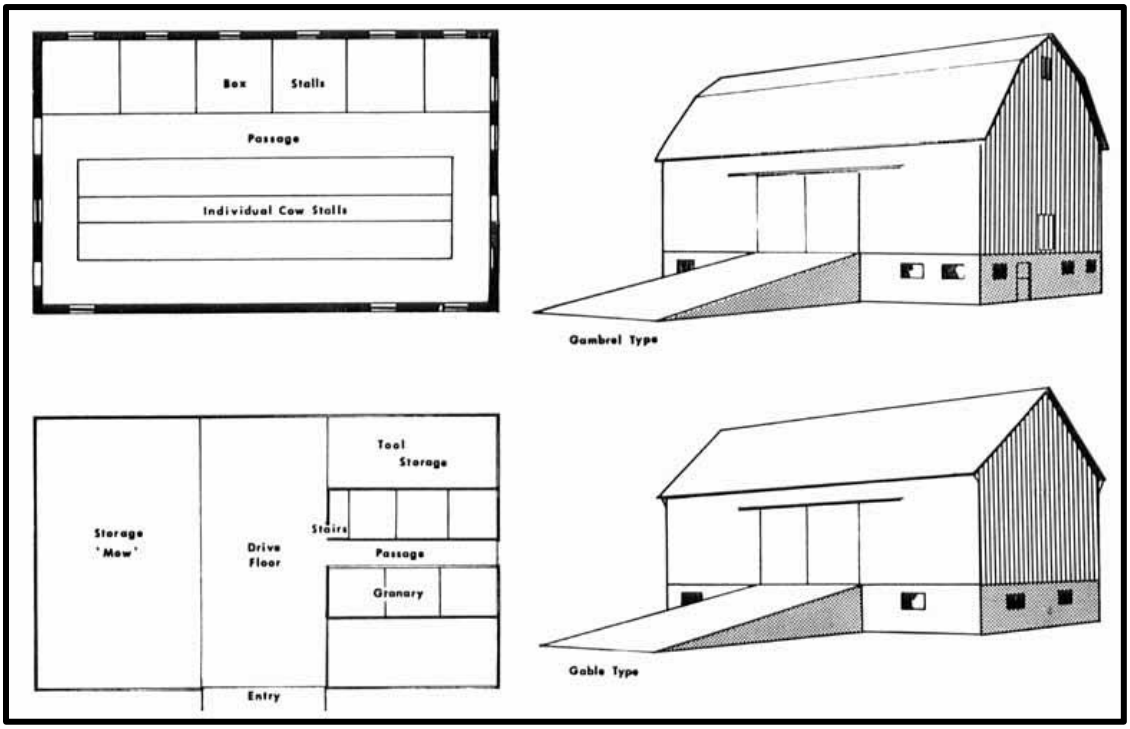


Figure 4: Central Ontario Barn
(Ennals 1972:257)

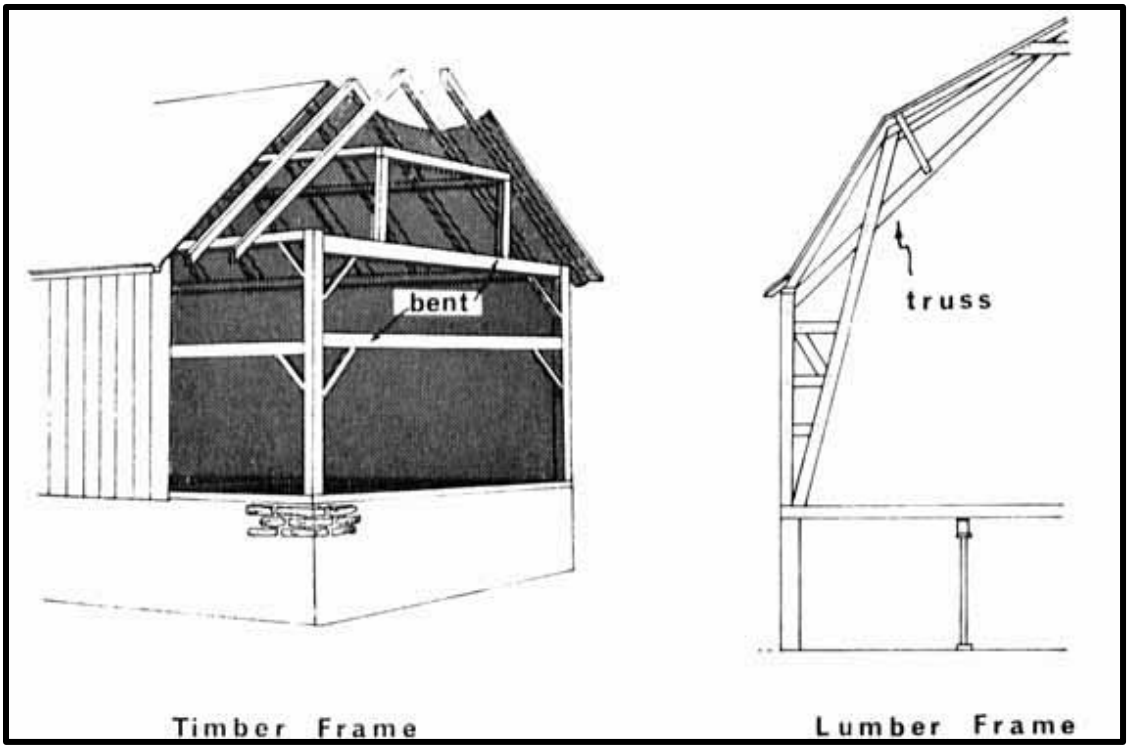


Figure 5: 19th Century Barn Construction Types
(Ennals 1972:257)

7.4 Comparative Conclusions

As a result of the further analysis in this report, the farmstead at 965 Gartshore Street belongs to the typical Historic Ontario Farmstead typology. While the components of the farmstead are not rare or unique in nature but together are representation of the farmstead as an Evolved Cultural Heritage Landscape. The tangible growth of the farm over time (see Map 9) has preserved the components of the farmstead from any major changes thus conserving its essence (see Map 6). While the farmstead as a whole acts like a CHL, the house and the barn are representative example of their respective styles in the area. Further evaluation of CHVI is conducted in the Section 8.0.

8.0 EVALUATION

8.1 Evaluation of Cultural Heritage Value or Interest – O. Reg. 569/22

The evaluation of 965 Gartshore Street according to O. Reg. 569/22 for determining CHVI is summarized in Table 8 below.

Table 8: Evaluation of 965 Gartshore Street Using O. Reg. 569/22

Criteria/Description	Meets Criteria (Y/N)	Rationale
1. Is a rare, unique, representative, or early example of a style, type, expression, material, or construction method.	Y	965 Gartshore Steet contains several structures which could individually be considered to possess design and physical value; however, this significance is strengthened by the grouping of these buildings within the property. 965 Gartshore Street displays many of the features of an Ontario Farm and therefore can be considered representative. The property has a centralized 'farmstead' composed of clustered grouping of a house, bank barn and silos. The property also contains an entrance driveway lined with mature trees. The farm is set back from the roadway with farmhouse placed nearest to the road. Among the structures located at 965 Gartshore Street, it contains a representative example of a Gothic Revival Cottage. The red brick residence retains much of the original historic fabric of the dwelling. The massing, roof line, fenestration, centrally placed gable peak and return eaves are reflective of the Gothic Revival style and "Ontario Cottage" architectural tradition. Gothic Revival dwellings are commonly found throughout Ontario especially on rural farmsteads. The bank barn is a representative example of an English style barn with Dutch revival influences seen in the gambrel roof, also referred to as a Central Ontario barn or "bank barn."
2. Displays a high degree of craftsmanship or artistic value.	N	The buildings on the property at 965 Gartshore Street do not display a high degree of craftsmanship or artistic value. They were built using common materials and technique for its construction period. The joinery found in the timber-framed barn is typical of the period with no outstanding or unusual details or ornamentation. The dichromatic brickwork of the house is striking, however, it a common feature of 19th century buildings. Richie in his 1979 article on dichromatic brickwork further notes that "Its application in many cases did not require any great skill on the part of the bricklayer" (1979:61)
3. Displays a high degree of technical or scientific achievement.	N	965 Gartshore Street does not display a high degree of technical or scientific achievement. The structures on the property were built using common construction techniques for their construction period.
4. Has direct associations with a theme, event, belief, person, activity, organization, or institution that is significant to a community.	N	965 Gartshore Street has been associated with various families through the course of time. From its construction until the early 1900s it was under the ownership of the Ford family, who were local farmers and smiths. Although they were long time residents of the area research did not reveal any significant contributions to the community by the Ford family members who lived on the property. It was subsequently owned by the Hallals, Edwards, Keys and REC Farms. Research did not indicate that these families/organizations made a significant contribution to the community. It is now owned by is the Corporation of the Township of Centre Wellington. Although the Township owns the property the current layout was established well before this ownership and therefore the property is not strongly associated with the Township as an institution.
5. Yields or has the potential to yield information that contributes to the	N	965 Gartshore Street does not yield information that contributes to the understanding of a community or culture.

Criteria/Description	Meets Criteria (Y/N)	Rationale
understanding of a community or culture.		
6. Demonstrates or reflects the work or ideas of an architect, builder, artist, designer, or theorist who is significant to a community.	N	965 Gartshore Street does not demonstrate or reflect the work or ideas of an architect, builder, artist, designer, or theorist who is significant to a community. The research conducted did not confirm an individual or company associated with the construction of the buildings on the property.
7. Is important in defining, maintaining, or supporting the character of an area.	Y	965 Gartshore Street maintains the agricultural character of this portion of Gartshore Street as its appearance as a rural farm remains. With a driveway that leads to a setback residence, a barn and associated agricultural fields, the property continues to reflect the bucolic nature and character of the surrounding area.
8. Is physically, functionally, visually or historically linked to its surroundings.	N	A significant relationship between the property and the immediate surroundings was not demonstrated in the research conducted. Although the property has been used for agriculture since the mid- 19th century and is located within a largely agricultural area, there is no notably strong physical, functional, visual or historical link that ties this particular property to its surroundings. The farmhouse and layout are typical and could be found anywhere within Ontario's countryside.
9. Is a landmark.	N	965 Gartshore Street is not a landmark.

965 Gartshore Street does meet at least two of the criteria outlined in O. Reg. 569/22; and therefore contains CHVI.

9.0 STATEMENT OF CULTURAL HERITAGE VALUE OR INTEREST

Based on the evaluation of the property against O. Reg. 569/22 it was determined that 965 Gartshore Street has CHVI. As such, a Statement of CHVI has been drafted below.

Introduction and Description of Property

The property at 965 Gartshore Street is located on the south side of Gartshore Street, north of Gordon Street. The one-and-a-half-storey red brick farmhouse is estimated to have been circa 1875 and the one-storey frame, wooden siding clad rear addition was constructed later. A large rectangular bank barn is also located on the property to the southwest of the house. The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however it contains a designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property.

Statement of Cultural Heritage Value/Statement of Significance:

965 Gartshore Street displays many of the features of an Ontario Farm and therefore can be considered representative. As a representative example of a farmstead, 965 Gartshore Street belongs to the typical Historic Ontario Farmstead typology. The property has a centralized 'farmstead' composed of clustered grouping of a house, bank barn and silo. The property also contains an entrance driveway lined with mature trees. The farm is set back from the roadway with farmhouse placed nearest to the road.

Among the structures located at 965 Gartshore Street, it contains a representative example of a Gothic Revival Cottage. The red brick residence retains much of the original historic fabric of the dwelling. The massing, roof line, fenestration, centrally placed gable peak and return eaves are reflective of the Gothic Revival style and "Ontario Cottage" architectural tradition. Gothic Revival dwellings are commonly found throughout Ontario especially on rural farmsteads.

The bank barn is a representative example of an English style barn with Dutch revival influences seen in the gambrel roof, also referred to as a Central Ontario barn or "bank barn." Made of typical wooden boards, the barn, consists of a substructure and a superstructure.

965 Gartshore Street maintains the agricultural character of this portion of Gartshore Street as its appearance as a rural farm remains. With a driveway that leads to a setback residence, a barn and associated agricultural fields, the property continues to reflect the bucolic nature and character of the surrounding area.

Cultural Heritage Attributes
965 Gartshore Street displays many of the features of an Ontario Farm and therefore can be considered representative, and it contains the following heritage attributes related to that value:

- Farmstead cluster of a house, bank barn and silo.
- Entrance driveway lined with mature trees.

- Unpaved and Organic laneways between the elements of the "farmstead cluster".
- Cluster set back from roadway with farmhouse placed nearest to road
- One-and-a-half storey brick Gothic Revival Cottage:
    - T-shaped plan;
    - Symmetrical three-bay façade;
    - Front gable roof with centrally placed gable peak, small arched window opening and a wooden finial;
    - Two-bay side elevations with side gable roof;
    - Rectangular fenestration with buff brick radiating voussoirs and quoins;
    - Return eaves;
    - Dichromatic decorative brick masonry detailing with a red brick cross pattern laid within courses of buff brick;
- Large bank barn:
    - Rectangular plan;
    - Hand-hewn log construction;
    - Split log construction;
    - Wooden sills with wooden moldings and lintels;
    - Trusses and frame construction;
    - Gambrel roof

965 Gartshore Street supports the rural character of the area and it contains the following heritage attributes related to that value:

- Clustered grouping of a house, bank barn and silo
- Entrance driveway lined with mature trees.
- View from the entrance driveway to the house.

A map of the heritage attributes is found below (see Map 8).

Map 8: Map of Heritage Attributes
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

10.0 CONCLUSIONS

A CHER was completed for 965 Gartshore Street. The results of a site visit, research and consultation were documented. This CHER contains the research as well as the examination of the property according to O. Reg. 569/22.

The subject property was found to meet criteria outlined in O. Reg. 569/22. The property can therefore be considered to have CHVI. The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however it contains a designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property. The structures of interest in the CHL include: the Gothic revival farmhouse, the bank barn, and the poured concrete silo beside the barn, the laneways that evolved over the course of time linking the farm's structures, and the tree-lined driveway.

As the property has a proposed development plan, a HIA should be undertaken to identify impacts to the cultural heritage value and heritage attributes of the subject property. Further, the HIA should consider the adjacent properties that the Township has flagged for potential inclusion on the municipal heritage register: 6611 and 6581 Highway 6, 968 St. David St. North and 950 Gartshore Street.

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APPENDIX A: SUBJECT PROPERTY IMAGES

Map 9: Photo Location Map of Study Area
(Produced by ARA under licence using ArcGIS® software by Esri, © Esri)

Image 1: Streetscape – Gartshore Street from Subject Property
(August 3, 2022; View looking Southeast)

Image 2: Adjacent Heritage Resource – 945 Gartshore Street
(August 3, 2022; View looking Southwest)

Image 3: Adjacent Heritage Resource – 950 Gartshore Street
(August 3, 2022; View looking Northeast)

Image 4: Context – View from Gartshore Street to Subject Property, Through Treeline
(August 3, 2022; View looking Southwest)

Image 5: 965 Gartshore Street – Farmhouse Façade
(August 3, 2022; View looking Northwest)

Image 6: 965 Gartshore Street – Farmhouse South Corner
(August 3, 2022; View looking North)

Image 7: 965 Gartshore Street – Farmhouse Southwest Elevation
(August 3, 2022; View looking Northeast)

Image 8: 965 Gartshore Street – Farmhouse West Corner
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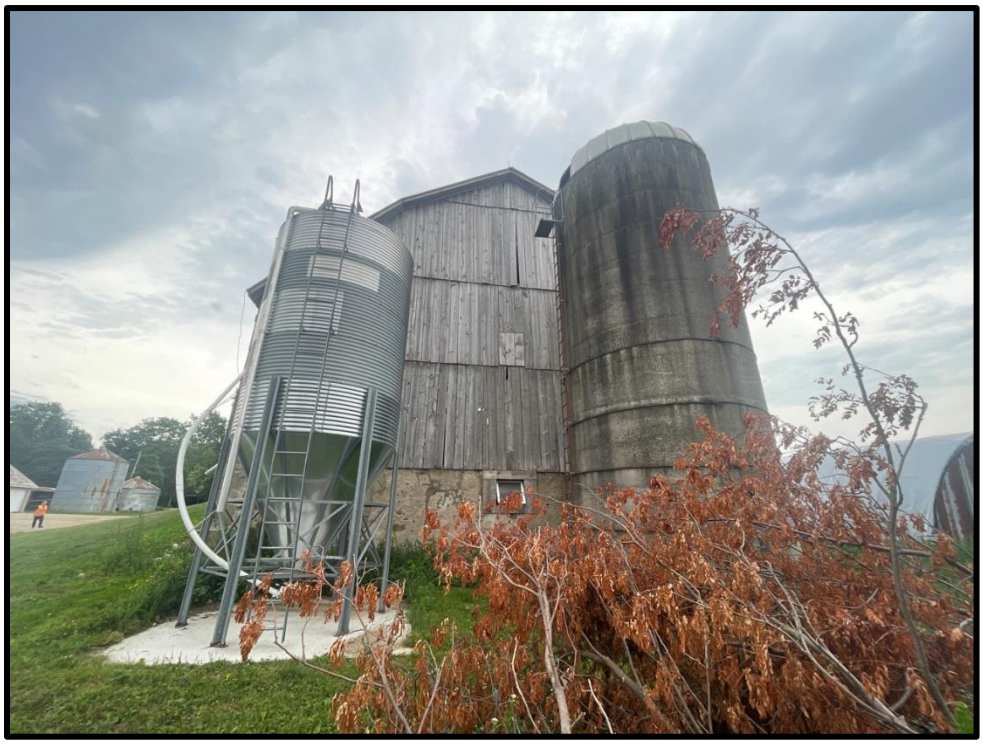

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Image 22: 965 Gartshore Street – View of Farm Buildings from Fields
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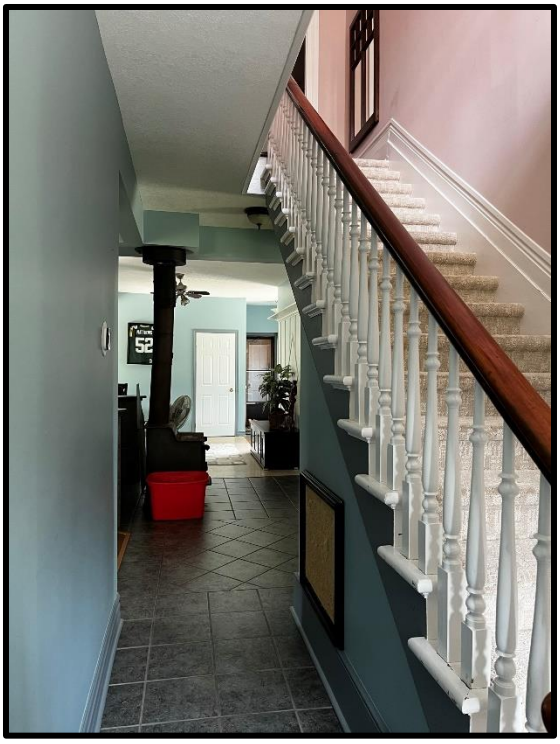

Image 23: Farmhouse Interior – View of Staircase and Main Hall
(Photo taken on August 3, 2022)

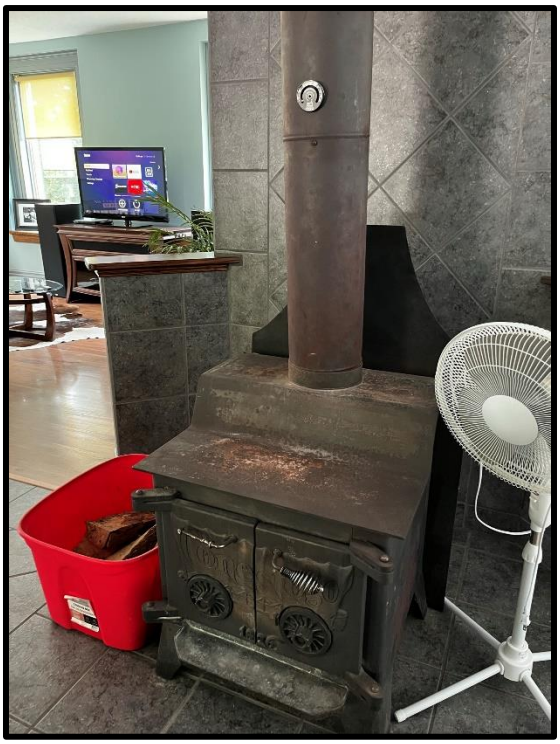

Image 24: Farmhouse Interior – View of Fireplace
(Photo taken on August 3, 2022)

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(Photo taken on August 3, 2022)

APPENDIX B: KEY TEAM MEMBER TWO-PAGE CURRICULUM VITAE

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Biography

Jacqueline McDermid has ten years of technical writing and management experience; Seven years direct heritage experience. She has gained seven years of experience conducting primary and secondary research for archaeological and heritage assessments and drafting reports and evaluating property according to Ontario Regulation 9/06 and 10/06 as part of Municipal Heritage Registers. Jacqueline is expert at copy editing heritage reports including checking grammar, consistency and fact checking, to ensure a high-quality product is delivered to clients. She has experience assisting with the drafting of Heritage Conservation District Studies through the drafting of reports for potential Heritage Conservation Districts in the City of Toronto (Weston HCD) and Township of Bradford West Gwillimbury (Bond Head HCD). Jacqueline has proven project management experience gained by completing projects on time and on budget as well as formal Project Management training. In 2018, under a six-month contract as the Heritage Planner at the Ministry of Transportation, acquired considerable experience conducting technical reviews of consultant heritage reports for Ministry compliance including Cultural Heritage Evaluation Reports, Heritage Impact Assessment, Strategic Conservation Plans, and Cultural Heritage Resource Assessments as well as gained valuable insight on provincial heritage legislation (*Ontario Heritage Bridge Guidelines*, *Ontario MTO Environmental Standards and Practices for Cultural Heritage, MTO Environmental Reference for Highway Design – Heritage*, MCM' *Heritage Identification & Evaluation Process* as well as the new *MCM Information Bulletins on Heritage Impact Assessments* and *Strategic Conservation Plans*, and inter-governmental processes. She has extensive Knowledge of heritage and environmental policies including the *Planning Act*, *Provincial Policy Statement*, the *Ontario Heritage Act*, Official Plans, *Environmental Assessment Act* and *Green Energy Act*. Working knowledge of the *Standards and Guidelines for Consultant Archaeologists* (2011), Ministry of Citizenship and Multiculturalism.

Education

2000–2007 Honours B.A., Wilfrid Laurier University, Waterloo, Ontario
Major: Near Eastern Archaeology

Work Experience

2020-Present **Heritage Project Manager**

2015–2020 **Technical Writer and Researcher – Heritage, Archaeological Research Associates Ltd., Kitchener, ON.**
Research and draft designation by-laws, heritage inventories, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations using Ontario Regulation 9/06, 10/06 and the Ontario Heritage Bridge Guidelines.

2018 **Environmental Planner – Heritage Ministry of Transportation, Central Region** – Six-month contract.
Responsibilities included: project management and coordination of MTO heritage program, managed multiple consultants, conducted and coordinated field assessments and surveys, estimated budgets including $750,000 retainer contracts. Provided advice on heritage-related MTO policy to Environmental Policy Office (EPO) and the bridge office.

2017–2018 **Acting Heritage Team Lead – Heritage Archaeological Research Associates Ltd., Kitchener, ON**.
Managed a team of Heritage Specialists, oversaw the procurement of projects, retainers; managed all Heritage projects, ensured quality of all outgoing products.

2014–2015 **Technical Writer – Archaeology, Archaeological Research Associates Ltd., Kitchener, ON.**
Report preparation; correspondence with the Ministry of Citizenship and Multiculturalism; report submission to the Ministry and clients; and administrative duties (PIF and Borden form completion).

2012–2013 **Lab Assistant, Archaeological Research Associates Ltd., Kitchener, ON.**
Receive, process and register artifacts.

2011–2012 **Field Technician, Archaeological Research Associates Ltd., Kitchener, ON.**
Participated in field excavation and artifact processing.

2005–2009 **Teaching Assistant, Wilfrid Laurier University, Waterloo, ON.**
Responsible for teaching and evaluating first, second, third- and fourth-year student lab work, papers and exams.

2005–2007 **Lab Assistant, Wilfrid Laurier University – Near Eastern Lab, Waterloo, ON.**
Clean, Process, Draw and Research artifacts from various sites in Jordan.

Selected Professional Development

2019 OPPI and WeirFoulds Client Seminar: Bill 108 – More Homes, More Choice
2019 Annual attendance at Ontario Heritage Conference, Goderich, ON (Two-days)
2019 Information Session: Proposed Amendments to the OHA, MCM
2018 Indigenizing Planning, three webinar series, Canadian Institute of Planners
2018 Cultural Heritage, Archaeology and Planning Symposium
2018 Transforming Public Apathy to Revitalize Engagement, Webinar, MetorQuest
2018 How to Plan for Communities: Listen to the Them, Webinar, CIP
2017 Empowering Indigenous Voices in Impact Assessments, Webinar, International Association for Impact Assessments
2015 Introduction to Blacksmithing (One day)
2015 Leadership Training for Managers Course, Dale Carnegie Training

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Biography

Sumra Zia, joined the Heritage team at ARA as a Cultural Heritage Technician, and works on heritage impact, assessment, and evaluations. Before joining the heritage team at ARA, Sumra completed a Graduate Diploma in Architectural Conservation from Carleton University in Ottawa. The diploma added to her bachelor's degree in Architecture and Planning from NED University in Pakistan. She has work experience in architecture design, interior design, urban planning, adaptive reuse projects together with working on historic buildings as a conservation specialist. Sumra is well versed with the Ontario Heritage Act, the Ontario Building Code, Ontario Heritage Toolkit and the Standards and Guidelines for the Conservation of Historic Places. Sumra has worked with local communities on tangible and intangible issues connected to architectural practices and as a part of her Architectural Conservation degree has completed various case studies on heritage properties in Canada, which range from the Royal Botanical Gardens in Burlington to the Elgin Hotel in Ottawa. She is passionate about studying the effects of global climate change on cultural heritage properties and landscapes and how working with climate change could be beneficial for best conservation practices.

Education

2022	Graduate Diploma in Architectural Conservation, Carleton University, Ottawa, ON.
2018	B. Arch in Architecture and Planning, NED University of Engineering and Technology, Karachi, Pakistan.

Professional Memberships and Accreditations

Current	PCATP, Pakistan Council for Architects and Town Planners
Current	IAP, Institute of Architects Pakistan

Work Experience

Current	**Cultural Heritage Technician, Archaeological Research Associates Ltd.** Works under the Project Managers on, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, Cultural Heritage Resource Evaluations, and other cultural heritage services.
2020–2021	**Project Architect, Doodling Studio.** Coordinated the completion of various architectural projects leading a team of draftsmen, 3D visualizers and architects. Coordinated with clients for interior design and selection of materials and textures. Conducted site surveys in coordination with contractors to follow project schedules and workflow.
2019–2020	**Architect, Zeeshan Umair Architects.** Prepared excel spreadsheets for bill of quantities for clients and contractors. Coordinated with vendors and distributors for latest and most viable construction

technology and materials. Punctually dispatched design proposals consisting of drawings and complete set of details for project execution.

2018–2019 **Junior Architect, DAZ Design Studio.**
Worked alongside the principal architect and interior designer on an urban design and restoration project. Coordinated directly with construction workers to ensure adequate and correct implementation of design on site. Prepared working drawings for design execution in line with project deliverables.

2015 **Architecture Intern, Habib Fida Ali Architects**.
Presented design options for a welfare organization office together with a team of senior architects. Explored manual sketching and watercolor mediums for the presentation of ideas, mood boards and final proposals. Delivered hand-made presentations to the board members of the welfare organization for interior space options.

Selected Professional Development

2022 AODA Customer Service Standards Training
2022 WHIMIS
2022 ACO Arch styles presentation
2022 ICOMOS University Forum, Just Transitions: Heritage Education for Climate Adaptation, hosted by academic members of the Climate Heritage Network
2022 Hobin Prize in Architecture & City Building awards ceremony
2021 Carleton Workshops
2021 Student well-being
2021 Anti-racism
2021 Research Ethics
2021 Untold Histories - Storytelling through Heritage, webinar by DWG.
2021 Changing the Narrative: Dispelling Homophobia, hosted by Afro-Caribbean Mentorship Program.
2021 DWG + Architectures of Hiding | Indigenous Walks
2021 Ingenious Talks Online: Recording Historic Sites from Home - Developing A Collaborative Learning Approach for Architectural Conservation and Sustainability, hosted by Carleton University, Ottawa.
2021 Demographic Re-Assembly - Online Forum, Ottawa as a case study for how cities respond to demographic shifts and the forces behind them.

ARCHAEOLOGY | HERITAGE | OUTREACH | EDUCATION

DRAFT

Heritage Impact Assessment
965 Gartshore Street
Site Development – Operations Centre
Township of Centre Wellington
Lots 17–18
Concession 16
Geographic Township of Nichol
Wellington County, Ontario

Prepared for
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HR-446-2023
ARA File# 2022-0233-02

29/05/2023

Original

EXECUTIVE SUMMARY

Under a contract awarded in June 2022 by R.J. Burnside, Archaeological Research Associates Ltd. carried out the heritage evaluation portion of a Heritage Impact Assessment in advance of a proposed development of 965 Gartshore Street in the Township of Centre Wellington, Ontario. 965 Gartshore Street is a farmstead and contains a historic residence constructed pre-1880, a bank barn, cultivated agricultural fields and several outbuildings.

The Cultural Heritage Evaluation Report conducted in 2022 by ARA, concluded that 965 Gartshore Street met two criteria of the O. Reg 9/06, therefore it can be considered to have cultural heritage value or interest.

This report forms the second part of a two-part project approach, as approved by the Township of Centre Wellington Planning Staff and involves the construction of multiple new structures.

The proposed development at 965 Gartshore Street involves the construction of the Township of Centre Wellington Operations Centre. The existing historic residence and treelined driveway at 965 Gartshore Street will be retained, while the bank barn, silo, agricultural fields and other outbuildings will be removed. The bank barn and silo form part of the "farmstead cluster" heritage attribute, and the bank barn itself is noted as a heritage attribute; and thus needs a clear rationale for their removal from the landscape. Retention of the barn and silo should be considered, and if not feasible, clear rationale for their removal should be provided. Adaptive reuse of the bank barn and silo can be explored. While a condition assessment was conducted on the Gothic Revival house, a similar report on the condition of the bank barn and silo may be useful.

Potential negative impacts to 965 Gartshore Street which may result from the current proposed development include:

- Impact 1 –There is the potential for direct impacts to heritage attributes of 965 Gartshore Street from removal of the bank barn, the concrete silo and the organic driveways.
- Impact 2 – Direct impacts are possible resulting from the proposed development which will alter the visual context of the farmstead cluster heritage attribute (Gothic Revival House, Bank Barn, and Silo) by adding buildings that are incompatible in scale, material, massing and location relative to the heritage resource as an Ontario Farmstead.
- Impact 3 - Alteration as a result of the proposed removal of the addition on the Gothic Revival House may directly impact the heritage sub-attributes of the house itself including the existing brick and window openings covered by the addition.
- Impact 4 – The proposed development will result in the isolation of the Gothic Revival house from its context as part of the farmstead cluster within an Ontario farmstead.
- Impact 5 – The proposed development will result in a change in land-use which entails site alteration to fill in the currently open spaces; specifically, the natural open spaces, agricultural fields, wooded lots, and organic pathways) that contribute to the heritage attributes of the representative example of an Ontario Farm.
- Impact 6 – The proposed development may impact archaeological resources on 965 Gartshore Street.

The heritage attributes of the adjacent properties are not anticipated to be impacted by the proposed development.

The following conservation/mitigation strategies are recommended:

- To protect the Gothic Revival house during the construction phases of the proposed development as well as during the addition demolition, vibrations should be identified through a ZOI study as directed by City Staff;
- To protect the Gothic Revival house during the construction phases of the proposed development as well as during the addition demolition, a Temporary Protection Plan should be created including provisions for fencing between the building and development areas, a list of elements to be conserved (i.e., brick, window and door openings), as well as communication protocols;
- A CHRD report should be prepared. Photographic and written documentation of the properties has been completed as part of the CHER report. It should be confirmed that the existing documentation that has been completed to date can satisfy the scope of a CHRD to the satisfaction of the Township staff;
- Materials should be salvaged from the bank barn and other reusable items from the outbuildings; and,
- A Commemoration Plan should be developed prior to the demolition of the bank barn and the poured concrete silo.

Archaeological assessment Stage 2 is required based on the Stage 1 assessment results.

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GLOSSARY OF ABBREVIATIONS

ACO – Architectural Conservancy of Ontario
ARA – Archaeological Research Associates Ltd.
CHER – Cultural Heritage Evaluation Report
GFA – Gross Floor Area
HIA –Heritage Impact Assessment
CHRD – Cultural Heritage Resource Documentation
CHVI – Cultural Heritage Value or Interest
MMAH – Ministry of Municipal Affairs and Housing
MCM – Ministry of Citizenship and Multiculturalism
OC – Operations Centre
OHA – Ontario Heritage Act
OP – Official Plan
O. Reg. – Ontario Regulation
PJR – Planning Justification Report
PPS – Provincial Policy Statement
RFP – Request for Proposal
ZOI – Zone of Influence

PERSONNEL

Principal: P.J. Racher, MA (#P007), CAHP
Heritage Operations Manager: K. Jonas Galvin, MA, CAHP, RPP, MCIP
Field Surveyors: J. McDermid, BA, CAHP, S. Zia, B.Arch., Dip. Heritage Conservation

Technical Writer: S. Zia
Senior Review: J. McDermid
Editor: J. McDermid

Two-page curriculum vitae (CV) that demonstrate the qualifications and expertise of key team members to perform cultural heritage work in Ontario are provided in Appendix A.

1.0 PROJECT CONTEXT

Under a contract awarded in June 2022 by R.J. Burnside, Archaeological Research Associates Ltd. (ARA) carried out the heritage evaluation portion of a Heritage Impact Assessment (HIA) in advance of a proposed development of 965 Gartshore Street in the Township of Centre Wellington, Ontario. 965 Gartshore Street is a farmstead and contains a historic residence constructed pre-1880, a bank barn, cultivated agricultural fields and several outbuildings. The Cultural Heritage Evaluation Report (CHER) conducted in 2023 by ARA concluded that 965 Gartshore Street met two criteria of the O. Reg 9/06 (as amended by O. Reg. 569/22), therefore it can be considered to have cultural heritage value or interest (CHVI), see Appendix B.

The proposed development at 965 Gartshore Street involves the construction of the Township of Centre Wellington Operations Centre (OC). The existing historic residence at 965 Gartshore Street will be retained with the removal of the bank barn, the agricultural fields and the outbuildings. The OC has been proposed to be developed in two phases and involves the construction of new structures. The buildings are described, in the Planning Justification Report (PJR) as: "2-storey administration building, a storage bunker, vehicular storage structure, fuel storage area, material storage area, a greenhouse, a stormwater management facility, a landscape berm, 2.4 meter noise wall, community garden and community trail" (GSP Group 2023:3).

This report forms the second part of a two-part project approach, as approved by the Township of Centre Wellington Planning Staff. This HIA builds on the findings from the CHER and examines the impacts of the proposed development of 965 Gartshore Street. The report includes:

- Description of the Proposed Development or Site Alteration (see Section 4.0)
- Measurement of Development of Site Alteration Impact (see Section 5.0)
- Consideration of Alternatives, Mitigation and Conservation Method (see Section 6.0 and Section 7.0)
- Summary Statement and Conservation Recommendations (see Section 9.0)

The property owner's contact information is as follows:
Township of Centre Wellington
1 Macdonald Square
519-846-9691 x289

The assessment was conducted in accordance with the aims of the *Provincial Policy Statement* (2020), the *Ontario Heritage Act*, R.S.O. 1990, c. O.18, *Standards and Guidelines for Conservation of Historic Places in Canada* (Parks Canada 2010), and MCM's *Ontario Heritage Toolkit* series (2006), the *County of Wellington Official Plan* (2022), and *Municipal Official Plan* (Township of Centre Wellington 2013 Consolidation).

2.0 LEGISLATIVE AND POLICY REVIEW

The framework for this report is provided by provincial planning legislation and policies as well as municipal Official Plans and guidelines.

2.1 Provincial Policies and Guidelines

2.1.1 The Planning Act

Section 2 of the Ontario *Planning Act* indicates that a council of a Municipality have regard for matters of provincial interest such as: "(d) the conservation of features of significant architectural, cultural, historical, archaeological or scientific interest" (Government of Ontario 1990). Section 3 of the *Planning Act* directs a municipal Council's decisions to be consistent with the *Provincial Policy Statement* (PPS 2020).

2.1.2 The Provincial Policy Statement (2020)

The *Provincial Policy Statement* (PPS 2020) contains a combined statement of the Province's land use planning policies. The PPS 2020 promotes the conservation of cultural heritage resources through detailed polices in Section 2.6, such as "2.6.3 Planning authorities shall not permit development and site alteration on adjacent lands to protected heritage property except where the proposed development and site alteration has been evaluated and it has been demonstrated that the heritage attributes of the protected heritage property will be conserved" (MMAH 2020:31).

2.1.3 Ontario Heritage Act

The Ontario Heritage Act, R.S.O. 1990, c.018 is the guiding piece of provincial legislation for the conservation of significant cultural heritage resources in Ontario. The *OHA* gives provincial and municipal governments the authority and power to conserve Ontario's heritage. The Act has policies which address individual properties (Part IV), heritage districts (Part IV), and allows municipalities to create a register of non-designated properties which may have cultural heritage value or interest (Section 27).

In order to objectively identify cultural heritage resources, O. Reg. 9/06 made under the *OHA* sets out three principal criteria with nine sub-criteria for determining cultural heritage value or interest (CHVI) (MCM 2006b:20–27). The criteria set out in the regulation were developed to identify and evaluate properties for designation under the *OHA*. The criteria set out in the regulation were developed to identify and evaluate properties for designation under the *OHA*. Best practices in evaluating properties that are not yet protected employ O. Reg. 569/22 to determine if they have CHVI. The O. Reg. 569/22 criteria include: design or physical value, historical or associative value and contextual value. These nine criteria are:

1. *The property has design value or physical value because it is a rare, unique, representative or early example of a style, type, expression, material or construction method,*
2. *The property has design value or physical value because it displays a high degree of craftsmanship or artistic merit, or*

3. *The property has design value or physical value because it demonstrates a high degree of technical or scientific achievement.*
4. *The property has historical value or associative value because it has direct associations with a theme, event, belief, person, activity, organization or institution that is significant to a community,*
5. *The property has historical value or associative value because it yields, or has the potential to yield, information that contributes to an understanding of a community or culture, or*
6. *The property has historical value or associative value because it,demonstrates or reflects the work or ideas of an architect, artist, builder, designer or theorist who is significant to a community.*
7. *The property has contextual value because it is important in defining, maintaining or supporting the character of an area,*
8. *The property has contextual value because it is physically, functionally, visually or historically linked to its surroundings, or*
9. *The property has contextual value because it is a landmark.* O. Reg. 569/22, s. 1 (2).

An *OHA* designation provides the strongest heritage protection available for conserving cultural heritage resources.

2.2 Municipal Policies

2.2.1 County of Wellington Official Plan

The *County of Wellington Official Plan* (2022 Consolidation) addresses cultural heritage resources and recognizes that "cultural heritage and archaeological resources form an important and, in many cases, highly visible part of the community fabric" (County of Wellington 2022 Consolidation:31). Policy 4.1.5 specifies that, “significant built heritage resources and significant cultural heritage landscapes shall be conserved” (County of Wellington 2022 Consolidation:33).

Subsection 4.6.7 of the OP, “Heritage Impact Assessment and Conservation Plan”, indicates that “a heritage impact assessment and conservation plan may be required to determine if any significant cultural heritage resources are impacted by a development proposal” (County of Wellington 2022 Consolidation:46). As part of an HIA, the *County of Wellington Official Plan* outlines the following requirements to determine said impacts:

> *a) Historical research, site analysis and evaluation*
> *b) Identification of the significance and heritage attributes of the cultural heritage resources*
> *c) Description of the proposed development or site alteration*
> *d) Assessment of development or site alteration impact*
> *e) Consideration of alternatives, mitigation and conservation methods. Methods to minimize or avoid a negative impact on a significant cultural heritage resource include, but are not limited to:*
>> *i) alternative development approaches*
>> *ii) isolating development and site alteration from significant built and natural features and vistas*

iii) design guidelines that harmonize mass, setback, setting, and materials
iv) limiting height and density
v) allowing only compatible infill and additions
vi) reversible alterations
vii) buffer zones, and
viii) site plan control

f) Implementation and monitoring
g) Summary statement and conservation recommendations (2022 Consolidation:46-47).

These requirements have been incorporated throughout this report.

2.2.2 Township of Centre Wellington Official Plan

The *Municipal Official Plan the Township of Centre Wellington* (2013 Consolidation) is the principal tool for guiding land use, growth, and development within the Township of Centre Wellington. The Township recognises the importance of cultural heritage resource conservation, as one of the aims of the Official Plan is to "protect the unique cultural heritage resources of the community" (Township of Centre Wellington 2013 Consolidation:4). Furthermore, the Township's goals and objectives for cultural heritage resources include:

1. *To protect the Township's heritage resources from neglect, deterioration, demolition, alteration, redevelopment or changes in use which threaten their existence or integrity.*
2. *To encourage and support the functional and economic use of heritage buildings.*
3. *To identify, protect and enhance natural areas.*
4. *To encourage public awareness and appreciation of the heritage resources of the Township and of the value of protecting these resources to both residents and visitors* (Policy C.2.1) (Township of Centre Wellington 2013 Consolidation:5).

Section C.2 contains additional policy guidelines, such as criteria and procedures for designation, heritage easements, demolition and documentation of listed structures, parking exemptions, and so on (Township of Centre Wellington 2013 Consolidation). Policy C.2.20 also provides legislative authorization for the Township's heritage conservation aims (Township of Centre Wellington 2013 Consolidation).

2.2.3 Summary of Policies

The PPS addresses cultural heritage resources and promotes their conservation. The PPS notes that significant heritage resources "shall be conserved". Policies of the *County of Wellington Official Plan* (2022 Consolidation) and the *Township of Centre Wellington Official Plan* (2013 Consolidation) call for the conservation of cultural heritage resources and for addressing development that may impact cultural heritage resources. This HIA will address these cultural heritage policies as they relate to the proposed project.

2.3 Key Concepts

The following concepts require clear definition in advance of the methodological overview and proper understanding is fundamental for any discussion pertaining to cultural heritage resources:

- **Built Heritage Resource** (BHR) can be defined in the *PPS* as: "a building, structure, monument, installation or any manufactured or constructed part or remnant that contributes to a property's cultural heritage value or interest as identified by a community, including Indigenous community. Built heritage resources are located on property that has been designated under Parts IV or V of the *Ontario Heritage Act*, or that may be included on local, provincial and/or federal and/or international registers" (MMAH 2020:41).
- **Cultural Heritage Value or Interest** (CHVI), also referred to as Heritage Value, is identified if a property meets one of the criteria outlined in O. Reg. 9/06 namely historic or associate value, design or physical value and/or contextual value. Provincial significance is defined under *Ontario Heritage Act (OHA) O. Reg*. 10/06.
- **Conserved** means "the identification, protection, management and use of built heritage resources, cultural heritage landscapes and archaeological resources in a manner that ensures their cultural heritage value or interest is retained. This may be achieved by the implementation of recommendations set out in a conservation plan, archaeological assessment, and/or heritage impact assessment that has been approved, accepted or adopted by relevant planning authority and/or decision-makers. Mitigative measures and/or alternative development approaches can be included in these plans and assessments" (MMAH 2020:41).
- **Heritage Attributes** are defined in the *PPS* as: "the principal features or elements that contribute to a protected heritage property's cultural heritage value or interest, and may include the property's built constructed, or manufactured elements, as well as natural landforms, vegetation, water features, and its visual setting (e.g. significant views or vistas to or from a protected heritage property" (MMAH 2020:44-45).
- **Protected heritage property** is defined as "property designated under Parts IV, V or VI of the Ontario Heritage Act; property subject to a heritage conservation easement under Parts II or IV of the Ontario Heritage Act; property identified by the Province and prescribed public bodies as provincial heritage property under the Standards and Guidelines for Conservation of Provincial Heritage Properties; property protected under federal legislation, and UNESCO World Heritage Sites" (MMAH 2020:49).
- **Significant** in reference to cultural heritage is defined as: "resources that have been determined to have cultural heritage value or interest. Processes and criteria for determining cultural heritage value or interest are established by the province under the authority of the Ontario Heritage Act" (MMAH 2020:51).

Key heritage definitions from the *County of Wellington Official Plan* are as follows:

- **Built heritage** is defined as "many buildings and structures, either individually or in groups, which are considered to be architecturally or historically significant to the community, county, province or country" (2022 Consolidation:31).
- **Cultural Heritage Landscapes** are defined as a "geographical area of heritage significance which has been modified by human activities and is valued by a community.

It involves a grouping(s) of individual heritage features such as structures, spaces, archaeological sites and natural elements, which together form a significant type of heritage form, distinctive from that of its constituent elements or parts. Examples may include, but are not limited to, heritage conservation districts designated under the Ontario Heritage Act, and villages, parks, gardens, battlefields, mainstreets and neighbourhoods, cemeteries, trailways and industrial complexes of cultural heritage value. For cultural heritage landscapes to be significant, they must be valued for the important contribution they make to our understanding of a place, an event, or a people" (2022 Consolidation:31).

3.0 HERITAGE ASSESSMENT

The findings from the evaluation, according O. Reg, 9/06 are found in Appendix B. The Statement of CHVI, which will be used to consider potential impacts as a result of the proposed development, is included below.

3.1 Statement of Cultural Heritage Value or Interest for 965 Gartshore Street:

Introduction and Description of Property

The property at 965 Gartshore Street is located on the south side of Gartshore Street, north of Gordon Street. The one-and-a-half-storey red brick farmhouse is estimated to have been circa 1875 and the one-storey frame, wooden siding clad rear addition was constructed later. A large rectangular bank barn is also located on the property to the southwest of the house. The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however it contains a designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property.

Statement of Cultural Heritage Value/Statement of Significance:

965 Gartshore Street displays many of the features of an Ontario Farm and therefore can be considered representative. As a representative example of a farmstead, 965 Gartshore Street belongs to the typical Historic Ontario Farmstead typology. The property has a centralized 'farmstead' composed of clustered grouping of a house, bank barn and silo. The property also contains an entrance driveway lined with mature trees. The farm is set back from the roadway with farmhouse placed nearest to the road.

Among the structures located at 965 Gartshore Street, it contains a representative example of a Gothic Revival Cottage. The red brick residence retains much of the original historic fabric of the dwelling. The massing, roof line, fenestration, centrally placed gable peak and return eaves are reflective of the Gothic Revival style and "Ontario Cottage" architectural tradition. Gothic Revival dwellings are commonly found throughout Ontario especially on rural farmsteads.

The bank barn is a representative example of an English style barn with Dutch revival influences seen in the gambrel roof, also referred to as a Central Ontario barn or "bank barn." Made of typical wooden boards, the barn, consists of a substructure and a superstructure.

965 Gartshore Street maintains the agricultural character of this portion of Gartshore Street as its appearance as a rural farm remains. With a driveway that leads to a setback residence, a barn and associated agricultural fields, the property continues to reflect the bucolic nature and character of the surrounding area.

Cultural Heritage Attributes

965 Gartshore Street displays many of the features of an Ontario Farm and therefore can be considered representative, and it contains the following heritage attributes related to that value:

- Farmstead cluster of a house, bank barn and silo.
- Entrance driveway lined with mature trees.
- Unpaved and Organic laneways between the elements of the "farmstead cluster".
- Cluster set back from roadway with farmhouse placed nearest to road
- One-and-a-half storey brick Gothic Revival Cottage:
    - T-shaped plan;
    - Symmetrical three-bay façade;
    - Front gable roof with centrally placed gable peak, small arched window opening and a wooden finial;
    - Two-bay side elevations with side gable roof;
    - Rectangular fenestration with buff brick radiating voussoirs and quoins;
    - Return eaves;
    - Dichromatic decorative brick masonry detailing with a red brick cross pattern laid within courses of buff brick;
- Large bank barn:
    - Rectangular plan;
    - Hand-hewn log construction;
    - Split log construction;
    - Wooden sills with wooden moldings and lintels;
    - Trusses and frame construction;
    - Gambrel roof

965 Gartshore Street supports the rural character of the area and it contains the following heritage attributes related to that value:

- Clustered grouping of a house, bank barn and silo
- Entrance driveway lined with mature trees.
- View from the entrance driveway to the house.

3.2 Adjacent Properties

As a best practice, ARA examines all adjacent properties in addition to the study area when assessing potential impacts of a project. After research, the field survey and consultation, ARA determines that one adjacent property has potential CHVI and is considered with this HIA. The property does not have any official recognition, and is not listed on the Municipal Heritage register. Consultation with the City planner for the Township of Centre Wellington was carried out via email, where they noted, "The property across the street at 950 Gartshore Street will also be reviewed in due course" to be added to the register. The property is included in Table 1. The table details its recognition type, current photograph and assumed heritage attributes based on the field survey in order to inform the impacts within this report.

Table 1: Adjacent Cultural Heritage Resource

Address	Photo (ARA 2022)	Assumed Heritage Attributes
950 Gartshore Street		Two-storey two-bay Georgian house, hip roof, , red brick construction, stone lintels and sills segmentally arched window and door openings, transom over front entryway, large setback,

4.0 DESCRIPTION OF PROPOSED DEVELOPMENT

4.1 Rationale for Proposed Development

The rationale for the development of 965 Gartshore Street is described by Township of Centre Wellington as follows:

> *The existing facilities are at or above capacity, are deteriorating and nearing the end of their service life and have sites that are too small to accommodate growth or expansion. This has resulted in varying degrees of overcrowding, inefficiencies in operations, health and safety concerns, and non conformance with industry best practices and regulatory requirements. These current issues are expected to be exacerbated in the future as the facilities become older and more staff, vehicles, and equipment are needed to deliver essential services for Centre Wellington's growing population.*
>
> *To address these issues, the Centre Wellington Council Strategic Plan 2019 - 2022 provided a strategic direction and initiative to open a new operations facility.*

4.2 Proposed Development Description

The Township of Centre Wellington carried out Space Needs Assessment and Concept Design Study to identify the potential needs of the multi departmental OC. As a result, eight potential options were developed with cost estimates. Of these eight options, option number six had the highest score, when judged against a set criterion, and was therefore the recommended solution (Figure 1 - Figure 3). Overall, the proposed development is described in the PJR as (GSP Group 2023:7):

> *The Township of Centre Wellington is proposing to develop a new operations Centre at 965 Gartshore Street. The proposed facility will occupy approximately 20 acres and will occur in two phases. Phase 1 of the facility will include an operations building with a gross floor area (GFA) of 3,560 m2 (38,321 ft2). It will also contain a 250 m2 (2,702 ft2) vehicle storage, pole barn and two 149 m2 (1,606 ft2) greenhouses. Phase 2 includes a 1,476 m2 (15,888 ft2) of additional GFA in the operations building as well as a 1,951 m2 (21,000 ft2) salt and storage building including interior loading. Phase 2 will also include an additional 219 m2 (2,357 ft2) of GFA to the operations building, and two additional greenhouses with 149 m2 (1,603 ft2) of GFA.*
>
> *Phase 1 of the operations facility will include 80 parking spaces for staff in addition to 16 visitor spaces and 4 barrier-free spaces. Phase 2 of the facility has been planned to accommodate 30 additional parking spaces.*

4.3 Zoning Context

965 Gartshore Street is currently zoned as Agricultural (A) and Environmental Protection Overlay (EPA Overlay). The current zoning does not allow for land uses pertaining to industrial operations to occur on the site. The rezoning of the land would allow for the OC to be developed and function.

Therefore, the development of the study area includes rezoning modifications. These modifications include the following (GSP Group 2023:46):

> *The Zoning By-law Amendment proposes to amend the existing zone from 'Agricultural' (A) to a specialized 'Institutional' (IN-XX) zone. The rezoning will include site-specific provisions to facilitate accessory structures on the site. A summary of the proposed development and zoning requirements are provided below in the following table:*

Regulation (IN) Zone	*Regulations (Lot with Individual On-Site Sewer and Water Services)*	*Proposed Development*	*Compliant (Y/N)*
Permitted Uses	*a) A public building* *b) A church* *c) A school* *d) A cemetery* *e) A hospital* *f) A day care centre* *g) A retirement residence* *h) A nursing home* *i) A group home* *j) A museum* *k) A community centre*	*Public Building shall mean any building or part thereof or structure owned, leased or occupied by the Corporation of the Township of Centre Wellington, the Corporation of the County of*	*Yes*

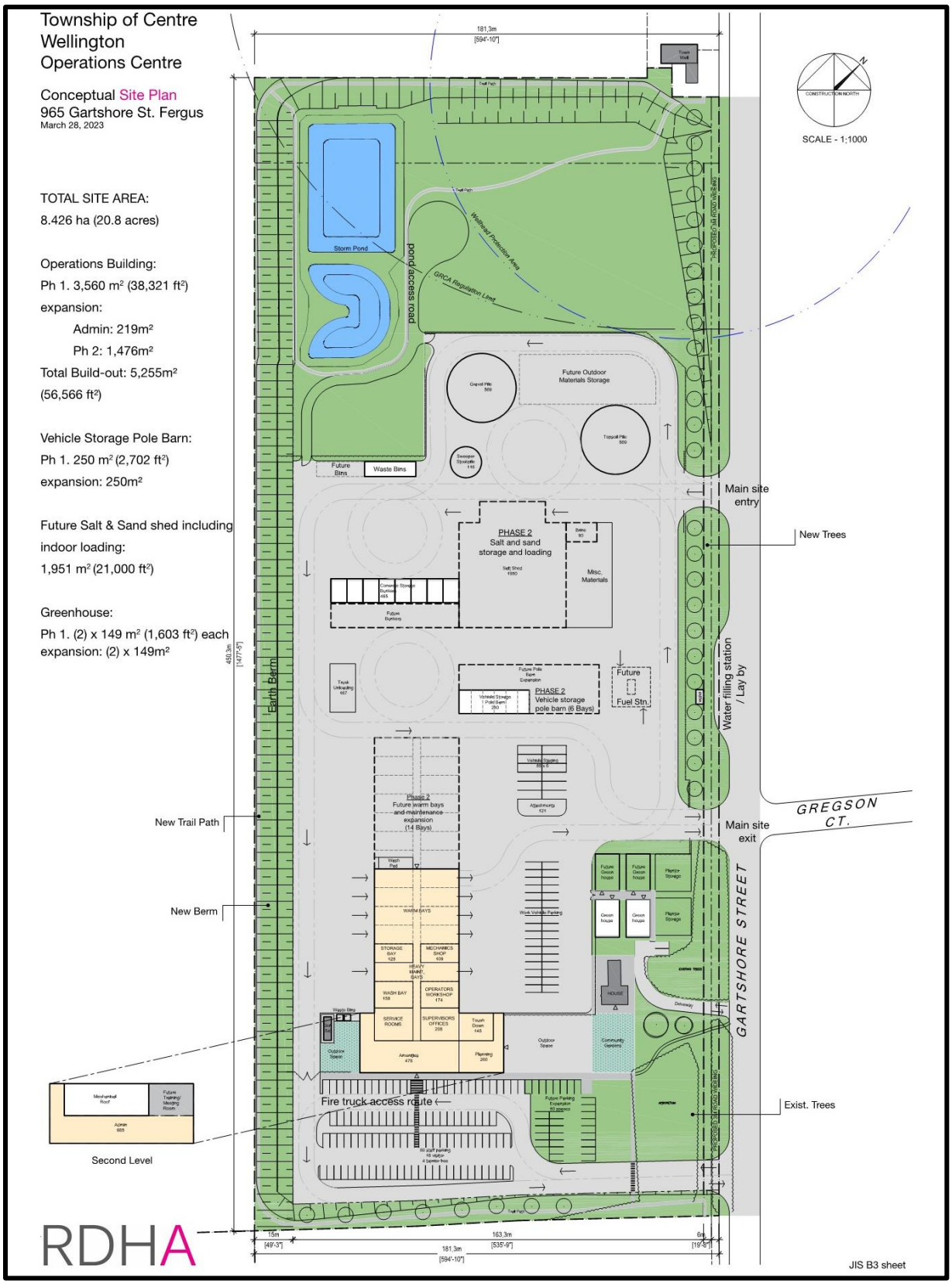

Figure 1: Proposed Site Development – Conceptual Site Plan
(RJ Burnside 2023)

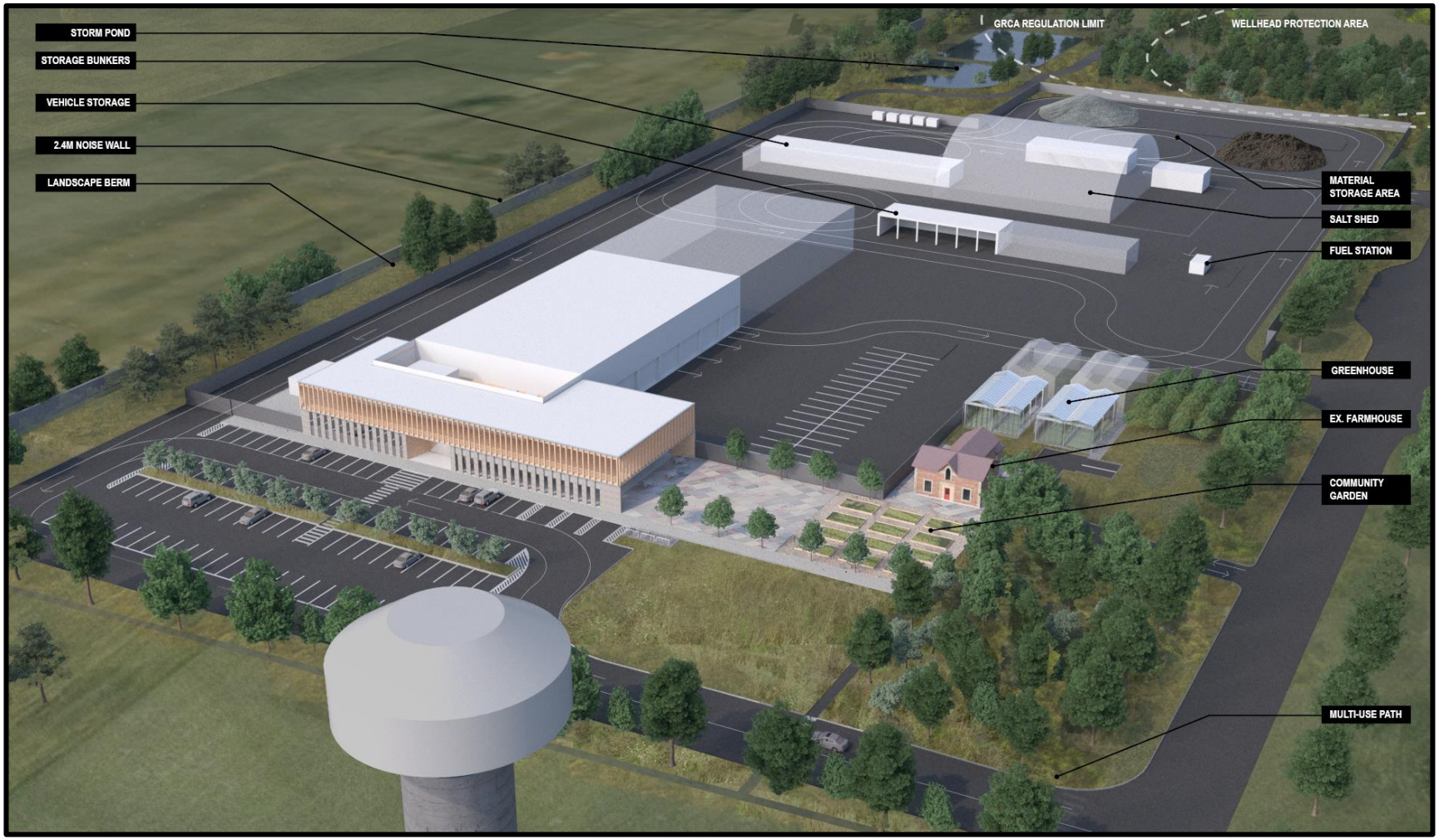

Figure 2: Proposed Site Development – Birdseye View
(RJ Burnside 2023)

Figure 3: Proposed Site Development – View from Southeast Corner of Study Area
(RJ Burnside 2023)

5.0 ANALYSIS OF IMPACT ASSESSMENT

Any potential project impacts on identified cultural heritage resources must be evaluated, including direct and indirect impacts.

Direct impacts (those that physically affect the heritage resources themselves) include, but are not limited to: demolition, initial project staging, excavation/levelling operations, construction of access roads and renovations or repairs over the life of the project. These direct impacts may impact some or all significant heritage attributes or may alter soils and drainage patterns and adversely impact archaeological resources.

Indirect impacts include but are not limited to: alterations that are not compatible with the historic fabric and appearance of the area; alterations that detract from the cultural heritage values, attributes, character or visual context of a heritage resource. This could include the construction of new buildings; the creation of shadows that alter the appearance of an identified heritage attribute; the isolation of a heritage attribute from its surrounding environment; the obstruction of significant views and vistas; and other less-tangible impacts.

InfoSheet #5: Heritage Impact Assessments and Conservation Plans (MCM 2006:3) provides an overview of several major types of negative impacts, including but not limited to:

- Destruction of any, or part of any, significant heritage attributes;
- Alteration that is not sympathetic, or is incompatible, with the historic fabric and appearance;
- Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden;
- Isolation of a heritage attribute from its surrounding environment, context or significant relationship;
- Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features;
- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces; and
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource (MCM 2006).

5.1 Project Location

An assessment of the impacts on 965 Gartshore Street can be evaluated using the negative impacts presented in *InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (MCM 2006). The impacts are examined below in Table 2.

Table 2: Impact Evaluation for 965 Gartshore Street
(Adopted from MCM 2006:3)

Type of Negative Impact	Applicable? (Y/N)	Comments
Destruction of any, or part of any, significant heritage attributes.	Y	The proposed development involves the removal of some heritage attributes from the farmstead at 965 Gartshore Street: the large Bank Barn, the concrete silo and the alteration of the organic driveways. These removals result in a modification of the farmstead cultural heritage landscape and will diminish the study area's contextual value supporting the rural character of the area. There is also the potential for indirect impact as a result of accidental impacts during construction activities to the entrance driveway line with mature trees.
Alterations to a property that detract from the cultural heritage values, attributes, character or visual context of a heritage resource, such as the construction of new buildings that are incompatible in scale, massing, materials, height, building orientation or location relative to the heritage resource.	Y	The current proposed development involves the construction of an Operations Centre and has the potential to detract from the visual context of the farmstead cluster heritage attribute. The proposed design adds new structures, parking areas, circulation patterns, landscaping, and the removal of the agricultural fields, organic circulation patterns. Alteration of the Gothic Revival House is proposed, the removal of the addition. This addition removal is an alteration to the existing house and may result in direct accidental impacts to the heritage sub-attributes of the house including the existing brick and window openings covered by the addition.
Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden.	N	The proposed site development will introduce new structures to the study area. The proposed structures are well away from the Gothic Revival house, and it appears that the shadows created would not have an impact on the structure. The extent of the impact of the shadows created can be determined in a shadow study.
Isolation of a heritage attribute from its surrounding environment, context or significant relationship.	Y	The location and relationship of the existing structures, natural features and the character of 965 Gartshore Street as a representative example of an Ontario Farm is a heritage attribute (see Section 3.0). The proposed development would isolate the farmhouse from the surrounding farmstead elements (i.e., the famr fields, barn, organic laneways).. rendering the study area no longer representative of an Ontario Farm.
Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features.	N	The proposed site development does not obstruct any significant views that were recognized as heritage attributes.
A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces.	Y	The proposed development is rezoning from agricultural land to commercial, andwill result in the removal of the natural open spaces, agricultural fields, wooded lots, and organic pathways which then would be replaced by built structures and paved internal circulation.

Type of Negative Impact	Applicable? (Y/N)	Comments
Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.	Y	With the proposed removal of the Bank Barn, silo, outbuildings and construction activities, there will be ground disturbance which may adversely affect any archeological resources.

As Table 2 summarizes, the heritage attributes of 965 Gartshore Street will be directly and adversely impacted by the current proposed development as defined by MCM *InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (2006). The impacts include:

- Impact 1 –There is the potential for direct impacts to heritage attributes of 965 Gartshore Street from removal of the bank barn, the concrete silo and the organic driveways.
- Impact 2 – Direct impacts are possible resulting from the proposed development which will alter the visual context of the farmstead cluster heritage attribute (Gothic Revival House, Bank Bank, and Silo) by adding buildings that are incompatible in scale, material, massing and location relative to the heritage resource as an Ontario Farmstead.
- Impact 3 - Alteration as a result of the proposed removal of the addition may directly impact the heritage sub-attributes of the house including the existing brick and window openings covered by the addition.
- Impact 4 – The proposed development will result in the isolation of the Gothic Revival house from its context as part of the farmstead cluster within an Ontario farmstead.
- Impact 5 – The proposed development will result in a change in land-use which entails site alteration to fill in the currently open spaces; specifically, the natural open spaces, agricultural fields, wooded lots, and organic pathways) that contribute to the heritage attributes of the representative example of an Ontario Farm.
- Impact 6 – The proposed development may impact archaeological resources on 965 Gartshore Street.

5.2 Adjacent Properties

An assessment of the impacts on the property adjacent to 965 Gartshore Street that was identified to have potential CHVI, can be evaluated using the negative impacts presented in *InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (MCM 2006). The impacts are examined below in Table 3.

Table 3: Impact Evaluation for Adjacent Properties
(Adapted from MCM 2006:3)

Type of Negative Impact	Applicable? (Y/N)	Comments
Destruction of any, or part of any, significant heritage attributes.	N	The proposed development involves the removal of the buildings associated with 965 Gartshore Street. The adjacent property and its assumed heritage attributes will remain.

Type of Negative Impact	Applicable? (Y/N)	Comments
Alterations to a property that detract from the cultural heritage values, attributes, character or visual context of a heritage resource, such as the construction of new buildings that are incompatible in scale, massing, materials, height, building orientation or location relative to the heritage resource.	N	The heritage attributes of the adjacent property are located a distance away from the proposed development and is buffered from the proposed development by vegetation or fencing, existing parking or roadways. As such the proposed development will not detract from the assumed heritage attributes of the adjacent property.
Shadows created that alter the appearance of a heritage attribute or change the viability of a natural feature or plantings, such as a garden.	N	The shadows created due to the proposed development at 965 Gartshore Street are at a distance from the adjacent property and as such would not affect the assumed heritage attributes of 950 Gartshore Street.
Isolation of a heritage attribute from its surrounding environment, context or significant relationship.	N	The proposed development will not isolate the assumed heritage attributes of 950 Gartshore Street from its surrounding environment.
Direct or indirect obstruction of significant views or vistas within, from, or of built and natural features.	N	No significant views or vistas were identified as a assumed heritage attributes associated with the adjacent property.
A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces.	N	The land use of the adjacent properties will not change.
Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource.	N	There are no anticipated land disturbances to 950 Gartshore Street which may adversely affect any archeological resources as a result of the proposed development.

As Table 3 summarizes, the assumed heritage attributes of adjacent property are not anticipated to be impacted by the proposed development.

6.0 ALTERNATIVE OPTIONS

6.1 Option 1 - Do Nothing

The "Do Nothing" approach is an alternative redevelopment approach whereby the proposed redevelopment and modification of the study area does not proceed. The study area and heritage attributes would remain in-situ.

This option is not feasible due to the current condition of the public works facilities in the Township of Centre Wellington. Based on the RFP provided by Centre Wellington (Centre Wellington 2022: 4),

> *The existing facilities are at or above capacity, are deteriorating and nearing the end of their service life and have sites that are too small to accommodate growth or expansion. This has resulted in varying degrees of overcrowding, inefficiencies in operations, health and safety concerns, and non conformance with industry best practices and regulatory requirements.*

The 'do nothing' option would exacerbate conditions and has the potential to increase health and safety concerns.

6.2 Option 2 – Removal of Structures at 965 Gartshore Street

As the option proposed initially, Option 2 entailed the removal of all buildings on the property, including the demolition of bank barn, the poured concrete silo, and the various outbuildings at 965 Gartshore Street (Figure 4). The option also entailed the removal of the agricultural fields, the organic laneways, the mature treeline, and the driveway leading up to the Gothic Revival house. The option did leave the Gothic Revival house in situ as 'existing in place' while removing its surrounding natural context. Removal of these buildings was proposed as part of the development of the OC (see Figure 1). The CHER completed by ARA for the study area reflected the CHVI of the property. In resulting meetings with Township staff, ARA demonstrated the property was a representative example of am Ontario Farmstead, presented the structures and features of the farmstead that contributed to the CHVI. As a result of reviewing the CHER and the resulting meetings, the Township revised the plans.

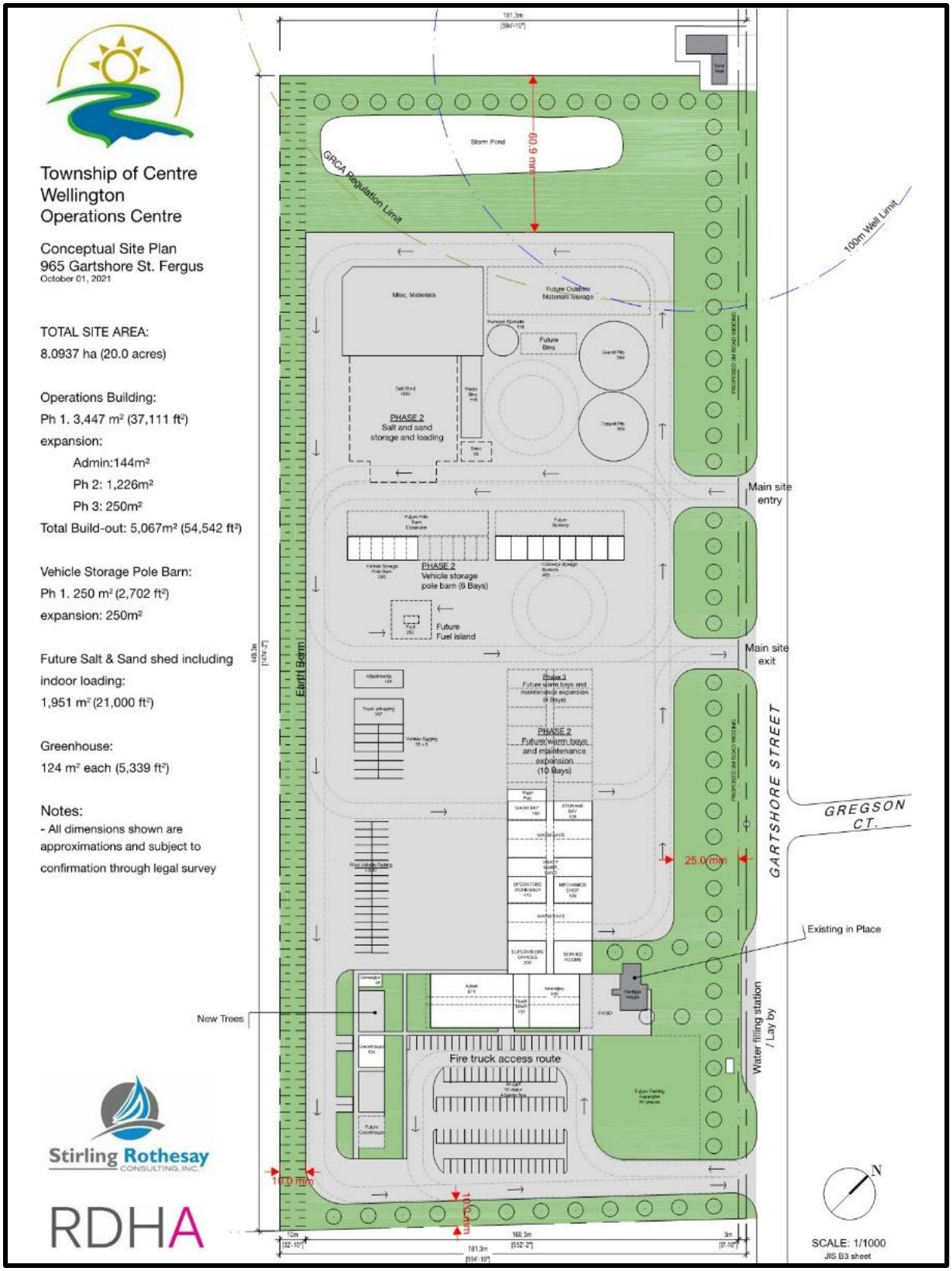

Figure 4: Proposed Development as of October 2021 (Option 2)

6.3 Option 3 – Retention of More Heritage Attributes

Option 3 includes the retention of the Gothic Revival house as well as the treelined driveway (Figure 1). This option was proposed as a result of the findings of the Cultural Heritage Evaluation Report, and resulting conversations between the Township, planning staff, engineers and the heritage and design consultants.

An independent building condition assessment of the Gothic Revival house at 965 Gartshore Street was conducted on November 17, 2022, by R.J. Burnside & Associates. Based on the findings within this assessment, structural components such as, wood, located in the basement and attic were determined in need of a structural review to assess 'moisture related damage', the later additions to the farmhouse were recommended to be removed as they 'were constructed improperly and are in poor condition' together with proper restoration of brick masonry (GSP Group 2023:12

As a result of the CHER, retention of the bank barn and silo was considered; it was concluded that retention of the barn and silo was not feasible. Rationale for this removal should be clarified in a Planning Justification Report.

6.4 Option 4 - Final Concept (Heritage Preferred Option)

As outlined above, the proposed development initially considered the demolition of all buildings and landscape features (Option 2). As a result of the completion of the CHER which found the property to have CHVI, the retention of all buildings with CHVI was considered. A compromise was conceptualized where the development can include some heritage attributes including: the organic driveway with the mature trees to conserve the heritage attributes connected to the Gothic Revival house (Option 3). As a result, mitigation measures have been provided below to help reduce impacts resulting from the proposed site alteration.

7.0 MITIGATION MEASURES

Since potential impacts to identified heritage resources were determined, proposed conservation or mitigative/avoidance measures are recommended. The former Ministry of Culture's *InfoSheet #5: Heritage Impact Assessments and Conservation Plans* (2006b:3) lists several specific methods of minimizing or avoiding a negative impact on a cultural heritage resource, including but not limited to:

- Alternative development approaches;
- Isolating development and site alteration from significant built and natural features and vistas;
- Design guidelines that harmonize mass, setback, setting, and materials;
- Limiting height and density;
- Allowing only compatible infill and additions;
- Reversible alterations; and
- Buffer zones, site plan control, and other planning mechanisms.

This section outlines suggested mitigation measures. The impacts that are addressed by each mitigation measure have been provided in brackets for reference.

7.1 Vibration Monitoring (Impact 1, Impact 2, Impact 3)

Construction activities associated with the current proposed development have the potential to create vibrations that could impact the cultural heritage resource located at 965 Gartshore Street. With respect to vibrations, the Zone of Influence (ZOI) is considered the area of land which is within or adjacent to a construction site. A ZOI study identifies buildings which may require vibration monitoring during the construction phase to which monitoring strategies can be determined. For example, the City of Toronto *By-law 515-2008 To amend City of Toronto Municipal Code Chapter 363, Building Construction and Demolition, with respect to regulations of vibrations from construction activity* provides an example of a detailed vibration assessment method and criteria. Typically, a ZOI study is carried out after site plan approval and construction methods and equipment is known prior to the construction phase. To mitigate any potential impacts caused by vibrations, it is recommended that the Township of Centre Wellington staff determine if a ZOI study is required and when this step will be required.

7.2 Temporary Protection Plan (Impact 2, Impact 3)

To protect the Gothic Revival house at 965 Gartshore Street during the construction period of the proposed new buildings as well as the removal of the addition, a Temporary Protection Plan (TPP) should be developed. The heritage attributes should be marked on the construction plans. Temporary construction fencing should be erected as a buffer between the house and the development areas. The fencing should be erected at a sufficient distance to ensure that there will be no direct or indirect impacts to the house as a result of the construction activities or equipment. The TPP should also include a communication protocol that details who needs to be informed about the heritage attributes and who should be contacted if there is an issue with the building. The TPP should include a plan for potential physical impact (i.e., a plan if there is any damage resulting from machinery). The TPP protocol should address the possibility of physical impacts and will

outline who to contact if an impact occurs and that proper repairs would be required to return the building to its previous condition. These items can be addressed through a stand-alone TTP or may be included as part of the Construction Management Plan.

7.3 Cultural Heritage Resource Documentation Report (Impact 4 and Impact 5)

A Cultural Heritage Resource Documentation (CHRD) Report provides in-depth documentation of the building. The process involves photographic documentation of the structure as a whole from all (accessible) angles as well as detailed photographs of all elements. Contextual photographs are also taken of the landscape surrounding the resource. These photographs are recorded on a photo map. A physical description of the resource and detailed description of the landscape and context are also included in the report. Additional measured drawings, land use history, archival photographs or maps obtained could also be added to the report. This report should be provided to local municipalities, stakeholder groups, local historical societies, museums, archives and/or libraries as part of the public record. The completion of a CHRD should be carried out prior to demolition.

Detailed photographic and written documentation of the different components slated to be removed at 965 Gartshore Street have been completed as part of the description portion of the CHER completed by ARA (Appendix B); however, it should be confirmed that the existing documentation has been completed to the satisfaction of Township heritage staff.

7.4 Salvage of Materials (Impact 4 and Impact 5)

This option allows for the retention of components of the buildings for reuse prior to their demolition. The selective removal of identified architectural or landscape elements preserves portions or features of buildings and structures that possess historical, architectural, or cultural value and can divert them from becoming landfill material. This mitigation option is not the strongest option from a heritage perspective; however, a removal and reuse program would allow for the conservation of key components of the structures. Reuse and salvage can be achieved by the identification, removal, and repurposing through symbolic conservation, or reusing of heritage materials from buildings prior to their demolition. These materials may then be used in other heritage structures as sourcing materials for repair and replacement can be challenging, especially if the materials are from an historic source that no longer exists, such as a quarry, an old-growth forest, or a manufacturing facility that has closed (Parks Canada 2010). As such, the careful salvage of materials from one historic structure can represent an opportunity for the in-kind replacement of quality historic materials in another.

The materials listed below provide an example of materials which may be worthy of salvage or reuse, however it can extend beyond those elements which may be considered to possess historical, architectural, or cultural value in order to align best practices for sustainable redevelopment. This salvage plan would apply to the Bank Barn as part of the demolition process.

Items to be considered for salvage include:

- Stone and wood in good condition;
- Windows and doors;

- Any interior features worthy of salvage and reuse including metal hardware; and
- Hand hewn and split log used in the structure of the barn.

The following recommendations for the salvage and reuse of materials are suggested:

- A reputable contractor(s) with proven expertise in salvage removal should be obtained.
    - The Architectural Conservancy of Ontario (ACO) North Waterloo Region maintains a *Directory of Heritage Practitioners* located in Ontario that claim to have experience with heritage and/or older properties. The section dedicated to "Moving, Dismantling and Salvage" could be referred to for salvage contacts, however, it is recommended that references and/or previous work be assessed before engaging with any of the listed businesses. The ACO directory is available online at: Moving, Dismantling & Salvage - ACO North Waterloo Region (aconwr.ca)
- The ultimate destination of salvaged materials should be determined prior to the initiation of any salvage process;
- Materials should only be salvaged if they are suitable for re-use in other buildings or projects, i.e., the material must not be irreparably damaged or infested;
- The material must be extracted in a manner that ensures that it is not irreparably damaged;
- Consider the incorporation of salvaged materials, such as bricks, stone, timber beams, wood planks, floorboards, etc. into the proposed development, potentially in the form of landscaped features, planters, pavilions/shade structures or lobby features; and
- Any materials not deemed salvageable, but which are still recyclable should be recycled in an effort to reduce the amount of material sent to a landfill.

7.5 Commemoration Plan (Impac4 and Impact 5)

Conservation through a Commemoration Plan allows the historical value of a property proposed for removal to be expressed and communicated to the public. The Commemoration Plan would outline the symbolic conservation methods through techniques such as plaques and the integration of original materials (i.e., brick masonry, pressed tin elements, windows, or doors). Plaque (s)/displays placed within the existing location (or at an agreed upon off site location) and accessible to passing residents and visitors, would serve to convey information about the property's architectural history.

A Commemoration Plan would:

- Explore options of integrating salvaged materials into any future landscape plans/site plans
- Recommend signage locations; and
- Outline graphics and text for signage.

The development of a Commemoration Plan should be completed prior to demolition activities in order to carry out any potentially recommended actions (i.e., salvage, further documentation).

7.6 Archaeological Assessment (Impact 6)

The Stage 1 Archaeological Assessment carried out by ARA in October 2022, determined that the study area was comprised of a mixture of areas of archaeological potential and areas of no archaeological potential. The areas that have archaeological potential are recommended for stage 2 assessment. These areas included the agricultural fields, and the grassed and wooded areas around the study area. The method recommended for the completion of these stage 2 surveys include, the pedestrian survey method, visual survey method and test pit surveys.

8.0 IMPLEMENTATION

Below, Table 4 outlines the recommended conservation/mitigative/avoidance measures as the development is undertaken. The requirement for these heritage mitigation measures may be incorporated by the Township of Centre Wellington staff into the site plan approval or addressed through the Construction Management Plan.

Table 4: Implementation Schedule

Construction Phase	Mitigation Measures	Implementation Phases		
		Due Diligence	Site Plan	Construction Management Plan
Project Planning and Design	Salvage materials/retain a reputable contractor(s) with proven expertise in salvage removal to determine salvable materials.	✓		
	Cultural Heritage Resource Documentation Report - Confirm the existing documentation within the CHER has been completed to the satisfaction of City staff.	✓		
	Complete a Commemoration Plan		✓	
	Undertake an archaeological assessment (if required)		✓	
	Explore suggested design considerations		✓	
Construction	Vibrations should be identified through a ZOI study (if required)			✓
	Complete a Temporary Protection Plan			✓

9.0 RECOMMENDATIONS

This HIA builds on the previously completed heritage evaluation and noted heritage attributes for 965 Gartshore Street (see Section 3.0).

The proposed development at 965 Gartshore Street involves the construction of the Township of Centre Wellington Operations Centre. The existing historic residence and treelined driveway at 965 Gartshore Street will be retained, while the bank barn, silo, agricultural fields and other outbuildings will be removed. The bank barn and silo form part of the "farmstead cluster" heritage attribute, and the bank barn itself is noted as a heritage attribute; and thus needs a clear rationale for their removal from the landscape. Retention of the barn and silo should be considered, and if not feasible, clear rationale for their removal should be provided. Adaptive reuse of the bank barn and silo can be explored. While a condition assessment was conducted on the Gothic Revival house, a similar report on the condition of the bank barn and silo should be considered.

The OC is proposed to be developed in two phases and involves the construction of new structures. The buildings are described as: "maintenance buildings of the facility, work yards, staff and visitor parking spaces, operational vehicle and equipment parking with storage, materials storage areas, circulation routes, entrance/ exit driveways, storm water management pond, screening berm along the west property line, fueling area, chemical storage, outdoor vehicle wash bay, vac truck dump out dewatering pit, and a publicly accessible bulk water filling station".

Potential negative impacts to 965 Gartshore Street which may result from the current proposed development include:

- Impact 1 –There is the potential for direct impacts to heritage attributes of 965 Gartshore Street from removal of the bank barn, the concrete silo and the organic driveways.
- Impact 2 – Direct impacts are possible resulting from the proposed development which will alter the visual context of the farmstead cluster heritage attribute (Gothic Revival House, Bank Barn, and Silo) by adding buildings that are incompatible in scale, material, massing and location relative to the heritage resource as an Ontario Farmstead.
- Impact 3 - Alteration as a result of the proposed removal of the addition Gothic Revival House may directly impact the heritage sub-attributes of the house itself including the existing brick and window openings covered by the addition.
- Impact 4 – The proposed development will result in the isolation of the Gothic Revival house from its context as part of the farmstead cluster within an Ontario farmstead.
- Impact 5 – The proposed development will result in a change in land-use which entails site alteration to fill in the currently open spaces; specifically, the natural open spaces, agricultural fields, wooded lots, and organic pathways) that contribute to the heritage attributes of the representative example of an Ontario Farm.
- Impact 6 – The proposed development may impact archaeological resources on 965 Gartshore Street.

The heritage attributes of the adjacent properties are not anticipated to be impacted by the proposed development.

The following conservation/mitigation strategies are recommended:

- To protect the Gothic Revival house during the construction phases of the proposed development as well as during the addition demolition, vibrations should be identified through a ZOI study as directed by City Staff.
- To protect the Gothic Revival house during the construction phases of the proposed development as well as during the addition demolition, a Temporary Protection Plan should be created including provisions for fencing between the building and development areas, a list of elements to be conserved (i.e., brick, window and door openings), as well as communication protocols.
- A CHRD report should be prepared. Photographic and written documentation of the properties has been completed as part of the CHER report. It should be confirmed that the existing documentation that has been completed to date can satisfy the scope of a CHRD to the satisfaction of the Township staff.
- Materials should be salvaged from the bank barn and other reusable items from the outbuildings.
- A Commemoration Plan should be developed prior to the demolition of the bank barn and the poured concrete silo. and
- Archaeological assessment stage 2 is required based on the Stage 1 assessment results.

10.0 BIBLIOGRAPHY

ARA
2022 *Stage 1 Archaeological Assessment*, Centre Wellington Operations Centre, 965 Gartshore Street, Township of Centre Wellington

Centre Wellington
2022 *Township of Centre Wellington Request for Proposal #21-22*, Consulting Services, Site Development – Operations Centre

Government of Ontario
2006 *Ontario Regulation 9/06* made under the *Ontario Heritage Act*. Accessed online at: www.e-laws.gov.on.ca/html/source/regs/english/2006/elaws_src_regs_ r06009_e.htm.
2009 *Ontario Heritage Act, R.S.O. 1990, c. O.18*. Accessed online at: www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90o18_e.htm.

GSP Group Inc.
2023 *Planning Justification Report*, 965 Gartshore Street, 970 Gartshore Street & 101 Gregson Court, Township of Centre Wellington, County of Wellington.

Ministry of Citizenship and Multiculturalism (MCM)
2006 *InfoSheet #5: Heritage Impact Assessments and Conservation Plans.* Ontario Heritage Tool Kit Series. Toronto: Ministry of Culture.
2006a *Heritage Property Evaluation: A Guide to Listing, Researching and Evaluating Cultural Heritage Property in Ontario Communities*. Ontario Heritage Tool Kit Series. Toronto: Ministry of Culture.

Ministry of Municipal Affairs and Housing (MMAH)
2020 *Provincial Policy Statement, 2020*. Toronto: Ministry of Municipal Affairs and Housing.

Parks Canada
2010 *Standards and Guidelines for the Conservation of Historic Places in Canada 2nd Edition*. Accessed online at: www.historicplaces.ca/media/18072/81468-parks-s+g-eng-web2.pdf.

Appendix A: Curriculum Vitae

Kayla Jonas Galvin, MA, RPP, MCIP, CAHP
Heritage Operations Manager
ARCHAEOLOGICAL RESEARCH ASSOCIATES LTD.
1 King Street West, Stoney Creek, L8G 1G7
Phone: (519) 804-2291 x120 Fax: (519) 286-0493
Email: kayla.jonasgalvin@araheritage.ca Web: www.araheritage.ca

Biography

Kayla Jonas Galvin, Archaeological Research Associates Ltd.'s Heritage Operations Manager, has extensive experience evaluating cultural heritage resources and landscapes for private and public-sector clients to fulfil the requirements of provincial and municipal legislation such as the *Environmental Assessment Act*, the *Standards & Guidelines for the Conservation of Provincial Heritage Properties* and municipal Official Plans. She served as Team Lead on the Ministry of Tourism, Culture and Sport Historic Places Initiative, which drafted over 850 Statements of Significance and for *Heritage Districts Work!*, a study of 64 heritage conservation districts in Ontario. Kayla was an editor *of Arch, Truss and Beam: The Grand River Watershed Heritage Bridge Inventory* and has worked on Municipal Heritage Registers in several municipalities. Kayla has drafted over 150 designation reports and by-laws for the City of Kingston, the City of Burlington, the Town of Newmarket, Municipality of Chatham-Kent, City of Brampton and the Township of Whitchurch-Stouffville. Kayla is the Heritage Team Lead for ARA's roster assignments for Infrastructure Ontario and oversees evaluation of properties according to *Standards & Guidelines for the Conservation of Provincial Heritage Properties*. Kayla is a Registered Professional Planner (RPP), a Member of the Canadian Institute of Planners (MCIP), is a professional member of the Canadian Association of Heritage Professionals (CAHP) and sits on the board of the Ontario Association of Heritage Professionals.

Education

2016	MA in Planning, University of Waterloo. Thesis Topic: *Goderich – A Case Study of Conserving Cultural Heritage Resources in a Disaster*
2003-2008	Honours BES University of Waterloo, Waterloo, Ontario Joint Major: Environment and Resource Studies and Anthropology

Professional Memberships and Accreditations

Current	Registered Professional Planner (RPP) Member of the Canadian Institute of Planners (MCIP) Professional Member, Canadian Association of Heritage Professionals (CAHP) Board Member, Ontario Association of Heritage Professionals

Work Experience

Current	**Heritage Operations Manager, Archaeological Research Associates Ltd.** Oversees business development for the Heritage Department, coordinates completion of designation by-laws, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations.

2009-2013 **Heritage Planner, Heritage Resources Centre, University of Waterloo**
Coordinated the completion of various contracts associated with built heritage including responding to grants, RFPs and initiating service proposals.

2008-2009, 2012 **Project Coordinator–Heritage Conservation District Study, ACO**
Coordinated the field research and authored reports for the study of 32 Heritage Conservation Districts in Ontario. Managed the efforts of over 84 volunteers, four staff and municipal planners from 23 communities.

2007-2008 **Team Lead, Historic Place Initiative, Ministry of Culture**
Liaised with Ministry of Culture Staff, Centre's Director and municipal heritage staff to draft over 850 Statements of Significance for properties to be nominated to the Canadian Register of Historic Places. Managed a team of four people.

Selected Professional Development

2019 OPPI and WeirFoulds Client Seminar: Bill 108 – More Homes, More Choice, 2019
2019 Annual attendance at Ontario Heritage Conference, Goderich, ON (Two-days)
2019 Information Session: Proposed Amendments to the OHA, by Ministry of Tourism, Culture and Sport
2018 Indigenous Canada Course, University of Alberta
2018 Volunteer Dig, Mohawk Institute
2018 Indigenizing Planning, three webinar series, Canadian Institute of Planners
2018 Cultural Heritage, Archaeology and Planning Symposium
2018 Transforming Public Apathy to Revitalize Engagement, Webinar, MetorQuest
2018 How to Plan for Communities: Listen to the Them, Webinar, CIP
2017 Empowering Indigenous Voices in Impact Assessments, Webinar, International Association for Impact Assessments
2017 Cultural Heritage, Archaeology and Planning Symposium
2017 Capitalizing on Heritage, National Trust Conference, Ottawa, ON.
2016 Cultural Heritage, Archaeology and Planning Symposium
2016 Heritage Rising, National Trust Conference, Hamilton
2016 Ontario Heritage Conference St. Marys and Stratford, ON.
2016 Heritage Inventories Workshop, City of Hamilton & ERA Architects
2015 Cultural Heritage, Archaeology and Planning Symposium
2015 City of Hamilton: Review of Existing Heritage Permit and Heritage Designation Process Workshop.
2015 Leadership Training for Managers Course, Dale Carnegie Training

Selected Publications

2018 "Conserving Cultural Heritage Landscapes in Waterloo: An Innovative Approach." *Ontario Association of Heritage Professionals Newsletter*, Winter 2018.
2018 "Restoring Pioneer Cemeteries" *Ontario Association of Heritage Professionals Newsletter.* Spring 2018. *In print.*
2015 "Written in Stone: Cemeteries as Heritage Resources." *Municipal World*, Sept. 2015.
2015 "Bringing History to Life." *Municipal World*, February 2015, pages 11-12.
2014 "Inventorying our History." *Ontario Planning Journal*, January/February 2015.
2014 "Assessing the success of Heritage Conservation Districts: Insights from Ontario Canada." with R. Shipley and J. Kovacs. *Cities*.

Jacqueline McDermid, BA CAHP
Heritage Team–Project Manager
ARCHAEOLOGICAL RESEARCH ASSOCIATES LTD.
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Email: jacqueline.mcdermid@araheritage.ca Web: www.araheritage.ca

Biography

Jacqueline McDermid has ten years of technical writing and management experience; Seven years direct heritage experience. She has gained seven years of experience conducting primary and secondary research for archaeological and heritage assessments and drafting reports and evaluating property according to Ontario Regulation 9/06 and 10/06 as part of Municipal Heritage Registers. Jacqueline is expert at copy editing heritage reports including checking grammar, consistency and fact checking, to ensure a high-quality product is delivered to clients. She has experience assisting with the drafting of Heritage Conservation District Studies through the drafting of reports for potential Heritage Conservation Districts in the City of Toronto (Weston HCD) and Township of Bradford West Gwillimbury (Bond Head HCD). Jacqueline has proven project management experience gained by completing projects on time and on budget as well as formal Project Management training. In 2018, under a six-month contract as the Heritage Planner at the Ministry of Transportation, acquired considerable experience conducting technical reviews of consultant heritage reports for Ministry compliance including Cultural Heritage Evaluation Reports, Heritage Impact Assessment, Strategic Conservation Plans, and Cultural Heritage Resource Assessments as well as gained valuable insight on provincial heritage legislation (*Ontario Heritage Bridge Guidelines*, *Ontario MTO Environmental Standards and Practices for Cultural Heritage, MTO Environmental Reference for Highway Design – Heritage*, MCM' *Heritage Identification & Evaluation Process* as well as the new *MCM Information Bulletins on Heritage Impact Assessments* and *Strategic Conservation Plans*, and inter-governmental processes. She has extensive Knowledge of heritage and environmental policies including the *Planning Act*, *Provincial Policy Statement*, the *Ontario Heritage Act*, Official Plans, *Environmental Assessment Act* and *Green Energy Act*. Working knowledge of the *Standards and Guidelines for Consultant Archaeologists* (2011), Ministry of Tourism, Culture and Sport.

Education

2000-2007 Honours B.A., Wilfrid Laurier University, Waterloo, Ontario
Major: Near Eastern Archaeology.

Work Experience

Current **Project Manager – Heritage, Archaeological Research Associates, Stoney Creek, ON**

2015-2020 **Technical Writer and Researcher – Heritage, Archaeological Research Associates Ltd., Kitchener, ON**
Research and draft designation by-laws, heritage inventories, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, and Cultural Heritage Resource Evaluations using Ontario Regulation 9/06, 10/06 and the Ontario Heritage Bridge Guidelines.

2018 **Environmental Planner – Heritage Ministry of Transportation, Central Region** – Six-month contract.
Responsibilities included: project management and coordination of MTO heritage program, managed multiple consultants, conducted and coordinated field assessments and surveys, estimated budgets including $750,000 retainer contracts. Provided advice on heritage-related MTO policy to Environmental Policy Office (EPO) and the bridge office.

2017-2018 **Acting Heritage Team Lead – Heritage Archaeological Research Associates Ltd., Kitchener, ON**
Managed a team of Heritage Specialists, oversaw the procurement of projects, retainers; managed all Heritage projects, ensured quality of all outgoing products.

2014-2015 **Technical Writer – Archaeology, Archaeological Research Associates Ltd., Kitchener, ON**
Report preparation; correspondence with the Ministry of Tourism, Culture, and Sport; report submission to the Ministry and clients; and administrative duties (PIF and Borden form completion).

2012-2013 **Lab Assistant, Archaeological Research Associates Ltd., Kitchener, ON**
Receive, process and register artifacts.

2011-2012 **Field Technician, Archaeological Research Associates Ltd., Kitchener, ON**
Participated in field excavation and artifact processing.

2005-2009 **Teaching Assistant, Wilfrid Laurier University, Waterloo, ON**
Responsible for teaching and evaluating first, second, third- and fourth-year student lab work, papers and exams.

2005-2007 **Lab Assistant, Wilfrid Laurier University – Near Eastern Lab, Waterloo, ON**
Clean, Process, Draw and Research artifacts from various sites in Jordan.

Professional Development

2021 "Drafting Statements of Significance." Webinar presented by ARA's K. Jonas Galvin for ACO's job shadow students

2021 Perspectives on Cultural Heritage Landscapes, Cultural Heritage, Archaeology and Planning Symposium by ARA

2021 "Workshop on recent changes in the Ontario planning legislation: what all heritage advocates need to know", webinar, hosted by the Architectural Conservancy of Ontario, with reps from MMAH.

2021 "Historic Mortar Replication and Repointing" webinar presented by IMI

2020 "Workshop on Historic Bridges" (2 Days) Association of Preservation Technology

2021 "Architectural Styles in Ontario" Webinar presented by ARA's K. Jonas Galvin

2019 OPPI and WeirFoulds Client Seminar: Bill 108 – More Homes, More Choice, 2019

2019 Cultural Heritage, Archaeology, and Planning (CHAP) Symposium *Perspectives on Cemeteries and Burials in Ontario* (One Day) by ARA in Burlington ON

2019 Ontario Heritage Conference, Goderich, ON (Two-days)

2019 Rural Heritage, Webinar, National Trust for Canada

2019 Information Session: Proposed Amendments to the OHA, by Ministry of Tourism, Culture and Sport

2019 Indigenous Heritage Places and Perspectives, Webinar, National Trust for Canada

2018 Cultural Heritage, Archaeology, and Planning (CHAP) Symposium *All 94: Truth Reconciliation, and Heritage Policy* (One Day) by ARA in Burlington ON
2018 Grand River Watershed 21st Annual Heritage Day Workshop and Celebration (One day)
2017 Cultural Heritage, Archaeology, and Planning (CHAP) Symposium: *Hidden Histories* (One Day), by ARA in Burlington, ON
2017 Leadership Training for Managers Course, Dale Carnegie Training
2016 Second Annual Cultural Heritage, Archaeology, and Planning (CHAP) Symposium (One Day), by ARA Waterloo ON
2015 Introduction to Blacksmithing, One-Day
2015 Cultural Heritage, Archaeology, and Planning (CHAP) Symposium *Where Are We Now?* by ARA Waterloo, ON
2015 Ontario Heritage Trust symposium, topics included: Cultural landscapes, City building, Tangible heritage, How the public engages with heritage, and Conserving intangible heritage
2014 Community Heritage Ontario, webinar, Part IV and V of the *Ontario Heritage Act*.

Presentations

2019 **Cemeteries and Burials Research.** Cultural Heritage Planning and Archaeology Symposium, Burlington.

Sumra Zia, G.D.A.C., B.Arch
Cultural Heritage Technician
ARCHAEOLOGICAL RESEARCH ASSOCIATES LTD.
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Email: sumra.zia@araheritage.ca Web: https://araheritage.ca/

Sumra Zia, joined the Heritage team at ARA as a Cultural Heritage Technician, and works on heritage impact, assessment, and evaluations. Before joining the heritage team at ARA, Sumra completed a Graduate Diploma in Architectural Conservation from Carleton University in Ottawa. The diploma added to her bachelor's degree in architecture and planning from NED University in Pakistan. She has work experience in architecture design, interior design, urban planning, adaptive reuse projects together with working on historic buildings as a conservation specialist. Sumra is well versed with the Ontario Heritage Act, the Ontario Building Code, Ontario Heritage Toolkit and the Standards and Guidelines for the Conservation of Historic Places. Sumra has worked with local communities on tangible and intangible issues connected to architectural practices and as a part of her Architectural Conservation degree has completed various case studies on heritage properties in Canada, which range from the Royal Botanical Gardens in Burlington to the Elgin Hotel in Ottawa. She is passionate about studying the effects of global climate change on cultural heritage properties and landscapes and how working with climate change could be beneficial for best conservation practices.

Education

2022	Graduate Diploma in Architectural Conservation, Carleton University, Ottawa, ON
2018	B. Arch in Architecture and Planning, NED University of Engineering and Technology, Karachi, Pakistan.

Professional Memberships and Accreditations

Current	PCATP, Pakistan Council for Architects and Town Planners
Current	IAP, Institute of Architects Pakistan

Work Experience

Current	**Cultural Heritage Technician, Archaeological Research Associates Ltd.** Works under the Project Managers on, Heritage Impact Assessments, Built Heritage and Cultural Heritage Landscape Assessments, Cultural Heritage Resource Evaluations, and other cultural heritage services.
2020-2021	**Project Architect, Doodling Studio.** Coordinated the completion of various architectural projects leading a team of draftsmen, 3D visualizers and architects. Coordinated with clients for interior design and selection of materials and textures. Conducted site surveys in coordination with contractors to follow project schedules and workflow.
2019-2020	**Architect, Zeeshan Umair Architects.** Prepared excel spreadsheets for bill of quantities for clients and contractors. Coordinated with vendors and distributors for latest and most viable construction

technology and materials. Punctually dispatched design proposals consisting of drawings and complete set of details for project execution.

2018-2019 **Junior Architect, DAZ Design Studio.**
Worked alongside the principal architect and interior designer on an urban design and restoration project. Coordinated directly with construction workers to ensure adequate and correct implementation of design on site. Prepared working drawings for design execution in line with project deliverables.

2015 **Architecture Intern, Habib Fida Ali Architects.**
Presented design options for a welfare organization office together with a team of senior architects. Explored manual sketching and watercolor mediums for the presentation of ideas, mood boards and final proposals. Delivered hand-made presentations to the board members of the welfare organization for interior space options.

Selected Project

Scoped Heritage Impact Assessment
Current **7119 Tecumseh Road,** Municipality of Lakeshore. Client: Mr. and Mrs. Lachine

Heritage Impact Assessment and Commemoration Plan
Current **Smith-Carrique Farm,** City of Oakville. Client: Schelegel Villages

Cultural Heritage Evaluations Report
Current **George Harvey Collegiate Institute**, City of Toronto. Client: Toronto Lands Corporation (TLC)

Heritage Impact Assessment
Current **45 Canby Street,** City of Thorold. Client: RO Beam Construction

Heritage Impact Assessment
Current **587 Highbury Ave,** City of London. Client: Michael Clark Construction

Municipal Designation Reports and Municipal Heritage Registers
Current **Brampton Municipal Heritage Register Updates,** City of Brampton. Client: City of Brampton

Cultural Heritage Evaluations Reports (Provincial Properties)
2022 **Crysler Heritage Park/Upper Canada Village CHE**, Town of Morrisburg. Client: St. Lawrence Parks Commission.

Condition Assessment
2022 **Christ Church**, City of Hamilton. Client: Canon Terry Charters.

Adaptive Reuse and Rehabilitation Design
2018 **Zaib un Nisa Street**, City of Karachi. Client: Municipality of Saddar Town.

Residential Interior Renovation

2021 **Honda Residence**, City of Karachi. Client: Sheikh Shiraz Mubashir and Shiekh Moiz Mubashir.

Professional Development

2022 AODA Customer Service Standards Training
- WHIMIS
- ACO Arch styles presentation

2022 ICOMOS University Forum, Just Transitions: Heritage Education for Climate Adaptation, hosted by academic members of the Climate Heritage Network

2022 Hobin Prize in Architecture & City Building awards ceremony

2021 Carleton Workshops
– Student well-being
– Anti-racism
– Research Ethics

2021 Untold Histories - Storytelling through Heritage, webinar by .DWG

2021 Changing the Narrative: Dispelling Homophobia, hosted by Afro-Caribbean Mentorship Program.

2021 DWG + Architectures of Hiding | Indigenous Walks

2021 Ingenious Talks Online: Recording Historic Sites from Home - Developing A Collaborative Learning Approach for Architectural Conservation and Sustainability, hosted by Carleton University, Ottawa.

2021 Demographic Re-Assembly - Online Forum, Ottawa as a case study for how cities respond to demographic shifts and the forces behind them.

Appendix B: Cultural Heritage Evaluation Report (ARA 2023)

Planning Justification Report

965 Gartshore Street
970 Gartshore Street & 101 Gregson Court
Township of Centre Wellington
County of Wellington

Official Plan Amendment
Zoning By-law Amendment

Township of Centre Wellington

May 2023

Prepared by:
GSP Group Inc.
72 Victoria Street South, Suite 201
Kitchener, ON
N2G 4Y9

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1.0 Introduction

1.1 Report Content and Structure

This Planning Justification Report has been prepared to provide a description of the proposed development at 965 Gartshore Street and future industrial uses at 970 Gartshore Street and 101 Gregson Court, as well as planning justification for the noted applications.

The objectives of this Report are as follows:

- To provide a description of the Site's existing conditions and its context within the Township of Centre Wellington, as well as the surrounding neighbourhood (Section 2);
- To outline the Proposed Development and required applications to facilitate the development (Section 3).
- To provide a summary of the technical reports prepared in support of the applications (Section 4).
- To provide an overview and analysis of the relevant provincial and local planning policies and guidelines relevant to the proposed applications (Section 6); and,
- To provide a planning opinion and justification supporting the proposed applications based on the suitability of the Site and the land use policy and regulatory framework (Section 6).

A draft Zoning By-law for the property municipally known as 965 Gartshore Street is included in this report as **Appendix No. 1**. **Appendix No. 2** contains the draft Zoning By-law for the property municipally located at 970 Gartshore Street. **Appendix No. 3** contains the draft Zoning By-law for the property municipally known as 101 Gregson Court.

1.2 Background

GSP Group Inc. ("GSP") has been retained by R.J Burnside & Associates Ltd., on behalf of the Township of Centre Wellington (here in referred to as the "Township") prepare a Planning Justification Report in support of a proposed municipal operations centre that includes a public works yard and administration building on the property municipally known as 965 Gartshore Street in the Township of Centre Wellington. The Planning Justification Report will also be prepared in support of proposed industrial uses on the properties located at 970 Gartshore Street and 101 Gregson Court in the Township of Centre Wellington.

965 Gartshore Street

Currently, the Township is operating from six public work facilities that are located across the municipality and include:

1. West Garafraxa Works Garage and office with separate salt/ sand storage building located at 8460 Wellington Road 19, Belwood.
2. Infrastructure Service Administration Office and Pilkington Garage located at 7444 Wellington County Rd, 21, Elora. These offices serve staff from Engineering, Infrastructure Services and Source Water Protection,
3. Elora West Roads Garage is located at 23 Park Road, Elora.
4. Fergus Water Services Shop and offices located at 295 Queen Street East, Fergus.
5. Fergus East Roads Garage and separate salt/sand storage building located at 600 Glengarry Crescent, Fergus.
6. Parks Barn, Farmhouse offices, and Greenhouses located at the Centre Wellington Community Sportsplex at 660 Belsyde Avenue, Fergus.

The Township recently conducted an Operations Centre Space Needs Assessment Study that concluded the current facilities are experiencing overcrowding and deficiencies based on the age and operation of these facilities. The report highlighted the need for additional capacity to maintain levels of service for the increasing population and employment growth in the Township. The preferred option was to build a new operations facility on a 20-acre site using a two phased construction approach.

On March 13, 2023, Report IS2023-05 was represented to Council by staff that outlined two options for future operations centre that included:

- Option 1: Based on space needs from 2021 Space Needs Assessment Study; and
- Option 2: Based on space needs form 2021 Space Needs Assessment Study; and also including current and forecasted future staff from the Planning & Development Department.

Township Council decided to proceed with Option 2 and accommodate the needs to future staff from the Planning & Development Department. To facilitate the proposed development, a Zoning By-law Amendment application is required for the property located at 965 Gartshore Street. The Zoning By-law Amendment proposes to rezone the property from an ‘Agricultural (A)’ zone to an ‘Institutional (IN-XX)’ zone with site-specific zoning regulations to facilitate accessory structures on the property.

970 Gartshore and 101 Gregson Court

The Township would like to add more available industrial land to the community. The Township currently owns two properties at 970 Gartshore and 101 Gregson Court that are located within an industrial area in north Fergus. The proposal is to rezone the properties to facilitate permit industrial land use on both properties. To facilitate the proposed land use, an Official Plan Amendment and Zoning By-law Amendment is required. The Official Plan Amendment proposes to redesignate the lands from Future Development to Industrial. The Zoning By-law Amendment proposes to change the existing zoning from a 'Future Development (FD)' zone to an 'General Industrial (M2)' zone to permit industrial-related uses on the property.

1.3 Proposed Development

965 Gartshore Street

The Township of Centre Wellington is proposing to develop a 20-acre property located municipally at 965 Gartshore Street to serve as the future location of a new municipal operations centre, works yard and administration centre (herein referred to the "future Public Works Site"). The future Public Works Site will consist of a 2-storey administration building, a storage bunker, vehicular storage structure, fuel storage area, material storage area and a greenhouse. The existing farmhouse will be maintained and repurposed for the proposed development. Other site features being proposed include a stormwater management facility, a landscape berm, 2.4 metre noise wall, community garden and community trail. Future phases of development may consist of an expansion to the administration building and vehicular storage area, as well as the addition of a salt storage shed.

The future Public Works Site will be accessible by four proposed entrances provided along Gartshore Street, including one full movement driveway, one inbound driveway and one outbound driveway. The proposed development will include 80 parking spaces for staff, in addition to 16 visitor parking spaces and 4 barrier-free spaces (see **Figure 1**).

970 Gartshore Street and 101 Gregson Court

The Township of Centre Wellington is proposing to change the land use on the properties located at 970 Gartshore Street and 101 Gregson Court (herein referred to as "future Industrial Sites"). The future Industrial Sites will have frontage onto both Gartshore Street and Gregson Court. There is also available municipal infrastructure to service future development on the properties.

Township of Centre Wellington
Operations Centre

Conceptual Site Plan
965 Gartshore St. Fergus
March 28, 2023

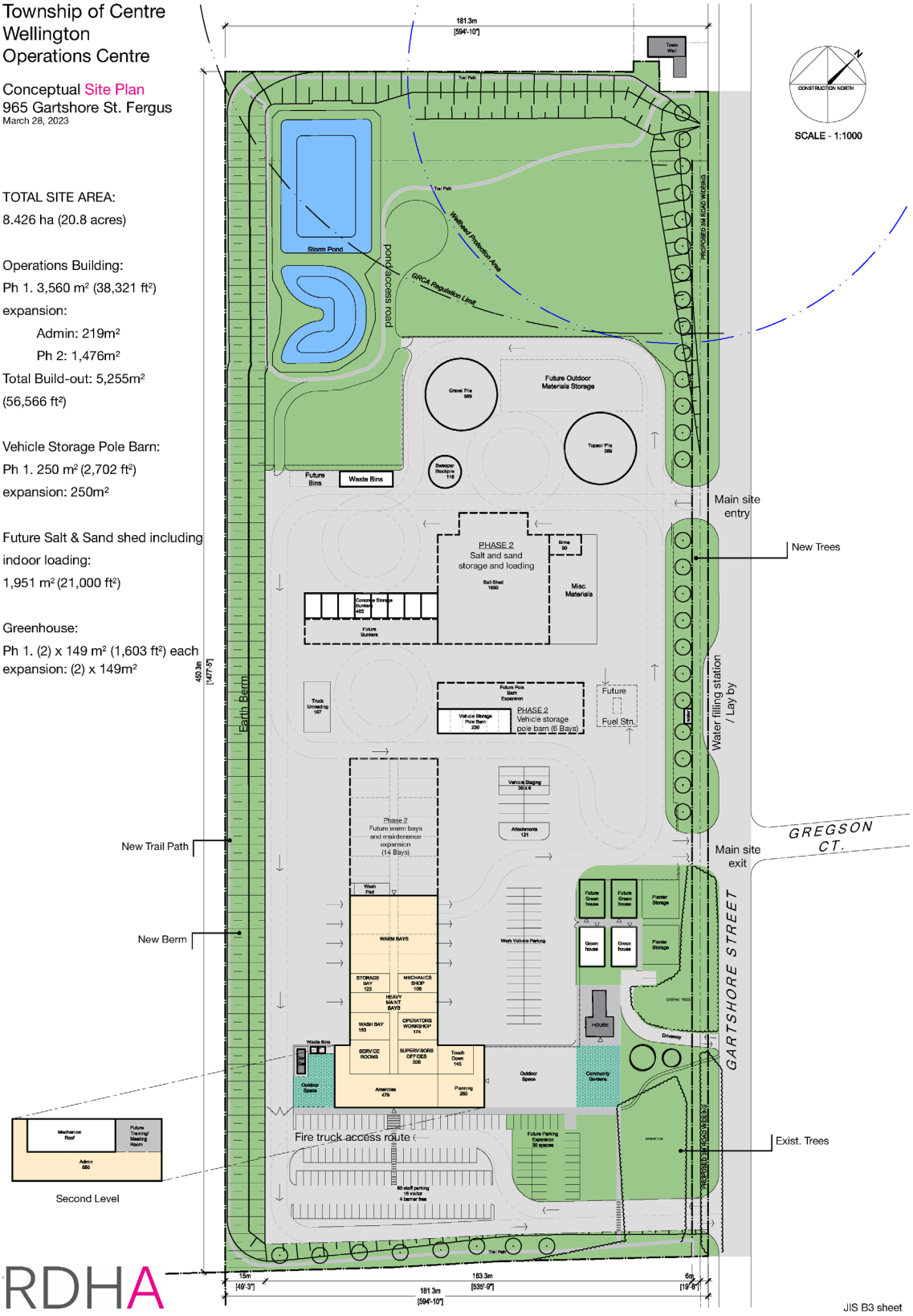
TOTAL SITE AREA:
8.426 ha (20.8 acres)

Operations Building:
Ph 1. 3,560 m² (38,321 ft²)
expansion:
Admin: 219m²
Ph 2: 1,476m²
Total Build-out: 5,255m²
(56,566 ft²)

Vehicle Storage Pole Barn:
Ph 1. 250 m² (2,702 ft²)
expansion: 250m²

Future Salt & Sand shed including indoor loading:
1,951 m² (21,000 ft²)

Greenhouse:
Ph 1. (2) x 149 m² (1,603 ft²) each
expansion: (2) x 149m²



RDHA

JIS B3 sheet

GSP group

Concept Plan
Source: GSP Group (2023)

Figure 1

1.4 Supporting Studies

This report should be read in conjunction with other reports/drawings prepared in support of the proposed applications:

- Concept Plan prepared by RDHA.
- Functional Servicing and Stormwater Management Report, dated April 2023, prepared by R.J Burnside & Associates Ltd.
- Traffic Impact Study (Final Revised), dated November 2022 (Revised May 2023), prepared by R.J Burnside & Associates Ltd.
- Arborist Report, dated February 2023, prepared by R.J Burnside & Associates Ltd.
- Cultural Heritage Evaluation Report, dated January 2023, prepared by Archaeological Research Associates Ltd.
- Stage 1 Archaeological Assessment, dated October 2022, prepared by Archaeological Research Associates Ltd.
- Preliminary Geotechnical Investigation, dated December 2022, prepared by JLP Services Inc.
- Building Condition Assessment, dated November 2022, prepared by R.J Burnside & Associates Ltd.
- Noise Impact Assessment, dated February 2023, prepared by R. J. Burnside & Associated Ltd.
- Environmental Impact Study (Revision 1), dated April 2023, prepared by R.J. Burnside & Associates Ltd.
- Hydrogeological Assessment, dated May 2023, prepared by R.J. Burnside & Associates Ltd.

These reports/studies have been summarized in Section 4 of this Report.

2.0 Site Description and Context

2.1 Site Location and Description

965 Gartshore Street

The property of the future Public Works Site is municipally known as 965 Gartshore Street and has a frontage on Gartshore Street. The Site is approximately 8.4 hectares (20.8 acres) in area with approximately 450 metres of frontage along Gartshore Street. The north end of site is within the Grand River Conservation Authority's (GRCA) regulation limit. The property is also located in a wellhead protection area (WHPA). The northeast corner of the site intersects with the WHPA-A while the remainder of the property is within WHPA-B.

The site has an overall high point near the northeast corner of the property. The site naturally drains east to west through an overland flow to an adjacent agricultural property.

The site is currently occupied with a two-storey residential farmhouse that includes a small addition (mud room). There is a small green house that is attached to the addition and to the main dwelling. Other structures on the site include a bank barn, concrete silo, and several outbuildings (meat shop, sheds, chicken coop, two (2) metal silos, storage building and pigsty). There are existing laneways that have evolved over the years that link the farm's structures together. There is also a tree-lined driveway leading to the main farmhouse dwelling.

970 Gartshore Street and 101 Gregson Court

The property municipally known as 101 Gregson Court is approximately 5,742 square metres (1.4 acres) in area and has frontage on both Gregson Court and Gartshore Street. The site is currently vacant and is characterized as a grassy field.

The property municipally known as 970 Gartshore Street is irregular in shape and has frontage on Gartshore Street, Gregson Court, and Glengarry Crescent. The site is approximately 57.8 acres (23.4 hectares) in area and is currently vacant. The property is largely characterized as a grassy field that also contains a large, wooded area with an identified wetland.

See **Figure 2** for the site location of 965 Gartshore Street, 970 Gartshore and 101 Gregson Court.

GSP group

Site Location
Source: Google Earth (2023)

Figure
2

2.2 Surrounding Land Uses

965 Gartshore Street

The site is surrounded by agricultural lands directly to the west and southwest and bound by Gartshore Street to the northeast. Beyond Gartshore Street to the northeast are lands used for industrial purposes. There is a residential subdivision immediately south-east of the site.

There are amenities within 800 metres, or a 10-minute walk, of the site. There is a Freshco (grocery store), Walmart and commercial food establishments including Wild Wings, Dairy Queen, and Guac Mexi Grill, all within walking radius from the Site. The site is also located close to Gibbons Drive Park.

The site is accessible from Gartshore Street which is a north-south arterial road under the jurisdiction of the County for the section south of Glengarry Crescent and under the jurisdiction of the Township north of Glengarry Crescent. Gartshore Street has a 2-lane urban cross section south of the Elora Cataract Trailway and has a rural cross section to the north.

970 Gartshore Street and 101 Gregson Court

The properties at 970 Gartshore Street and 101 Gregson Court are located across from each other separated by a municipal road (Gregson Court). The properties are surrounded by a wooded area and agricultural lands to the immediate north. Both properties are bound by Gartshore Street to the west. Further west beyond Gartshore Street is the proposed future Public Works Site. To the south and east the properties are surrounded by existing industrial uses.

See **Figure 3** for surrounding land uses.

GSP group

Surrounding Context

Source: Grand River Conservation Authority (2023)

Figure 3

3. Proposed Development

3.1 Overview of Proposed Development

The Township of Centre Wellington is proposing to develop a new operations Centre at 965 Gartshore Street. The proposed facility will occupy approximately 20 acres and will occur in two phases. Phase 1 of the facility will include an operations building with a gross floor area (GFA) of 3,560 m^2 (38,321 ft^2). It will also contain a 250 m^2 (2,702 ft^2) vehicle storage, pole barn and two 149 m^2 (1,606 ft^2) greenhouses. Phase 2 includes a 1,476 m^2 (15,888 ft^2) of additional GFA in the operations building as well as a 1,951 m^2 (21,000 ft^2) salt and storage building including interior loading. Phase 2 will also include an additional 219 m^2 (2,357 ft^2) of GFA to the operations building, and two additional greenhouses with 149 m^2 (1,603 ft^2) of GFA.

Phase 1 of the operations facility will include 80 parking spaces for staff in addition to 16 visitor spaces and 4 barrier-free spaces. Phase 2 of the facility has been planned to accommodate 30 additional parking spaces.

Additionally, the Township would like to change the land use on the adjacent properties at 970 Gartshore Street and 101 Gregson Court to permit industrial-related uses on the property. Currently, there is a short supply of industrial land in the Township to attract new businesses to the community.

3.2 Overview of Required Applications

To facilitate the future Public Works Site, an application for a Zoning By-law Amendment is required. To facilitate the rezoning of future Industrial Sites, an Official Plan Amendment and Zoning By-law Amendment application is required. These applications are further detailed in the following sections.

3.2.1 Zoning By-law Amendment (965 Gartshore Street)

The future Public Works Site is zoned ‘Agricultural’ with an ‘Environmental Protection Overlay’ according to Schedule A, Map 80 of the Township Zoning By-law. The Zoning By-law Amendment proposed to rezone the site to a specialized ‘Institutional’ (IN-XX) zone. The Zoning By-law Amendment proposes to rezone the site as follows:

- Rezone the site on Map 80 from ‘Agricultural’ zone to an ‘Institutional’ zone with site-specific zoning regulations to facilitate accessory structures on the site.

A summary of the site-specific zoning regulations being proposed are detailed below:

- Relief from Section 4.2, Table 4B, Column B to permit accessory structures within the required front yard setback.

- Relief from Section 4.2, Table 4B, Column D to permit an accessory structure to have a maximum height of 13 metres.
- Relief from Section 4.2, Table 4B, Column E to allow accessory structures to be constructed prior to the main building.

A draft of the proposed Zoning By-law Amendment is included as **Appendix No. 1**

3.2.2 Official Plan Amendment (970 Gartshore Street & 101 Gregson Court)

The future Industrial Sites are currently located within the urban boundary of Fergus, and outside of the built-up area. The sites are currently designated Future Development in the Township Official Plan. To facilitate future industrial land use on the sites, an Official Plan Amendment is required to redesignate the portion of lands designated Future Development to Industrial.

3.2.3 Zoning By-Law Amendment (970 Gartshore Street & 101 Gregson Court)

The property at 970 Gartshore Street is currently zoned 'Future Development (FD)', 'General Industrial (M2)' with an Environmental Protection Overlay. The property at 101 Gregson Court is currently zoned 'Future Development (FD)'. To facilitate future industrial use on both properties, the 'Future Development (FD)' zone is proposed to be rezoned to a 'General Industrial (M2)' zone.

A draft Zoning By-law Amendment for these properties has been included in this report in **Appendix No. 2** and **Appendix No. 3**.

4. Supporting Studies

The following studies have been prepared in support of the proposed development at 970 Gartshore Street. For additional details on the summaries below, please consult the full reports.

4.1 Functional Servicing / Stormwater Management Report

A Functional Servicing and Stormwater Management Report, dated April 2023, was prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- The proposed future Public Works Site will be able to be serviced using existing water and sanitary services within the Right-of-Way (the "ROW").
- A new 150 mm watermain will be required to provide domestic and fire servicing, with a 200 mm sanitary sewer required to connect into the existing 250 mm sanitary line.
- The design of the site meets the requirements for site grading and stormwater management with a proposed wet pond on the west property line to outlet to Gartshore Street.
- The existing municipal infrastructure is sufficient and capable of supporting the proposed development.
- No external updates to the existing infrastructure will be required.

4.2 Noise Impact Assessment

A Noise Impact Assessment, dated February 2023, was prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- The site will house snowplows, municipal works vehicles, materials such as salt and sand for winter maintenance, a front-end loader, a fuel depot, and all facilities needed to maintain the equipment. The site will also contain an administrative building that will have HVAC units and an emergency generator.
- Based on the predicted sound levels it was determined that noise mitigation measures are required for the future Public Works Site.
- The following noise mitigation measures were required to meet the applicable MECP noise standards:
    - An acoustic barrier along the south-west property line is proposed to mitigate the noise exceedances. The acoustic barrier is 2.6 m tall along the most southern property line.

    - The norther 245 m of the south-west property line requires a shorter barrier of 2.2 m tall. Both barriers are proposed to sit atop a 2.5 m earth berm, constructed at a 3:1 slope within the 15m allowance.
    - Acoustical barriers must be constructed in a structurally sound manner, designed to withstand wind and snow loading.
    - The barrier must be constructed without cracks and surface gaps.
- Prior to Issuance of Building Permit an Acoustical Consultant should be retained to review the shop drawings of the required acoustic barriers.
- Prior to operations beginning at the site, an acoustic engineer should confirm that the acoustic barrier and berm have been properly constructed.

4.3 Arborist Report

An Arborist Report, dated February 2023, was prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- A variety of planted deciduous and coniferous trees are found on the subject property.
- A total of 331 trees were individually assessed.
- A total of 247 trees included in the assessment are recommended for preservation. These trees are setback from the construction or can be protected and have a good or fair condition.
- Tree protection fencing is recommended to be installed to reduce impact to trees from construction where construction is proposed within the project site.
- A total of 84 trees are recommended for removal. These trees either conflict with the proposed development elements or significant impacts to root zones will occur due to the implementation of the plan or have been given a poor rating based on its condition on the date of inventory.
- There are a total of 10 trees recommended for removal based on being in poor/dead condition; there are a total of 71 trees recommended for removal due to conflicts with their location within the proposed new development; 2 Ash species to be removed due to the rapid spread of Emerald Ash Borer disease.
- As per the Township compensation requirements, 168 trees will need to be replanted on site to accommodate the trees currently noted for removal.

4.4 Transportation Study

A Transportation Study, dated March 2023 (Revised May 2023), was prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- Under existing and future conditions, all intersections are and will operate with excess capacity.
- To minimize future queuing deficiency, it is recommended that the signal timing be optimized at this intersection.
- It is recommended that the Township continue to monitor traffic operations at this intersection, to confirm the signal optimization requirements.
- Phase 1 of the future Public Works Site will not result in any external intersection improvements.
- No additional lane requirements will be required because of site traffic. Access and circulation analyses confirms that the future Public Works Site can accommodate all expected design vehicles.

4.5 Archaeological Assessment

A Stage 1 Archaeological Assessment, dated October 17, 2022, was prepared by Archaeological Research Associates Ltd in support of the future Public Works Site. The report concluded that:

- The Stage 1 assessment determined that the study area comprises a mixture of areas of archaeological potential land areas of no archaeological potential. It is recommended that the identified areas of archaeological potential be subject to a Stage 2 property assessment.

4.6 Cultural Heritage Evaluation Report

A Cultural Heritage Evaluation Report (CHER), dated January 19, 2023, prepared by Archaeological Research Associates Ltd. In support of the future Public Works Site. The report concluded that:

- The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however, it contains a designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property.
- The structure of interest in the Cultural Heritage Landscape include: the Gothic revival farmhouse, the bank barn, and the poured concrete soil beside the barn, the laneway that evolved over the course of time linking the farm's structures, and the tree-lined driveway.
- A Heritage Impact Assessment (HIA) should be undertaken to identify impacts to the cultural heritage value and heritage attributes of the subject property. Further, the HIA should consider the adjacent properties that the Township has flagged for potential inclusion on the municipal heritage register.

4.7 Preliminary Geotechnical Investigation

A Preliminary Geotechnical Investigation, dated December 19, 2022, was prepared by JLP Services Inc., in support of the future Public Works Site. The report concluded that:

- The boreholes encountered a surficial deposit of topsoil, followed by discontinuous deposits of sandy silt till and silty sand.
- The groundwater level appears to range between 1.2 to 3.8 metres below grade, with the localized groundwater table considered to be a perched condition. Seasonal fluctuations of the shallow groundwater level should be anticipated.

4.8 Building Condition Assessment

A Building Condition Assessment, dated November 17, 2022, was prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- The building at 965 Gartshore Street consists of a two-storey residential farmhouse structure. It appears that it may have been constructed in the late 1800s based on building materials and practices used to build it.
- It is recommended to mediate the moisture issues in the basement, a general excavation, waterproofing and weeping title installation program will be required.
- A structural review should be completed to determine if any of the structural wood members in the basement and attic have suffered moisture related damage.
- The mudroom additional, the greenhouse structure and the covered porch should all be removed as they are not original to the structure, were constructed improperly and are in poor condition.
- The sheet metal roofing system is aged and will likely require replacement within the next 10 years.
- A significant masonry repair program will be required to properly restore the clay brick veneer.
- The windows can remain in service well beyond the 10-year horizon of the assessment.
- Other recommendations for furnace, air conditioning, wood fireplace, ceiling fans, plumbing, electrical, life safety system are further detailed in the report.

4.9 Environmental Impact Study

An Environmental Impact Study, dated April 2023, prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site. The report concluded that:

- Portions of the County of Wellington's Natural Heritage System are found on the north area of the site and require characterization and demonstration that no negative impacts to the features and functions will result from the development.
- The following features are, or may be, present within 120 metres of the future Public Works Site:
    - Irvine Creek Wetland Complex
    - Colonial Waterbird Nesting Area
    - Significant Wildlife Habitat, Bat Maternity Colonies, Turtle Wintering Areas, Colonially – Nesting Bird Breeding Habitat, Deer yarding Areas, Deer Winter Congregation Areas, Amphibian Breeding Habitat (Woodland), Terrestrial Crayfish, Special Concern and Rare Wildlife Species and Habitat of endangered and threatened species.
- A 30 metres buffer has been applied to the Irvine Creek PSW. A total area of 228 m^2 will be impacted by grading on the site. Enhancement in this area is recommended.
- A list of proposed mitigation measures is contained in Table 8.1 of the EIS.
- The proposed development is to replace croplands and the rural residential farm operations with a public works yard and administration building. Retention of trees within the tree collection, south hedgerow and around the rural residential area is proposed. Development is buffered from the natural heritage functions of the wetland, so impacts are not anticipated if mitigation measures are implemented.

5.0 Hydrogeological Assessment

A Hydrogeological Assessment, dated May 2023, prepared by R.J. Burnside & Associates Ltd., in support of the future Public Works Site has included that:

- The water table on the property ranges from 1 to 4 m below surface across the subject lands.
- Should excavations during construction or servicing extend below the water table the local soils may need to be dewatered.
- If dewatering is above the regulated threshold, a standard Permit to Take Water (PTTW) process applies. Thresholds less than 400,000 L/d can proceed under the Environmental Activity Sector Registry (ESAR) process.
- In both cases, a scientific study must review the potential for environmental impacts and provide mitigation and monitoring measures to the satisfaction of the MECP or other review agency.
- Dewatering, if required, is expected to be limited to the shallow overburden and bedrock wells are not expected to be impacted (water wells within 500 m were

reviewed). It is recommended that the scientific study required for PTTW or EASR should include an assessment of the potential zone of influence for dewatering and within that zone, identify any wells that require monitoring during the dewatering process.

- Prior to or during construction, all inactive wells within the development footprint need to be property decommissioned by a licensed water well contractor to Ontario Regulation 903.

5. Planning Policy Framework

The following section sets out the relevant planning policy framework to assess the appropriateness of the proposed Official Plan Amendment and Zoning By-law Amendments in the context of provincial and local policies and regulations.

5.1 Ontario Planning Act

The *Planning Act* R.S.O. 1990, c.P.13 establishes the policy-led land use planning system for Ontario that outlines matters of provincial interest as part of municipal planning decisions and provides for statutory planning processes in Ontario.

Section 2 of the *Planning Act* identified the breadth of matters considered as being provincial interest which a municipality must "have regard to" in carrying out its responsibility under the Planning Act. These matters are general in nature and broad in range. These matters are captured in more detail through the policy statements and provincial plans issued under Section 3 of the *Planning Act* and through the Official Plan of the City of Guelph which are reflected in subsequent section of this Planning Justification Report.

Section 3(5) of the Planning Act requires that decisions of municipal councils regarding the exercise of authority concerning planning matters, including decisions on Planning Act applications:

(a) Shall be consistent with the policy statements issued under subsection (1) that are in effect on the date of the decision; and

(b) Shall conform with the provincial plans that are in effect on that date, or shall not conflict with them, as the case may be.

The 2020 Provincial Policy Statement was issued under Section 3(5) and is applicable and relevant to the consideration of the proposed application. The 2020 Growth Plan for the Greater Horseshow, 2017 Greenbelt Plan, 2017 Oak Ridges Moraine Conservation Plan, and 2017 Niagara Escarpment Plan were also issued under Section 3(5). The 2020 Growth Plan for the Greater Golden Horseshow applies to all the sites.

The information and materials to be provided by an application under subsection 22(4) of the *Planning Act* includes the following for an Official Plan Amendment application with regard to the future Industrial Sites:

	Planning Act Requirement	Information Provided
1.	The name, address, telephone number and if applicable, the email address of the applicant.	GSP Group c/o Valerie Schmidt 201 – 72 Victoria Street South Kitchener, ON N2G 4Y9 vschmidt@gspgroup.ca 519-569-8883
2.	The name of the municipality or planning board that is being requested to initiate the amendment to its official plan.	Township of Centre Wellington
3.	The date of the request to the municipality or planning board	May 23, 2023
4.	The name of the official plan requested to be amended.	Township of Centre Wellington Municipal Official Plan
5.	A description of the subject lands, including such information as the municipality, or the geographic township in unorganized territory, concession and lot numbers, reference plan and part numbers, and street names and numbers.	970 Gartshore Street 101 Gregson Court
6.	If known, the approximately area of the subject land, in metric units.	970 Gartshore Street Area – approx. 60.4 acre (24.4 hectares) 101 Gregson Court Area – 1.4 acres (0.6 hectares)
7.	Whether the requested amendment changes, replaces or deletes a policy in the official plan.	No.
8.	If the answer to section 7 is yes, the policy to be changed, replaced or deleted.	Not applicable.
9.	Whether the requested amendment adds a policy to the official plan.	No
10.	The purpose of the requested amendment.	To amend the land use designation from Future Development to Industrial to recognize the MDS setback no longer applies to the properties.

10.1	In the case of a requested amendment to a lower-tier municipality's official plan, the current designation of the subject land in the upper-tier municipality's official plan and an explanation of how the amendment conforms with the upper-tier municipality's official plan.	The County of Wellington Official Plan designates both properties as part of the Fergus Urban Centre. On property at 970 Gartshore Street, the properties is also designated as Core Greenlands and Greelands. The lands to be redesignated to Industrial are located with the Urban Centre which permits a full range of land use opportunities including industrial.
11.	The current designation of the subject land in the official plan and the land uses that the designation authorizes.	The current land use designation on the property at 970 Gartshore Street is Industrial, Future Development, Core Greenlands and Greenlands. The current land use designation on the property at 101 Gregson Court is Future Development. Future Development permits existing uses and non-intensive agricultural operations.
12.	Whether the requested amendment changes or replaces a designation in the official plan.	The requested amendment is proposing to change a designation in the official plan.
13.	If the requested amendment changes or replaces a designation, the designation to be changed or replaced.	The requested amendment is to change the land use on both properties from Future Development to Industrial. All other land use designations will remain.
14.	The land uses that the requested official plan amendment would authorize.	The amendment would request an Industrial land use on the properties.
15.	Whether water will be provided to the subject land by a publicly owned and operated piped water system, a privately owned and operated individual or communal well, a lake or other water body, or other means.	Water will be provided by a publicly owned and operated system.

16.	Whether sewage disposal will be provided to the subject land by a publicly owned and operated sanitary sewage system, a privately owned and operated individual or communal septic system, a privy or other means.	Sewage disposal will be provided by a publicly owned and operated system.
17.	If the requested amendment would permit development on a privately owned and operated individual or communal septic system and more than 4500 litres of effluent would be produced per day as a result of the development being completed, (a) a servicing options report; and (b) a hydrogeological report.	Not applicable.
18.	Whether the subject land or land within 120 metres of it is the subject of an application by the applicant under the Act for, (a) a minor variance or a consent; (b) an amendment to an official plan, a zoning by-law or a Minister's zoning order; or (c) approval of a plan of subdivision or a site plan.	Yes. Zoning By-law Amendment is being proposed at 965 Gartshore Street.
19.	If the answer to section 18 is yes, the following information about each application: (a) its file number; (b) the name of the approval authority considering it; (c) the land it affects; (d) its purpose; (e) its status; and (f) its effect on the requested amendment	The adjacent property at 965 Gartshore Street is subject to a Zoning By-law Amendment to facilitate the development of a public works facility. The amendment is being processed simultaneously. No file number has been assigned.
20.	If a policy in the official plan is being changed, replaced or deleted or if a policy is being added, the text of the requested amendment.	Not applicable.

21.	If the requested amendment changes or replaces a schedule in the official plan, the requested schedule and the text that accompanies it.	Included as part of the Planning Justification Report.
22.	If the requested amendment alters all or any part of the boundary of an area of settlement in a municipality or establishes a new area of settlement in a municipality, the current official plan policies, if any, dealing with the alteration or establishment of an area of settlement.	Not applicable.
23.	If the requested amendment removes the subject land from an area of employment, the current official plan policies, if any, dealing with the removal of land from an area of employment.	Not applicable.
24.	An explanation of how the requested amendment is consistent with the policy statements issued under subsection 3 (1) of the Act.	See Planning Justification Report.
25.	Whether the subject land is within an area of land designated under any provincial plan or plans.	Yes, Growth Plan for the Greater Golden Horseshoe.
26.	If the answer to section 25 is yes, an explanation of how the requested amendment conforms or does not conflict with the provincial plan or plans.	See Planning Justification Report.
26.1	A proposed strategy for consulting with the public with respect to the request.	Participate in the Statutory Public Meeting.
27.	An affidavit or sworn declaration by the applicant certifying that the information required under this Schedule and provided by the applicant is accurate.	See **Appendix No. 4**.

The information and materials to be provided by an application under subsection 34(10.1) of the *Planning Act* includes the following for a Zoning By-law Amendment application for all the future Public Works Site and future Industrial Sites:

	Planning Act Requirement	Information Provided
1.	The name, address, telephone number and if applicable, the email address of the applicant.	GSP Group c/o Valerie Schmidt 201 – 72 Victoria Street South Kitchener, ON N2G 4Y9 vschmidt@gspgroup.ca 519-569-8883
2.	The date of the request to the municipality or planning board	May 23, 2023
4.	If known, the names and addressed of the holders of any mortgages, charges or other encumbrances in respect of the subject lands.	None.
5.	The current zoning of the subject land.	970 Gartshore Street – Future Development (FD Zone), General Industrial (M2 Zone) and Environmental Protection (EP). 101 Gregson Court – Future Development (FD) Zone. 965 Gartshore Street – Agricultural (A) Zone.
6.	The nature and extent of the rezoning requested.	970 Gartshore Street – to amend the zoning from FD to M2 to permit industrial use of the property. 101 Gregson Court – to amend the zoning from FD to M2 to permit industrial use of the property. 965 Gartshore Street – to amend the zoning from Agricultural (A) to Institutional (IN-XX) to permit a public works site on the property and to recognize site-specific provisions

		to facilitate accessory structures on the property.
7.	The reason why the rezoning is requested.	970 Gartshore Street - to permit industrial use of the property. 101 Gregson Court – to permit industrial use of the property. 965 Gartshore Street – to permit a public works facility on the property and to recognize site-specific provisions to facilitate accessory structures on the property.
8.	If the subject land is within an area where the municipality has pre-determined the minimum and maximum density requirements or the minimum and maximum height requirements, a statement of these requirements.	Not applicable.
9.	A description of the subject land, including such information as the municipality, concession and lot numbers, registered plan and lot numbers, reference plan and part numbers and street names and numbers.	970 Gartshore Street 101 Gregson Court 965 Gartshore Street
10.	The frontage, depth and area of the subject land, in metric units	970 Gartshore Street Frontage – approx. 82 metres Depth – approx. 345 metres Area – approx. 60.4 acre (24.4 hectares) 101 Gregson Court Frontage – approx. 67 metres Depth – approx. 68 metres Area – 1.4 acres (0.6 hectares) 965 Gartshore Street Frontage – 445 Depth – 181 metres

		Area – 20.8 ac (8.4 ha)
11	If the application is to implement an alteration to the boundary of an area of settlement or to implement a new area of settlement, details of the official plan or official plan amendment that deals with the matter.	Not applicable.
12.	If the application is to remove land from an area of employment, details of the official plan or official plan amendment that deals with the matter.	Not applicable.
13.	If the subject land is within an area where zoning with conditions may apply, an explanation of how the application conforms to the official plan policies relating to zoning with conditions	Not applicable.
14.	Whether access to the subject land will be, (a) by a provincial highway, a municipal road that is maintained all year or seasonally, another public road or a right of way; or (b) by water.	Subject lands will be accessible through a municipal road (Gartshore Street and Gregson Court).
15.	If access to the subject land will be by water only, the parking and docking facilities used or to be used and the approximate distance of these facilities from the subject land and the nearest public road.	Not applicable.
16.	The existing uses of the subject land.	970 Gartshore Street - vacant 101 Gregson Court – vacant 965 Gartshore Street – former agricultural uses. Currently, not being farmed.
17.	Whether there are any buildings or structures on the subject land.	965 Gartshore Street – farmhouse, barn, silo and accessory structures are on the site.

18.	If the answer to section 17 is yes, the following information for each building or structure: (a) the type of building or structure; and (b) in metric units, the setback from the front lot line, rear lot line and side lot lines, the height of the building or structure and its dimensions or floor area.	See Building Condition Assessment Report submitted as part of the application and further outlined in the Planning Justification Report.
19.	The proposed uses of the subject land.	970 Gartshore Street & 101 Gregson Court – industrial uses. No development is proposed at this time. 965 Gartshore Street – institutional uses (public works yard and administration building)
20.	Whether any buildings or structures are proposed to be built on the subject land.	965 Gartshore Street. Phase 1 includes an operations building, vehicle storage pole barn and greenhouse. Phase 2 includes expansion to the operations building; future salt and sand shed and two additional greenhouses. 970 Gartshore Street & 101 Gregson Court – no buildings proposed.
21.	If the answer to section 20 is yes, the following information for each building or structure: (a) the type of building or structure; and (b) in metric units, the setback from the front lot line, rear lot line and side lot lines, the height of the building or structure and its dimensions or floor area.	Please refer to concept plan.

22.	If known, (a) the date the subject land was acquired by the current owner; (b) the date any existing buildings or structures on the subject land were constructed; and (c) the length of time that the existing uses of the subject land have continued.	a) Approx. October 2021 (965 Gartshore Street) a) Unknown – 101 Gregson Street and 970 Gartshore Street b) 965 Gartshore – existing building dated back to 19th century. b) No buildings at 101 Gregson Street and 970 Gartshore Street c) Unknown.
23.	Whether water will be provided to the subject land by a publicly owned and operated piped water system, a privately owned and operated individual or communal well, a lake or other water body or other means.	Water will be provided by a publicly owned and operated system.
24.	Whether sewage disposal will be provided to the subject land by a publicly owned and operated sanitary sewage system, a privately owned and operated individual or communal septic system, a privy or other means	Sanitary sewage system will be provided by a publicly owned and operated system.
25.	If the application would permit development on privately owned and operated individual or communal septic systems, and more than 4500 litres of effluent would be produced per day as a result of the development being completed, (a) a servicing options report; and (b) a hydrogeological report.	Not applicable.
26.	Whether storm drainage will be provided by sewers, ditches, swales or other means	Stormwater management facility being proposed at 965 Gartshore Street.

		No development proposed at 970 Gartshore Street or 101 Gregson Court.
27.	If known, (a) whether the subject land has ever been the subject of an application under the Act for approval of a plan of subdivision or for a consent; (b) if the answer to clause (a) is yes, the file number and status of the application; (c) whether the subject land has ever been the subject of an application under section 34 of the Act; and (d) whether the subject land has ever been the subject of a Minister's Zoning Order and, if known, the Ontario Regulation number of that order.	a) Unknown b) N/A c) Unknown d) No
28.	A sketch showing, in metric units, (a) the boundaries and dimensions of the subject land; (b) the location, size and type of all existing and proposed buildings and structures on the subject land, indicating their distance from the front lot line, rear lot line and side lot lines; (c) the approximate location of all natural and artificial features (*for example, buildings, railways, roads, watercourses, drainage ditches, banks of rivers or streams, wetlands, wooded areas, wells and septic tanks*) that, (i) are located on the subject land and on land that is adjacent to it, and (ii) in the applicant's opinion, may affect the application; (d) the current uses of land that is adjacent to the subject land;	Concept plan provided.

	(e) the location, width and name of any roads within or abutting the subject land, indicating whether it is an unopened road allowance, a public travelled road, a private road or a right of way; (f) if access to the subject land will be by water only, the location of the parking and docking facilities to be used; and (g) the location and nature of any easement affecting the subject land.	
29.	An explanation of how the application for an amendment to the zoning by-law is consistent with policy statements issued under subsection 3 (1) of the Act.	See Planning Justification Report.
30.	Whether the subject land is within an area of land designated under any provincial plan or plans.	Yes, subject to the Growth Plan for the Greater Horseshoe
31.	If the answer to section 30 is yes, an explanation of how the application conforms or does not conflict with the provincial plan or plans.	See Planning Justification Report.
31.1	A proposed strategy for consulting with the public with respect to the application.	Attend the Statutory Public Meeting.
32.	An affidavit or sworn declaration by the applicant that the information required under this Schedule and provided by the applicant is accurate.	See **Appendix No. 4**.

5.2 Provincial Policy Statement

The 2020 Provincial Policy Statement ("PPS) established the policy direction for land use planning on matters of Provincial Interest. The PPS directs the majority of growth and development to existing serviced settlements and has imposed boundaries around settlement areas to limit sprawl, protect farmland, increase servicing efficiency and reduce greenhouse gas emissions.

Settlement Areas

Section 1.1.3.1 of the PPS directs settlements areas to be focus of growth and development. Policy 1.1.3.2 states that land use patterns within settlement area shall be based on densities and a mix of land uses which:

a) *Efficiently use land and resources.*
b) *Are appropriate for, and efficiently use, the infrastructure and public service facilities which are planned or available, and avoid the need for their unjustified and/or uneconomical expansion.*
c) *Minimize negative impacts to air quality and climate change, and promote energy efficiently.*
d) *Prepare for the impacts of a change climate;*
e) *Support active transportation.*
f) *Are transit-supportive, where transit is planned, exists or may be developed; and*
g) *Are freight-supportive.*

Response: The future Industrial Sites are located within the Urban Centre of Fergus and located just outside of the Built Boundary. The redesignation of the land use and rezoning of the properties at 101 Gregson Court and 970 Gartshore will enable the properties to be used for industrial uses. The future Industrial Sites will be able to connect to municipal and sewer infrastructure and will provide further options for industrial growth in the Township. The location of the future Industrial Sites is strategically located to the urban population. Once development is proposed on the properties, as part of Site Plan Control, the developer will be encouraged to minimize negative impacts to air quality and climate change and promote energy efficiency in the building design. Based on the reasons above, it is my opinion that the applications in support of the future Industrial Sites are consistent with Section 1.1.3 of the PPS.

The property at 965 Gartshore is located outside of the Fergus Urban Centre and not considered to be in a settlement area. Therefore, this section of the PPS does not apply to the future Public Works Site.

Managing and Directing Land Use

Section 1.1.1 of the PPS seeks the establishment of “healthy, livable, and safe communities” through:

a. *Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term;*

b. *Accommodating an appropriate affordable and market-based range and mix of residential types (including single-detached, additional residential units, multi-unit housing, affordable housing and housing for older persons), employment (including industrial and commercial), institutional (including spaces of worship, cemeteries and long-term care homes), recreation, park and open space, and other uses to meet long-term needs;*

c. *Avoiding development and land use patterns that would prevent the efficient expansion of settlement areas in those areas which are adjacent or close to settlement areas;*

d. *avoiding development and land use patterns that would prevent the efficient expansion of settlement areas in those areas which are adjacent or close to settlement areas;*

e. *promoting the integration of land use planning, growth management, transit-supportive development, intensification and infrastructure planning to achieve cost-effective development patterns, optimization of transit investments, and standards to minimize land consumption and servicing costs;*

f. *improving accessibility for persons with disabilities and older persons by addressing land use barriers which restrict their full participation in society;*

g. *ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs;*

h. *promoting development and land use patterns that conserve biodiversity; and,*

i. *preparing for the regional and local impacts of a changing climate.*

Response: The future Public Works Site is located on underutilized agricultural land located just outside of the Township's Urban Centre. The Township evaluated potential sites for the future Public Works Site and determined the location at 965 Gartshore Street was the most favorable location based on its flat topography; location to existing industrial area; low risk of soil and/or groundwater contamination; its proximity to the urban population and central location for service delivery; and the site can be economically serviced through existing watermain and sanitary sewer.

The future Industrial Sites will provide an opportunity for economic growth in the Township. The properties are in close proximity to the urban population and strategically located within an existing industrial area. Furthermore, the properties can also be serviced through existing municipal services.

For these reasons, it is my opinion that the applications for the future Public Works Site and future Industrial Sites are consistent with Policy 1.1.1 of the PPS which provides for an

opportunity for intensification and development due to its underutilized states, and ability to efficiently make use of existing municipal infrastructure and services.

Rural Areas

Rural Areas are defined in the Provincial Policy Statement as: "*a system of lands within municipalities that may include rural settlement areas, rural lands, prime agricultural areas, natural heritage features and resource areas".*

Section 1.1.4.1 of the PPS directs that healthy, integrated, and viable rural areas should be supported by:

a) *building upon rural character, and leveraging rural amenities and assets;*
e) *using rural infrastructure and public service facilities efficiently;*
f) *promoting diversification of the economic base and employment opportunities through goods and services, including value-added products and the sustainable management or use of resources;;*
h) *conserving biodiversity and considering the ecological benefits provided by natures;*
i) *and providing opportunities for economic activities in prime agricultural areas, in accordance with policy 2.3.*

Response: The future Public Works is located outside of the Urban Centre and on lands designated as Prime Agricultural in the County of Wellington Official Plan and zoned Agricultural in the Township Zoning By-law The future Public Works Site will be able to connect to water and sewage from the existing watermain and sanitary sewer connection at the site. The proposed stormwater management pond will meet the stormwater needs of the proposal as outlined in the Functional Servicing Report prepared by R. J. Burnside & Associates Limited. The rural character of the future Public Works Site will be preserved with the tree-lined laneway and farmhouse to maintain the rural character of the area. The future Public Works Site will also contribute towards the local economic base and create employment opportunities for the local population, as well as support nearby secondary businesses. An ecological evaluation of the property concluded that the Proposed Development is buffered from the natural heritage functions of the identified wetland, so impacts are not anticipated if mitigation measures are implemented as per the EIS prepared for the site. Based on the above reasons, it is my opinion that the proposed application for 965 Gartshore Street is consistent with Section 1.1.4.1 of the PPS.

970 Gartshore Street and 101 Gregson Court are located within the settlement area of Fergus. Therefore, the Rural Area policies of the PPS do not apply to the future Industrial Sites.

Public Service Facilities

Policy 1.6 of the PPS states that public service facilities shall be provided in an efficient manner that prepares for the impacts of a changing climate while accommodating projected needs. Planning for public service facilities shall be coordinated to be financially viable and available to meet current needs and project needs (Policy 1.6.1 of the PPS). Before developing new public service facilities, the use of existing infrastructure should be optimized; and opportunities for adaptive re-use should be considered (Policy 1.6.3 of the PPS). Furthermore, public service facilities should be strategically located to support the efficient delivery of emergency management services, and to ensure the protection of public health and safety (Policy 1.6.4 of the PPS). Policy 1.6.5 directs public service facilities to be in community hubs to facilitate service integration and access to active transportation.

Response: The Proposed Development for the future Public Works Site is the recommended option that will accommodate current and long-term space needs at a relatively low estimated capital cost. There is a need for additional capacity to maintain levels of service for the increasing population and employment growth in the Township. The future Public Works Site can be serviced with existing municipal water and sewage infrastructure and is located close to the urban population. Site amenities include a trail path around the perimeter of the site to promote active transportation. Community gardens are also provided for community use and enjoyment. The farmhouse on the future Public Works Site will be preserved and repurposed through the proposed development. The site is in a strategic location to provide efficient service to Township residents. For these reasons, it is my opinion that the Proposed Development is consistent with Policy 1.6 of the PPS.

The properties at 970 Gartshore Street and 101 Gregson Court are not proposing a public service facility, therefore, Policy 1.6 of the PPS does not apply.

Sewage, Water and Stormwater

Policy 1.6.6.1 of the PPS states that planning for sewage and water services shall:

a) *accommodate forecasted growth in a manner that promotes the efficient use and optimization of existing:*
    1. *municipal sewage services and municipal water services; and*
    2. *private communal sewage services and private communal water services, where municipal sewage services and municipal water services are not available or feasible;*
b) *ensure that these systems are provided in a manner that:*
    1. *can be sustained by the water resources upon which such services rely;*

2. *prepares for the impacts of a changing climate;*
3. *is feasible and financially viable over their lifecycle; and*
4. *protects human health and safety, and the natural environment;*

c) *promote water conservation and water use efficiency;*

d) *integrate servicing and land use considerations at all stages of the planning process*

Policy 1.6.6.2 of the PPS states that municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety.

Section 1.6.6.7 states that planning for stormwater management shall:

a) *be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term;*

b) *minimize, or, where possible, prevent increases in contaminant loads;*

c) *minimize erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure;*

d) *mitigate risks to human health, safety, property and the environment;*

e) *maximize the extent and function of vegetative and pervious surfaces; and*

f) *promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.*

Response: The proposed applications are consistent with Policy 1.6.6.1, 1.6.6.2 and 1.6.6.7 of the PPS. The future Public Works Site and future Industrial Sites will be serviced by existing connections to municipal services in the Township. The future Public Works Site will be designed with a stormwater management facility on-site. There is no proposed development for the future Industrial Sites at this time, therefore stormwater management will be determined through Site Plan Control. It is my opinion that the proposed applications are consistent with Section 1.6.6 of the PPS.

Natural Heritage

Section 2.1.1 of the PPS states natural features and areas shall be protected for the long term.

Section 2.1.8 of the PPS states "*development and site alteration shall not be permitted on adjacent lands to the natural features and area identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and its has been*

demonstrated that there will be no negative impacts on the natural features or on their ecological functions."

Section 2.2.2 of the PPS states that "*Development and site alteration shall be restricted in or near sensitive surface water features and sensitive ground water features such that these features and their related hydrological functions will be protected, improved or restored*."

Response: Portions of the County of Wellington's Natural Heritage System are found in the north area of the future Public Works Site. Based on the findings of the Environmental Impact Study ("EIS") prepared by R.J. Burnside & Associates, a 30-metre buffer has been applied to the identified wetland (Irvine Creek PSW). The proposed development at 965 Gartshore Street is buffered from the natural heritage functions of the wetland, so impacts are not anticipated if mitigation measures are implemented as per the EIS.

There is no proposed development on the future Industrial Sites. There is a wetland identified on Appendix 3 of the County of Wellington Official Plan on the property at 970 Gartshore. If future development is proposed within 120 metres of the identified natural heritage, an Environmental Impact Study will be required as part of Site Plan Control.

For the reasons stated above, it is my opinion that the applications are consistent with Policy 2.1 of the PPS.

Agriculture

Policy 2.3 of the PPS directs that prime agricultural areas should be protected for the long-term use for agriculture.

As per Policy 2.3.3.1 of the PPS permitted uses and activities in prime agricultural areas include agricultural uses, agricultural-related uses and on-farm diversified uses.

Section 2.3.3.3 of the PPS states that new land uses shall comply with the minimum distance separation formulae.

Section 2.3.6.1 b) of the PPS states that planning authorities may only permit non-agricultural uses in prime agricultural area for limited non-residential uses, provided the following are demonstrated:

1. *the land does not comprise a specialty crop area;*
2. *the proposed use complies with the minimum distance separation formulae;*
3. *there is an identified need within the planning horizon provided for in the policy 1.1.2 for additional land to be designated to accommodate the proposed uses; and*

4. *alternative locations have been evaluated, and*
    i. *there are no reasonable alternative locations which avoid prime agricultural areas;*
    ii. *there are no reasonable alternative locations in prime agricultural areas with lower priority agricultural land.*

Response: The future Public Works Site is located outside of the Township Urban Centre and designated Prime Agricultural in the County of Wellington Official Plan. The future Public Works Site is in conformity with each of the relevant PPS policies. As outlined in the Ministry of Agriculture Guidelines on Permitted Uses in Ontario's Prime Agricultural Areas, in prime agricultural areas, non-agricultural uses may be permitted provided they meet the criteria outlined in Policy 2.3.6.1 b) of the PPS.

The future Public Works Site is not identified as a specialty crop area. Specialty crop areas consist of crops such as tender fruits, grapes, vegetable crops, greenhouse crops and crops from agriculturally developed organic soil. The agricultural fields previously planted and harvested were soybeans.

The future Public Works Site is not within 500 metres of a current agricultural operation and therefore the Minimum Distance Separation setbacks contained in the Ministry of Agriculture, Food and Rural Affairs guidelines do not apply.

As per Policy 1.1.2 of the PPS, nothing limits the planning for infrastructure, public service facilities and employment areas beyond a 25-year time horizon.

The Township of Centre Wellington conducted a Space Needs Assessment that outlined the findings of overcrowding and deficiencies of the Township's aging works and operation facilities. The report highlighted the need for additional capacity to maintain levels of service for the increasing population and employment growth in the Township. The study provided eight potential solutions with high level cost estimates, with options ranging from do nothing, to expanding the existing facilities, to building a new facility in phases. The evaluation assessed the eight potential options against a series of eight scored criteria. The highest scoring option was to build a new operations facility on a 20-acre centrally located site using a two phased construction approach. The Space Needs Assessment recommended that the Township's Operations Facility be located on a 20-acre site to provide sufficient room for future growth. The site should also be located close to the geographic and population centre of Centre Wellington. There was an option to build a new combined Operations Centre with the County of Wellington on a shared site. However, the County's Elora garage is only 5.2 acres, half of which is already being used by the County. Given the inadequacy of the site, the conflicting timelines, the unsuitable location, and the high cost, it was

determined that it was not feasible or cost effective for the Township to have a combined Operations Centre on a shared site with the County.

Based on the reasons provided below, it is my opinion that the future Public Works Site has satisfied the criteria in Policy 2.3.6.1 of the PPS to permit a non-agricultural use in a prime agricultural area. The future Public Works Site is also consistent with Policy 2.3.3.3 of the PPS.

Cultural Heritage and Archaeological

Policy 2.6 of the PPS directs significant building heritage resources and significant cultural heritage landscapes to be conserved. The Policy also prohibits development and site alteration on lands containing archaeological resources or areas of archeological potential.

Response: A Cultural Heritage Evaluation ("CHER") was completed and found that the subject property meets the criteria outlined in O. Reg. 569/22. The property is considered to have Cultural Heritage Value or Interest (CHVI). The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however it contains designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property. The structures in the Cultural Heritage Landscape (CHL) include:

- The Gothic Revival farmhouse
- The bank barn and poured concrete silo beside the barn
- The laneways that evolved over the course of time linking the farm's structures
- The tree-lined driveway

Since there is a proposed development for the property at 965 Gartshore Street, the evaluation recommends that a Heritage Impact Assessment (HIA) should be undertaken to identify impacts to the cultural heritage value and heritage attributes of the subject property and should consider the adjacent properties that the Township has flagged for potential inclusion on the municipal heritage register: 6611 and 6581 Highway 6, 968 St. David St. North and 950 Gartshore Street.

A Stage 1 Archaeological Assessment was also conducted on the property that determined there was a mixture of areas of archaeological potential. It is recommended that the identified areas of archaeological potential be subject to a Stage 2 property assessment. The Stage 2 Assessment was not complete at the time of writing this report but will be a requirement as part of the future Site Plan Application for the property. The HIA will also be completed and submitted as part of the Site Plan Application that is required for the Proposed Development. It is my opinion that the applications are consistent with Policy 2.6

of the PPS that no development or site alteration will be permitted until the archaeological resources and areas of archaeological potential have been fully evaluated.

For the future Industrial Sites, there is no development proposed at the time of writing this report. Any future development on the properties will require an Archaeological Assessment as part of the Site Plan Control process.

6.0 Growth Plan for the Greater Golden Horseshoe (2020)

The Growth Plan for the Greater Horseshoe (the "Growth Plan") builds on the policy directions contained in the PPS and in this regard, is intended to function as a policy framework for achieving strong and prosperous communities by managing growth in the Greater Horseshoe (GGH) Region. The policies contained in the Growth Plan guide land uses, transportation, and infrastructure with the goal of enhancing the quality of life of residents. All decisions made within the GGH that affects planning matters are to conform to the policies in the Growth Plan.

Growth Management

Policy 2.2.1 of the Growth Plan directs growth be directed to settlement areas that have a delineated built boundary; have existing or planned municipal water and wastewater and can support a complete community. The Policy also supports the achievement of complete communities by supporting a diverse mix of land uses, including residential and employment uses and convenient access to stores, services, and public service facilities.

Response: The future Public Works Site and future Industrial Sites can both be serviced with existing municipal water and sewage. The applications are consistent with Policy 2.2.1 of the Growth Plan by providing employment uses and public service facilities as part of a complete community.

Employment

Policy 2.2.5 of the Growth Plan promotes economic development by:

a) *Making more efficient uses of existing employment areas and vacant and underutilized employment lands and increasing employment densities.*
b) *Ensuring the availability of sufficient land, in appropriate locations, for a variety of employment to accommodate forecasted employment growth to the horizon of this Plan.*

Response: The proposed applications are consistent with Policy 2.2.5 of the Growth Plan as the future Industrial sites will make efficient use of underutilized land and create

opportunities for employment in the Township. The future Public Works Site is located outside of the settlement area, so this policy does not apply.

Public Service Facilities

Policy 3.2.8 of the Growth Plan directs public service facilities to be co-located in community hubs and integrated to promote cost-effectiveness. New public service facilities should be located in settlement areas that are accessible by active transportation.

Response: The future Public Works Site is located just outside of the settlement area of Fergus. Despite its location outside of the Urban Area boundary, it is strategically located near the urban population. A public use trail and community gardens will be provided on the site to encourage community members to the site. For these reasons, it is my opinion that the future Public Works Site is consistent with Policy 3.2.8 of the Growth Plan.

The future Industrial Sites are not proposing any public service facilities so this policy does not apply.

Natural Heritage System

Policy 4.2.2 of the Growth Plan states that within the Natural Heritage System for the Growth Plan new development or site alteration needs to demonstrate no negative impacts on key natural heritage features. Policy 4.2.4 of the Growth Plan states that outside of settlement areas, a proposal for new development or site alteration within 120 metres of a key natura heritage feature will require a natural heritage evaluation.

Response: Based on EIS prepared by R.J. Burnside & Associates, a 30-metre buffer has been applied to the Irvine Creek PSW. The proposed development at 965 Gartshore Street is buffered from the natural heritage functions of the wetland, so impacts are not anticipated if mitigation measures are implemented as per the EIS prepared for the site.

There is no proposed development on the future Industrial Sites. There is a wetland identified on Appendix 3 of the County of Wellington Official Plan at 970 Gartshore. If future development is proposed within 120 metres of the identified natural heritage, an Environmental Impact Study will be required as part of Site Plan Control.

Based on the reasons provided above, it is my opinion that the proposed applications are consistent with Policy 4.2.2 and Policy 4.2.4 of the Growth Plan.

Agricultural System

Section 4.6.2 of the Growth Plan sets out policies to ensure agricultural and non-agricultural uses remain compatible. Where mitigation is required, measures will be incorporated as part of the non-agricultural use and "*where appropriate, this should be based on an agricultural impact assessment.*"

Section 4.2.6.8 of the Growth Plan states "*prime agricultural areas identified in upper- and single-tier official plans that were approved and in effect as of July 1, 2017 will be considered the agricultural land base for the purposes of this Plan.*"

Response: The proposed application conforms to Section 4.2.6.2 of the Growth Plan. There are no land use compatibility issues with the proposed future Public Works as the site is surrounded by non-agricultural uses including residential and industrial uses. Furthermore, there was no municipal requirement for an Agricultural Impact Assessment to be completed in support of the proposed Zoning By-law Amendment application.

7.0 County of Wellington Official Plan

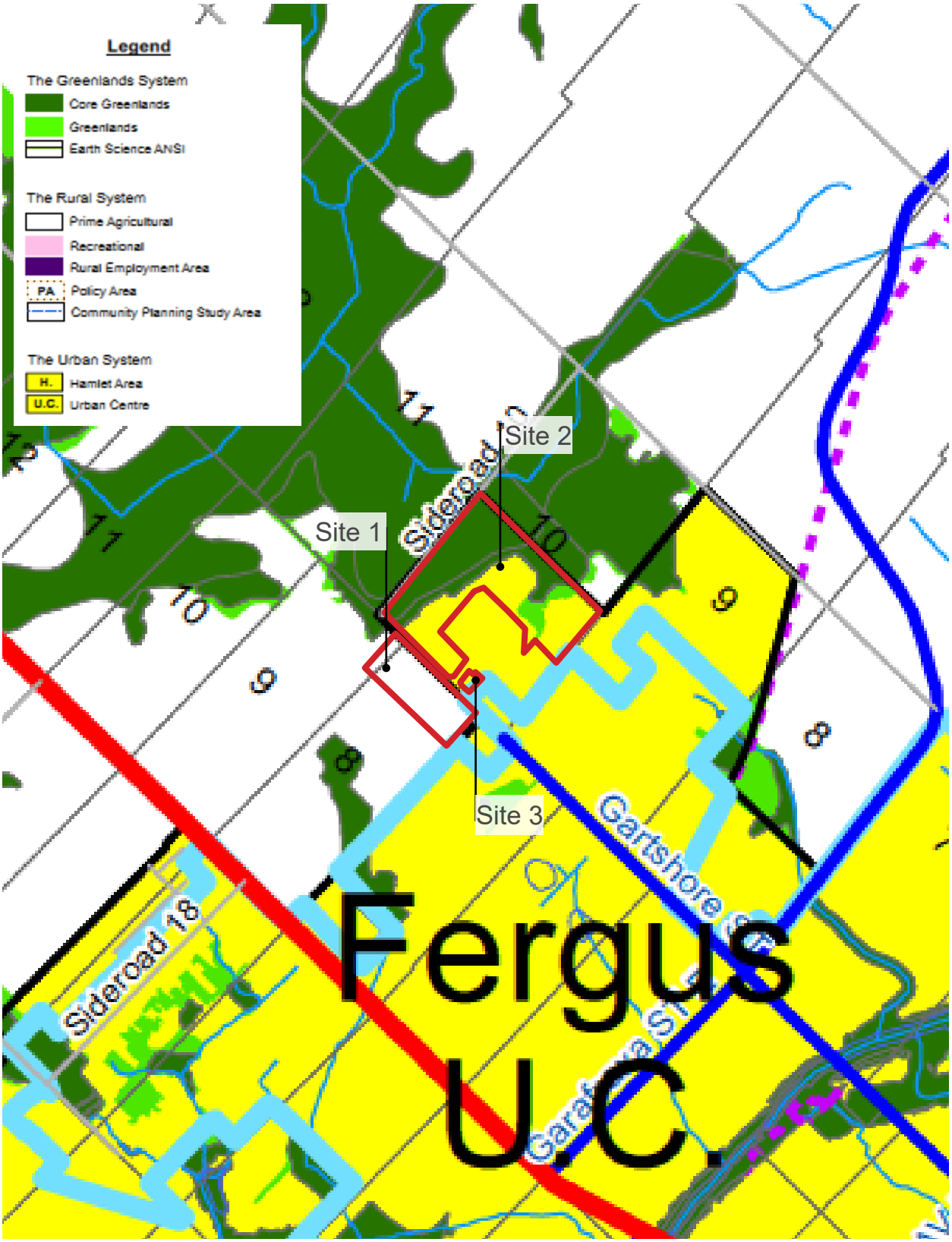
The County of Wellington Official Plan ("County OP") was first adopted in 1998 with changes being made since its inception and was recently updated June 1, 2018. The County OP policies are the basis on which the County and local council make decisions on land use planning matters. Local municipalities have the option to develop their own more detailed policies for all or parts of their community, and as such The Township of Centre Wellington adopted its own Official Plan in 2003 which provides more detailed planning policies for land use within the boundaries of the Urban Centre. Accordingly, for the rural areas of the Township of Centre Wellington the County Official Plan applies.

7.1 Land Use Designation

970 Gartshore and 101 Gregson Court

According to Schedule A1 of the County OP, the property municipally known as 970 Gartshore Street is within the Fergus Urban Centre and designated Core Greenlands and Greenlands. The property at 101 Gregson Court is also designated as part of the Urban Centre of Fergus (**Figure 4**). According to Section 7.5 of the County Official Plan, permitted use in the Urban Centre includes a range of land use opportunities including residential, commercial, industrial, and institutional.

Response: The future Industrial Sites are both located within the Fergus Urban Centre and can be serviced with available municipal servicing. The sites are intended to be developed in the future for industrial uses. The uses proposed are permitted under the Urban Centre designation. Therefore, no amendment to the County Official Plan is required to facilitate



County of Wellington Official Plan

Source: County of Wellington Official Plan Schedule A1 (2021)

Figure 4

the proposed land use. Any future development at 970 Gartshore will need to comply with the policies associated with the Core Greenland and Greenland designations in the County Official Plan. It is my opinion that land use proposed on the future Industrial Sites conforms to the County of Wellington Official Plan policies.

965 Gartshore Street

According to Schedule A1 of the County OP, the property municipally known as 965 Gartshore Street is designated Prime Agricultural in the County Official Plan. Permitted uses in the Prime Agricultural Area include community service facilities. Section 6.4.9 of the County Official Plan states that ensure that prime agricultural land is only used for community services facilities, the establishment of new community service may only be allowed through a zoning by-law amendment that addresses the requirements of Section 4.3.3 of the County OP.

Section 4.3.3 of the County OP states the limited non-residential uses may only take place in prime agricultural areas if the need for the use can be demonstrated and provided that there are no reasonable alternative locations which avoid prime agricultural areas with lower priority agricultural lands. The following table outlines the criteria to satisfy this Section of the County OP.

Section 4.3.3 Criteria	Response
Need • projected population for the local municipality and county or growth allocated by broader studies • public health or safety considerations • existing vacant land already designated for the proposed use • potential for infilling existing areas • previous rates of land consumption • availability and efficiency of servicing	The province recently approved substantial growth through the County's Municipal Comprehensive Review. As a result, the Township of Centre Wellington is being allocated the most growth during the next planning horizon. As outlined in the Space Needs Assessment, the current operation facilities are overcrowded and are deficient with the age of the buildings. To accommodate the anticipated growth and continue to provide efficient service to the community, a new operations centre is required. It was recommended in the study that the site would have to be approximately 20-acres in area to accommodate future needs and growth.

• need for a variety of opportunities to encourage economic development and satisfy housing and business demand	The future Public Works Site can be serviced with existing municipal water and sanitary services. It will also create opportunities for future employment growth.
Alternative Locations • impacts on agricultural land and operations • location requirements of the proposed use • degree of land fragmentation in the area • Canada Land Inventory classification iii) Compliance with minimum separation distances established for livestock operations.	In the Spaces Needs Assessment, the Township evaluated different options to accommodate the need for a new facility and future growth. The site at 965 Gartshore Street was selected as the preferred option. The site will not impact any agricultural land and operations. The property lies immediately adjacent to the Fergus Urban Centre and is surrounded by residential and industrial uses to the immediate south and east. The preservation of the farmhouse and tree-lined laneway will contribute towards the cultural heritage landscape north of the site. It is also located next to the Urban Centre and will enable the Township to provide a high level of service delivery to the residents. The property is also size adequately to provide the new operations centre and accommodate future growth.

Response: The future Public Works Site is permitted under the Agricultural designation in the County OP. Based on the criteria in Section 4.3.3 of the County Official Plan, it is my opinion that the Township has demonstrated through the Space Needs Assessment that there is a need for a new operations facility based on the current facility deficiencies and the projected growth that the Township is going to experience in the next planning horizon. The Township has also demonstrated that other sites were evaluated when determining the optimal site for the new facility. The location of the future Public Works Site will not impact current agricultural land or operations; is strategically close to the Urban Centre and will maintain the rural character of the surrounding area. It is my opinion that the proposed land use is permitted and that an Official Plan Amendment to the County OP is not required to facilitate the proposed development.

7.2 Cultural Heritage

Cultural heritage and archaeological resources form an important part of the community fabric. In conjunction with the Ontario Heritage Act, the Official Plan contains policies for the protection and enhancement of cultural heritage resources including built heritage, cultural heritage landscapes and archaeological resources.

As per Section 4.1.5(j) of the Official Plan, if the County has determined a proposed development has an area of archaeological potential, an assessment of the property will be required to identify archaeological resources. Any resources identified and determined to be significant will be conserved.

Response: A Cultural Heritage Evaluation ("CHER") was completed and found that the subject property meets the criteria outlined in O. Reg. 569/22. The property is considered to have Cultural Heritage Value or Interest (CHVI). The property is an Ontario Farm and can be considered an evolved cultural heritage landscape as the property evolved over time to meet the functional needs of the farm, however it contains designed elements in its tree-lined driveway that was constructed to frame the farmhouse upon entry to the property.

Since there is a proposed development for the property at 965 Gartshore Street, the evaluation recommends that a Heritage Impact Assessment (HIA) should be undertaken to identify impacts to the cultural heritage value and heritage attributes of the subject property and should consider the adjacent properties that the Township has flagged for potential inclusion on the municipal heritage register: 6611 and 6581 Highway 6, 968 St. David St. North and 950 Gartshore Street.

A Stage 1 Archaeological Assessment was also conducted at 965 Gartshore Street that determined there was a mixture of areas of archaeological potential. It is recommended that the identified areas of archaeological potential be subject to a Stage 2 property assessment. The Stage 2 Assessment was not complete at the time of writing this report but will be a requirement as part of a future Site Plan Application for the property. The HIA will also be completed and submitted as part of the Site Plan Application that is required for the Proposed Development.

For the future Industrial Sites, there is no development proposed at the time of writing this report. Any future development on the properties will require an Archaeological Assessment as part of the Site Plan Control.

Based on the reasons above, it is my opinion that the applications conform with Section 4.1.5(j) of the County Official Plan.

7.3 Economic Development

Section 4.2.3 of the Official Plan encourages a variety of employment opportunities in a variety of locations. Opportunities for industrial, commercial, and recreation activities will be supported in appropriate locations.

The main employment generator in the rural system will be resource-based industries such as agriculture, aggregate operations, and forestry. It is also recognized that other employment opportunities can be supported in the rural system that are based on the ability to provide larger lots, larger buffers for compatibility, and access to major roads.

Section 4.2.4 of the County Official Plan states the Urban System is intended to provide the greatest opportunity for employment. New industrial uses are expected to be located in all settlements, but particular in those with full municipal sewage and water services.

Response: The property at 965 Gartshore Street is within the Rural System on a large lot of 20.8 acres. The large lot size provides an opportunity for the Township of Centre Wellington to construct an Operations Facility that will accommodate future growth and consolidate their operations. The proposed development will include a vegetive buffer and noise wall to reduce any impacts to surrounding residential properties. In my opinion, the proposed development conforms to Section 4.2.3 of the County OP.

The applications submitted for 101 Gregson Court and 970 Gartshore Street propose industrial use on both properties. Its use is compatible with the surrounding area which is predominately industrial. Both properties can be serviced with municipal water and sewage. Therefore, it is my opinion, the proposed land use designation on the properties conforms with Section 4.2.4 of the County OP.

7.4 Water Sources

Schedule B3 of the Official Plan identifies vulnerable areas for each municipal water supply source and their associated vulnerability score. Wellhead Protection Area is an area that is related to a wellhead and within which it is desirable to regulate or monitor drinking water threats because land use activities in these areas have the potential to affect the quality or quantity of water that flows into the well.

According to Schedule B3 of the Official Plan, the all three sites are within Well Head Protection Area (WHPA) A with a vulnerability score of 8, 2, 4, 6. WHPA-A indicates that the property is within a 100-metres radius of a well. As per Section 4.9.5.4 of the Official Plan, the submission of a Drinking Water Threats Disclosure Report may be required.

Response: The future Public Works Site is located within the Wellhead Protection Area for the Fergus municipal supply well and located within the 100 metres separation zone and the 2-year time of travel. The higher vulnerability score suggests that the municipal aquifer in the area is vulnerable to contamination. Due to the potential for drinking water threats associated with the future Public Works facility, a Threats Disclosure report may be required as part of the Site Plan Control process. This also applies to the future Industrial sites as they are located across from the future Public Works Site.

7.5 Greenlands System

According to the Official Plan, the Greenland designation is intended to include natural heritage features including wetlands, environmentally sensitive areas, streams and valley lands, fish, and wildlife habitat among other areas. As noted in Section 2.4.1 of the Official Plan, the property at 965 Gartshore Street is adjacent to land designated as Core Greenlands. Additionally, the site at 970 Gartshore Street is partially designated as Core Greenlands and Greenlands.

Natural features such as provincially significant wetlands, habitat of endangered or threatened species and fish habitat and hazardous lands within the County of Wellington are included in the Core Greenlands designation. According to Appendix 3 of the County OP, there is an identified wetland on the property of 970 Gartshore Street.

Section 5.6 of the Official Plan states that within the Core Greenlands designation, development and site alteration shall not be permitted within Provincially Significant Wetlands, or in significant habitat of threatened or endangered species. When development is proposed in the Greenlands system or on adjacent lands, the County or local municipality will require the developer to identify the nature of the features; and prepare where required, an environmental impact assessment. Development will not be approved unless the County is satisfied that the Greenland and Environmental Impact Assessment policies have been met.

Response: Portions of the County of Wellington's Natural Heritage System are found in the north area of the future Public Works Site. Based on the findings of the Environmental Impact Study ("EIS") prepared by R.J. Burnside & Associates, a 30-metre buffer has been applied to the Irvine Creek PSW. The Proposed Development at 965 Gartshore Street is buffered from the natural heritage functions of the wetland, so impacts are not anticipated if mitigation measures are implemented as per the EIS.

There is no proposed development on the future Industrial Sites. If future development is proposed within 120 metres of the identified natural heritage, an Environmental Impact Study will be required as part of Site Plan Control.

For the reasons stated above, it is my opinion that the applications are conforms to Section 5.6 of the County OP.

7.6 Environmental Services

Section 11.3 of the Official Plan required the County or local municipality, the Conservation Authority and Ministry of Environmental to be consulted with respect to the final storm water management design. Furthermore, Section 11.3.4 of the Official Plan requires a stormwater management report submitted prior to approval of zoning amendments, site plans or builing permits.

Response: R.J. Burnside and Associates Ltd., prepared a Functional Servicing and Stormwater Management Report that documents the functional servicing and stormwater management system design for the future Public Works Site which is detailed in Section 4.1 of this Report.

Any future development proposed at 970 Gartshore Street and 101 Gregson Court will be required to demonstrate how stormwater management will be designed on the site. This will be required as part of the Site Plan Control process.

Based on the above, it is my opinion that the proposed applications conform to Section 11.3 of the County OP.

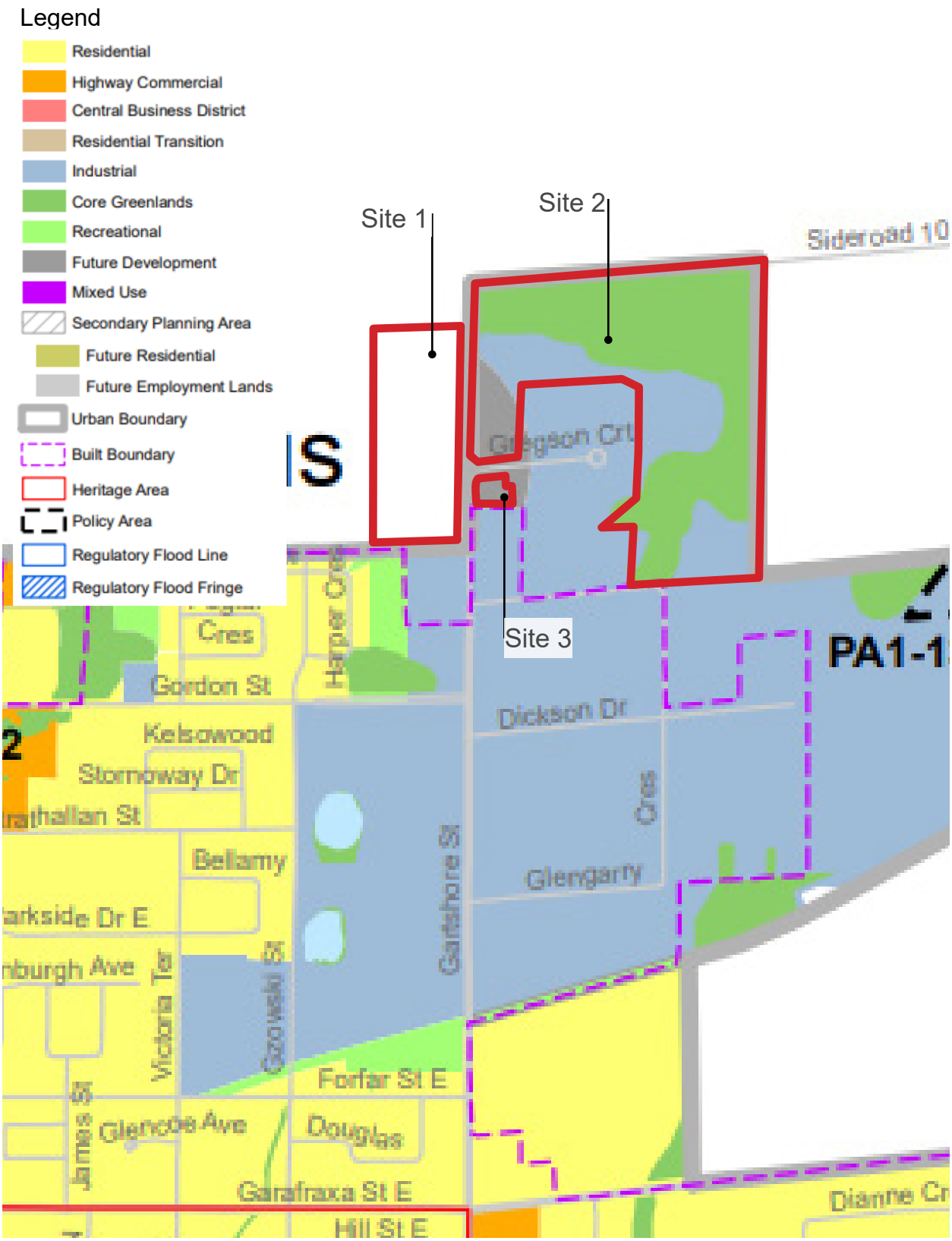
8.0 Township of Centre Wellington Official Plan

The Township of Centre Wellington Official Plan ("Township OP") was first adopted in 2003 and approved in May 2005 with several changes being made since its inception and was recently updated on January 4, 2013. The purpose of the Township OP is to outline goals, objectives, and policies to guide future physical, social, and economic development, and change within the Township. In Centre Wellington, there are three Urban Centres identified including Fergus, Elora-Salem and Belwood. The remainder of the Township is part of the Greenlands and Rural systems identified in the County OP.

8.1 Land Use Designation

The property at 965 Gartshore Street is not designated within the Township of Centre Wellington Official Plan. It is part of the Greenlands and Rural systems identified in the County OP.

The property at 970 Gartshore Street is currently designated Future Development, Industrial and Core Greenlands according to Schedule A1 of the Centre Wellington Official Plan. The property at 101 Gregson Court is also currently designated Future Development (**Figure 5**).



Land Use

Source: Centre Wellington Official Plan Schedule A1 (2016)

Figure 5

The permitted uses within the Future Development designation are limited to existing uses and non-intensive agricultural operations. The redesignation of Future Development lands may be considered if it is proven that additional land for development purposes is required. Section D.9.4 of the Township Official Plan requires a comprehensive review of the following:

Criteria	Compliance
That the need for additional land is demonstrated by the fact that a substantial portion of the land designated for development by this Plan are already developed.	The Township has a low supply of available industrial land to offer business that want to locate to the Township. The addition of two parcels of land that are already within an industrial area will assist in attracting new economic growth to the community.
That services for all kinds are or can be reasonably and economically provided to the proposed development.	The Township has confirmed that municipal services including water and sanitary are available to service both sites.
That adequate development plans which indicate that type of development and facilities to be provided (such as, streets, schools, parks and shopping facilities) are or will be made available to the municipality.	Once the future Industrial Sites are redesignated to an Industrial land use in the Township Official Plan and rezoned to a General Industrial (M2) zone, then the properties can be sold and future development plans can be provided.
That the proposed development is contiguous to and is a logical extension of existing development.	The future Industrial Sites are a contiguous development of the surrounding industrial area. The properties along Gregson Court and properties to the south, south-east, and south-west are all designated Industrial in the Township Official Plan. The redesignation of the land use to Industrial is a logical extension of the existing land use in the area.
Any required impact studies have been completed.	The Future Development designation applies to both properties as there was an active barn on the agricultural lands to the west at 965 Gartshore Street. The barn is no longer active, and the Minimum Distance Separation setbacks no longer apply. Therefore, there are no impacts to surrounding agricultural operations or lands if the properties are developed in the future.

Response: To facilitate future industrial uses on the properties at 970 Gartshore Street and 101 Gregson Court, an Official Plan Amendment is required to Township Official Plan to redesignate the lands from Future Development to Industrial. The current Core Greenlands designation on the property at 970 Gartshore Street is not proposed to change. It is my opinion that the proposed applications conform to Section D.9.4 of the Official Plan and should be considered for an Industrial land use designation.

8.2 Cultural Heritage Resources

Section C.2.14 of the Township Official Plan encourages the Township to restore and maintain municipally owned heritage buildings and structures to a high standard as its commitment to the protection of heritage resources and to provide an example of the benefits of quality restoration and maintenance. Furthermore, the Township should ensure that municipally owned heritage buildings, or structures are sold, leased or transferred to another owner or lessee are subject to a heritage agreement which will guarantee the preservation, maintenance and use which respects its heritage significance.

Section C.2.17 of the Township Official Plan encourages archeological survey and the preservation of significant archaeological resources. Section C.2.21 of the Township Official Plan directs that heritage resources include more than just “old buildings”; they also can include complete landscapes as well. The Township may identify cultural heritage landscapes in Centre Wellington.

Response: For the future Industrial Sites, there is no development proposed at the time of writing this report. Any future development on the properties will require an Archaeological Assessment as part of the Site Plan Control.

Based on the reasons above, it is my opinion that the applications conform with Section C.2.14 and C.2.17 of the Township Official Plan.

8.3 Natural Heritage

The Township of Centre Wellington encourages the protection and enhancement of the natural heritage of the Township. According to Policy C.3.2 of the Township Official Plan, all provincially and locally significant wetlands are included in the Core Greenlands designation. No development is permitted on provincially significant wetlands. Development on land adjacent to provincially significant wetlands will only be permitted subject to the preparation of an Environmental Impact Assessment as outlined by the policies of this Plan.

Response: There is no proposed development on the future Industrial Sites. If future development is proposed within 120 metres of the identified natural heritage, an

Environmental Impact Study will be required as part of Site Plan Control. For the reasons stated above, it is my opinion that the applications conform to Section C.3.2 of the Township OP.

8.4 Municipal Servicing

The Township Official Plan anticipates that all new developments will have access to full range of appropriate municipal services. According to Section C.2 of the Township Official Plan, the Fergus and Elora-Salem Urban Centres have municipal sewer and water services. New development will be required to connect to these services where they are available.

Response: The future Industrial Sites can connect to available municipal water and water. It is my opinion that the proposed applications conform to Section C.2 of the Township Official Plan.

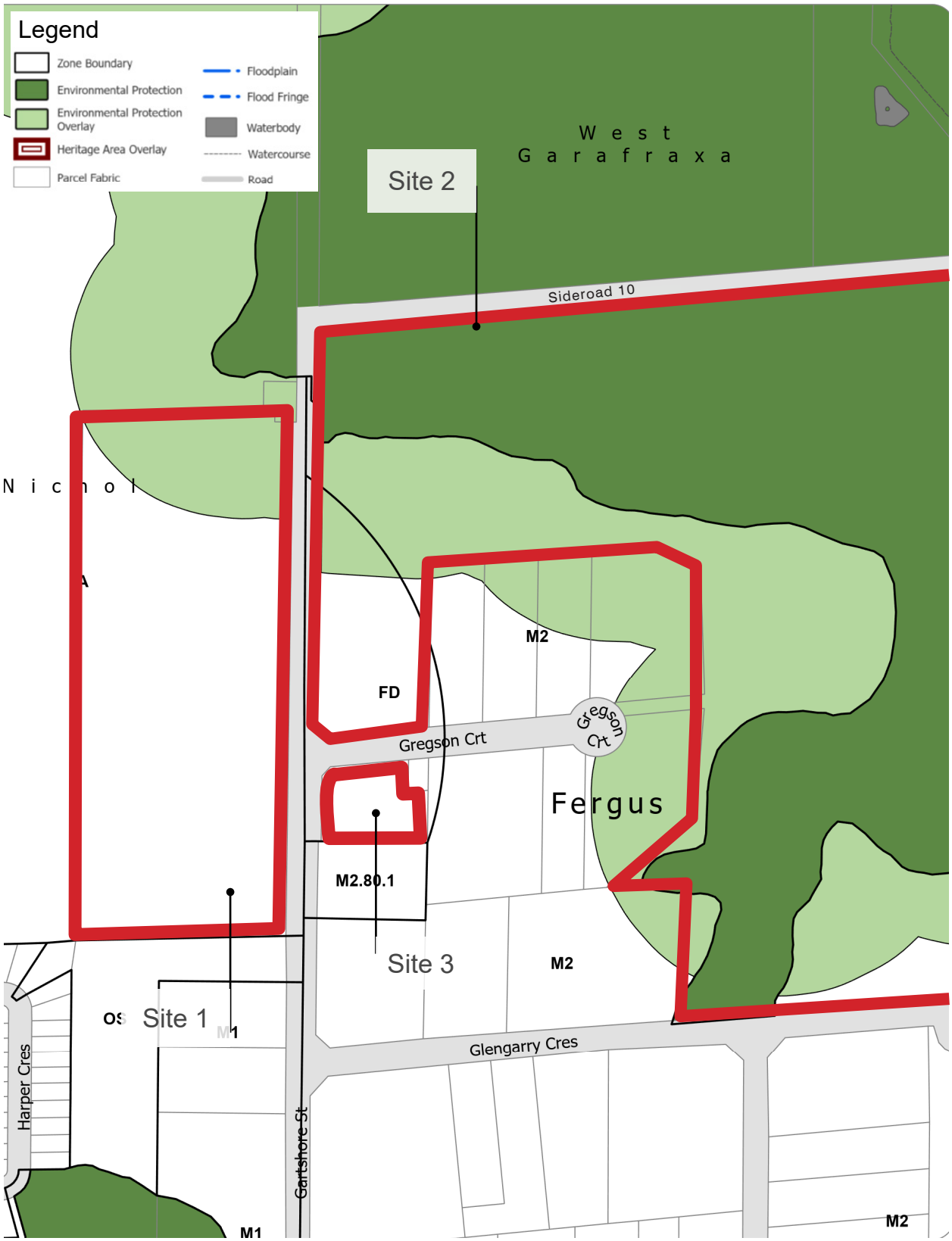
9.0 Township of Centre Wellington Zoning By-law

9.1 965 Gartshore Street

The future Public Works Site is currently zoned 'Agricultural' (A) and 'Environmental Protection Overlay' (EPA Overlay) in the Township of Centre Wellington Zoning By-law No. 2009-045 (**Figure 5**). The Agricultural zoning only permits agricultural uses, buildings and structures, single detached dwellings, and accessory uses. The Environmental Protection Overlay indicates that the provisions and regulations of the underlying zone shall continue to apply, but there are additional provisions and regulations applied.

The Zoning By-law Amendment proposes to amend the existing zone from 'Agricultural' (A) to a specialized 'Institutional' (IN-XX) zone. The rezoning will include site-specific provisions to facilitate accessory structures on the site. A summary of the proposed development and zoning requirements are provided below in the following table:

Regulation (IN) Zone	Regulations (Lot with Individual On-Site Sewer and Water Services)	Proposed Development	Compliant (Y/N)
Permitted Uses	a) A public building b) A church c) A school d) A cemetery e) A hospital f) A day care centre g) A retirement residence h) A nursing home i) A group home j) A museum k) A community centre	**Public Building** shall mean any building or part thereof or structure owned, leased or occupied by the Corporation of the Township of Centre Wellington, the Corporation of the County of	Yes



Centre Wellington Zoning

Source: Township of Centre Wellington Zoning By-law Map 80 (2022)

Figure 6

	l) Uses, building and structures accessory to the foregoing	Wellington, the Province of Ontario or the Government of Canada.	
Minimum Lot Frontage	30 m (98.4 ft)	445 m	Yes
Minimum Lot Area	0.4 ha (1 ac)	8.4 ha (20.8 ac)	Yes
Maximum Building Height	3 storeys but not more than 11 m (36 ft)	2 storeys	Yes
Minimum Front Yard	15 m (49.2 ft) plus any applicable distance specified in Section 4.37 =15m + 10m = 35m measured at right angles to the centreline of the street allowance	35.51 m	Yes
Minimum Exterior Side Yard	4.5 (14.8 ft)	N/A	N/A
Minimum Rear Yard	7.5 m (24.6 ft)	29.8 m	Yes
Maximum Lot Coverage	40%	9.6 %	Yes
Buffer Strip	A Buffer Strip shall be required in accordance with Section 4.7 wherever an Institutional Use abuts land used or zoned Residential or Open Space. Min. height of not less than 1.5 (4.9 ft) 4.7.1 Have a minimum width throughout of not less than 1.5 m (4.9 ft). 4.7.2 Be located within and abutting the entire zone limit other than along a street line where such buffer strip is required. 4.7.3 Consist of a continuous un-pierced planting of trees, shrubs and other landscaping features, maintained at an ultimate height of not less than 1.8 m (5.9 ft). 4.7.4 Be kept free of all parking, buildings or structures except for a legal boundary partition and used only for the placement of trees, shrubs, similar vegetation and landscaping features.	Buffer strip details to be confirmed at Site Plan. Buffer width is 14.8 metres	Yes

	4.7.5 Be landscaped and maintained by the owner of land on which such buffer strip is required. 4.7.6 Notwithstanding the above and subject to site plan approval, a solid fence, wall, or other landscaping feature of equivalent height may be considered in place of a continuous planting area. When considering such an alternative buffer, regard shall be given to the location, height, materials, finishing and porosity of the wall or fence, as well as the site's characteristics.		
Table 4B: Accessory Building Regulations (Lot Area less than 10 ha (24.7 ac)			
Setback from Lot Lines	0.6 m (2ft)	Greater than 0.6 metres	Yes.
Prohibited Locations	In a required front or exterior side yard	Accessory buildings permitted within the required front yard.	No. Site Specific provision required.
Max. Floor Area (1) (1) Including accessory buildings, the lot coverage of all buildings on a lot shall not exceed the maximum lot coverage specified in the zone regulations.	5% of the total lot area or 0.42 ha (4,200 sq. m)	Less than 4,200 sq. m	Yes.
Max. Height	6.7 m (22 feet)	13 m (42 feet) for the salt and sand storage.	No. Site Specific provision required.
Time of Establishment	Only after the main building has lawfully commenced construction, except for permitted temporary uses.	Existing house to be permitted before the main building is constructed.	No. Site Specific provision required.
Prohibited Use of An Accessory Building	No accessory building shall be used for human habitation.	No human habitation or commercial uses being proposed.	Yes

	No accessory building shall be used for commercial purposes except in accordance with Sections 4.12 (Farm Business) and 4.17, 4.18, and 4.19 (Home Business)		
Parking and Loading Space Provisions			
Parking Area	Located within any yard provided that no part of a parking space is located closer than 3 m (9.8 ft) to street line, or closer than 1.5 m to any other lot line.	No parking is being proposed within 3 m to the streetline, or 1.5 m to any lot line.	Yes
Parking Space Dimension	2.75 m x 5.5 m	2.75 m x 5.5 m	Yes
Parking Requirement	1 space per 30 sq. m of GLA for Public Buildings Phase 1 1291 sq.m GLA = **43 spaces** Phase 2 209 sq.m GLA = **7 spaces** **50 spaces**	80 staff spaces 16 visitor 96 spaces plus 30 additional with the expansion **126 spaces**	Yes
Barrier Free Parking Dimension	4 m x 5.5 m	4 m x 5.5 m	Yes
Barrier Free Parking Requirements	**3 spaces**	**4 spaces**	Yes

A summary of the site-specific zoning regulations being proposed are detailed below:

- Relief from Section 4.2, Table 4B, Column B to permit accessory structures within the required front yard setback.
- Relief from Section 4.2, Table 4B, Column D to permit an accessory structure to have a maximum height of 13 metres.
- Relief from Section 4.2, Table 4B, Column E to allow accessory structures to be constructed prior to the main building.

A draft of the proposed Zoning By-law Amendment is included as **Appendix No. 1**

Response: It is my opinion that the Zoning By-law Amendment is appropriate and represents good planning. The property is close to the Urban Centre and can be serviced with existing municipal infrastructure. The development generally complies with the proposed 'Institutional' (IN-XX) zoning. The Zoning By-law Amendment has included site-specific provisions to facilitate accessory structures on the property.

The Zoning By-law prohibits accessory structures within the required front yard setback. As per the concept plan (**Figure 1**), the existing farmhouse (to be renovated and repurposed), the future greenhouses and fuel depot are located within the required front yard setback. The fuel depot will be screened from Gartshore Street with a landscape buffer. This will mitigate any concerns from a streetscape perspective. The existing farmhouse is integral to the proposed development as it will preserve the cultural heritage landscape of the site. The future greenhouses will also contribute to the rural character of the area and have been strategically placed near the farmhouse to keep with rural cultural landscape. For these reasons, it is my opinion that permitting the accessory structures within the required front yard setback should be supported.

The future salt shed (to be constructed as part of Phase 2) is a planned accessory structure on the site. The height of the salt shed exceeds the maximum height for an accessory of 6.7 metres. The proposed salt shed is proposed to be 13 metres in height. The future salt shed will be located centrally on the site and away from the existing farmhouse to mitigate any impacts on the streetscape and cultural heritage landscape of the area. Again, a landscaped buffer will be provided along that portion of Gartshore Street to mitigate any impacts to the streetscape. It is my opinion that permitting a maximum height for an accessory structure of 13 metres is appropriate for this site.

The Township Zoning by-law states the accessory structures are to be constructed after the main building has lawfully commenced construction. In this situation, there is an existing farmhouse dwelling that will remain on the site and will require relief from this provision of the Zoning By-law. In my opinion, providing relief to this provision will permit the farmhouse to be restored and preserved.

9.2 970 Gartshore Street

The property at 970 Gartshore is currently zoned ‘Future Development’, ‘Industrial’ ‘Environmental Protection’ and subject to the ‘Environmental Protection Overlay’ according to Map 80 in the Township of Centre Wellington Zoning By-law No. 2009-045. The Zoning By-law Amendment proposes to amend the existing zone from ‘Future Development’ to a ‘General Industrial’ (M2) zone to permit industrial uses on the property.

A draft of the proposed Zoning By-law Amendment is included as **Appendix No. 2**

A summary of the zoning requirements is provided below in the following table:

Regulation General Industrial (M2) Zone	Regulations	970 Gartshore Street	Compliant (Y/N)
Minimum Lot Frontage	30 m (98.4 ft)	Approx. 82 m	Yes
Minimum Front Yard	6 m (19.7 ft)		

Minimum Rear Yard	7.5 (24.6 ft)	Not applicable. No development proposed.
Minimum Interior Side yard	3 m (9.8 ft)	
Minimum Exterior Side Yard	6 m (19.7 ft)	
Buffer Strip	A buffer strip in accordance with Section 4.7 is required along any interior side lot line and rear lot line which abuts land zoned for residential, institutional or open space purposes.	
Outdoor Storage	Outdoor storage of goods, materials and equipment is permitted in accordance with Section 4.29, except that in an M2 zone outdoor storage is not permitted within 15 m (49.2 ft) of land zoned for residential, institutional or open space purposes.	
Outdoor Display Area	Outdoor display and sales is permitted in accordance with Section 4.28, except that in an M2 zone outdoor display and sales is not permitted within 15 m (49.2 ft) of lands zoned residential, institutional or open space.	
Setbacks from Adjacent Uses	Where land zoned M2 abuts any land zoned for residential, institutional, future development or open space purposes, no buildings shall be allowed within 30 metres (98.4 ft) of said zone limit.	

Response: The draft Zoning By-law is requesting that the 'Future Development (FD)' zone be rezoned to a 'General Industrial (M2)' zone to facilitate future industrial uses on the property. There are no proposed changes to the existing 'Environmental Protection (EP)' zone. The lot frontage of the property complies with the minimum requirements of the Zoning By-law. The request to permit industrial use of the property should be supported as it is compatible with the surrounding area. The site is located within a larger industrial area of Fergus. The property was placed in a 'Future Development' zone due to the presence of

an active agricultural barn located across the street at 965 Gartshore Street. The agricultural operation on the property has since ceased and the Minimum Distance Separation setbacks no longer apply to the site. Therefore, it is my opinion that the proposed zoning by-law amendment should be supported.

9.3 101 Gregson Court

The property at 101 Gregson Court is currently zoned 'Future Development' according to Map 80 in the Township of Centre Wellington Zoning By-law No. 2009-045. The Zoning By-law Amendment proposes to amend the existing from 'Future Development' zone to a "General Industrial' (M2) zone to permit industrial uses on the property.

A draft of the proposed Zoning By-law Amendment is included as **Appendix No. 3**

A summary of the zoning requirements are provided below in the following table:

Regulation General Industrial (M2) Zone	Regulations	101 Gregson Court	Compliant (Y/N)
Minimum Lot Frontage	30 m (98.4 ft)	Approx. 67 m	Yes.
Minimum Front Yard	6 m (19.7 ft)	Not applicable. No development proposed.	
Minimum Rear Yard	7.5 (24.6 ft)		
Minimum Interior Side yard	3 m (9.8 ft)		
Minimum Exterior Side Yard	6 m (19.7 ft)		
Buffer Strip	A buffer strip in accordance with Section 4.7 is required along any interior side lot line and rear lot line which abuts land zoned for residential, institutional or open space purposes.		
Outdoor Storage	Outdoor storage of goods, materials and equipment is permitted in accordance with Section 4.29, except that in an M2 zone outdoor storage is not permitted within 15 m (49.2 ft) of land zoned for residential, institutional or open space purposes.		
Outdoor Display Area	Outdoor display and sales is permitted in accordance with Section 4.28, except that in an M2 zone outdoor display and sales is not permitted within 15 m (49.2		

	ft) of lands zoned residential, institutional or open space.	
Setbacks from Adjacent Uses	Where land zoned M2 abuts any land zoned for residential, institutional, future development or open space purposes, no buildings shall be allowed within 30 metres (98.4 ft) of said zone limit.	

Response: The draft Zoning By-law is requesting that the 'Future Development (FD)' zone be rezoned to a 'General Industrial (M2)' zone to facilitate future industrial uses on the property. The existing lot frontage complies with the minimum requirements of the Zoning By-law. The request to permit industrial use of the property should be supported as it is compatible with the surrounding area. The site is located within a larger industrial area of Fergus. The property was placed in a 'Future Development' zone due to the presence of an active agricultural barn located across the street at 965 Gartshore Street. The agricultural operations on the property have since ceased and the Minimum Distance Separation setbacks no longer apply to the site. Therefore, it is my opinion that the proposed zoning by-law amendment should be supported.

6.0 Conclusions

The Township of Centre Wellington is proposing a new public works facility on the property municipally known as 965 Gartshore Street. The proposed development will provide a consolidated space to service the growing community, as well as future employment growth. To facilitate the proposed development, a Zoning By-law Amendment is required to rezone the property from 'Agricultural (A)' to a specialized 'Institutional' (IN) zone to permit the proposed use and recognize site specific provision to facilitate accessory structures on the property.

In conjunction with the rezoning of 965 Gartshore Street, the Township of Centre Wellington would also like to remove the Future Development designation on the properties municipally known as 970 Gartshore Street and 101 Gregson Court in Fergus. The current Future Development designation was related to an active agricultural operation that was located on 965 Gartshore Street. The farming operation has ceased on the property, and therefore, the Minimum Distance Separation setbacks no longer apply to the site. Therefore, the Township is requesting to amend the Official Plan designation from Future Development to Industrial to permit future industrial uses on the property. The Township is also requesting that the Zoning By-law be amended to change the current zoning of 'Future Development (FD)' to General Industrial (M2)' to permit future industrial uses on the properties. The proposed applications will provide additional vacant industrial land to the Township and an opportunity for additional economic growth within the community.

The Planning Justification Report concluded that the Official Plan Amendment and Zoning By-law applications are justified for the following reasons:

- It is consistent with the policies of the Provincial Policy Statement.
- It conforms with the policies of the Growth Plan.
- It conforms with the County of Wellington Official Plan.
- It conforms with the Township of Centre Wellington Official Plan.
- The proposed development and future development are compatible with the surrounding land uses.
- The proposed future Public Work Site and future Industrial Sites will not have a negative impact on agriculture/agricultural operations.
- The proposed future Public Work Site and future Industrial Sites will contribute towards providing residents in the Township with more efficient public services; and will contribute toward the local economic base in the County and Township and provide local employment opportunities for residents.

Based on the foregoing, it is my opinion that the proposed Official Plan Amendment and Zoning By-law Amendment are appropriate, represent good land use planning and are in the public interest.

Yours truly,
GSP Group Inc.

V. Schmidt

Valerie Schmidt, MCIP, RPP
Senior Planner

Appendix No. 1

The Corporation of the Township of Centre Wellington

By-law 2023-XX

Whereas the Council of the Corporation of the Township of Centre Wellington deems it desirable to amend By-law No. 2009-045, as amended, pursuant to Section 34 of the Planning Act, R.S.O. 1990;

Now therefore the Council of the Corporation of the Township of Centre Wellington hereby enacts as follows:

1. Schedule "A" Map 80 to By-law No. 2009-045 is hereby amended in accordance with the attached Schedule "A" which forms part of this By-law

2. Section 15 of By-law No. 2009-045, as amended, is hereby further amended by adding the following Exception IN.XX.X:

15.XX.X	IN.XX.X	Notwithstanding anything else in this by-law to the contrary, on land zoned IN**.XX.X**, the following special provisions shall apply: 1. <u>Accessory Structures</u> • The provisions of Section 4.2, Table 4B, Column B shall not apply to accessory structures. Accessory structures are permitted in the required front yard. • The provisions of Section 4.2, Table 4B, Column B shall not apply to the salt and sand storage building. A maximum height of the salt and sand storage shed shall be 13 metres. • The provisions of Section 4.2, Table 4B, Column B shall not apply to accessory structures. Accessory structures shall be permitted before the construction of the main building.

3. All other applicable provisions of By-law No. 2009-045 shall continue to apply to the lands affected by this amendment.

4. This By-law shall come into effect on the date of final enactment by the Council pursuant to Section 34 of the Planning Act, R.S.O., 1990.

Read a first, second and third time and finally passed this XX day of XXXX, 2023.

_____ _____

Mayor – Shawn Watters Clerk – Kerri O'Kane

Township of Centre Wellington

Schedule "A"

By-law 2023-XX

An Amendment to the Township of Centre Wellington
Zoning By-law No. 2009-045 as amended

This is Schedule "A" to By-law 2033-XX passed this XX day of XXXX, 2023

Mayor – Shawn Watters

Clerk – Kerri O'Kane

Appendix No. 2

The Corporation of the Township of Centre Wellington

By-law 2023-XX

Whereas the Council of the Corporation of the Township of Centre Wellington deems it desirable to amend By-law No. 2009-045, as amended, pursuant to Section 34 of the Planning Act, R.S.O. 1990;

Now therefore the Council of the Corporation of the Township of Centre Wellington hereby enacts as follows:

1. Schedule "A" Map 80 to By-law No. 2009-045 is hereby amended in accordance with the attached Schedule "A" which forms part of this By-law

2. All other applicable provisions of By-law No. 2009-045 shall continue to apply to the lands affected by this amendment.

3. This By-law shall come into effect on the date of final enactment by the Council pursuant to Section 34 of the Planning Act, R.S.O., 1990.

Read a first, second and third time and finally passed this XX day of XXXX, 2023.

_____ _____

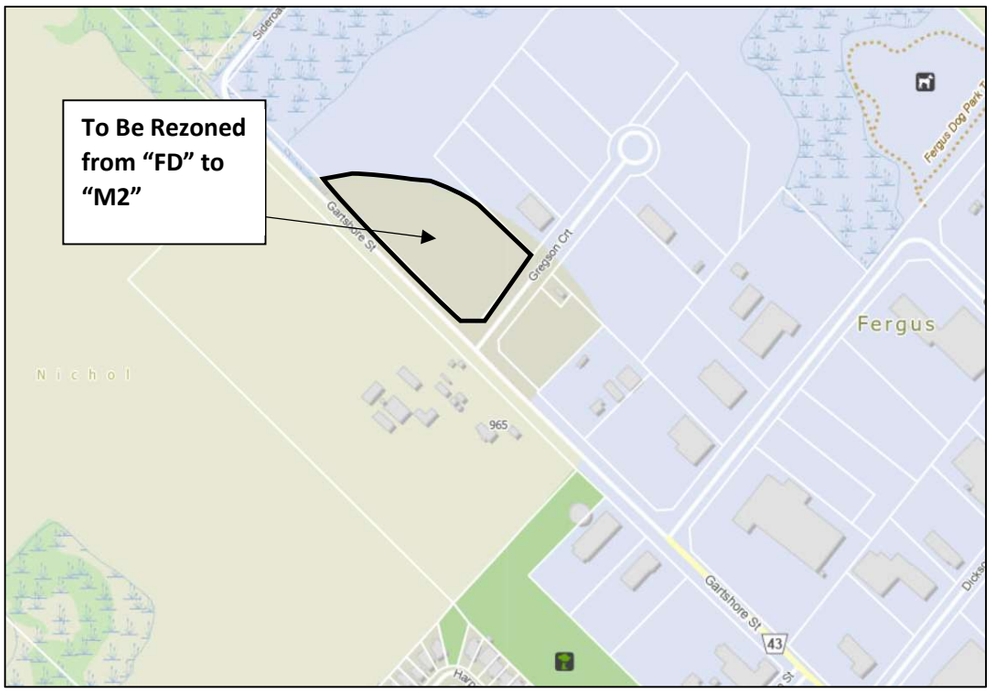
Mayor – Shawn Watters Clerk – Kerri O'Kane

Township of Centre Wellington

Schedule "A"

By-law 2023-XX

An Amendment to the Township of Centre Wellington
Zoning By-law No. 2009-045 as amended



This is Schedule "A" to By-law 2033-XX passed this XX day of XXXX, 2023

Mayor – Shawn Watters

Clerk – Kerri O'Kane

Appendix No. 3

The Corporation of the Township of Centre Wellington

By-law 2023-XX

Whereas the Council of the Corporation of the Township of Centre Wellington deems it desirable to amend By-law No. 2009-045, as amended, pursuant to Section 34 of the Planning Act, R.S.O. 1990;

Now therefore the Council of the Corporation of the Township of Centre Wellington hereby enacts as follows:

1. Schedule "A" Map 80 to By-law No. 2009-045 is hereby amended in accordance with the attached Schedule "A" which forms part of this By-law

2. All other applicable provisions of By-law No. 2009-045 shall continue to apply to the lands affected by this amendment.

3. This By-law shall come into effect on the date of final enactment by the Council pursuant to Section 34 of the Planning Act, R.S.O., 1990.

Read a first, second and third time and finally passed this XX day of XXXX, 2023.

_____ _____

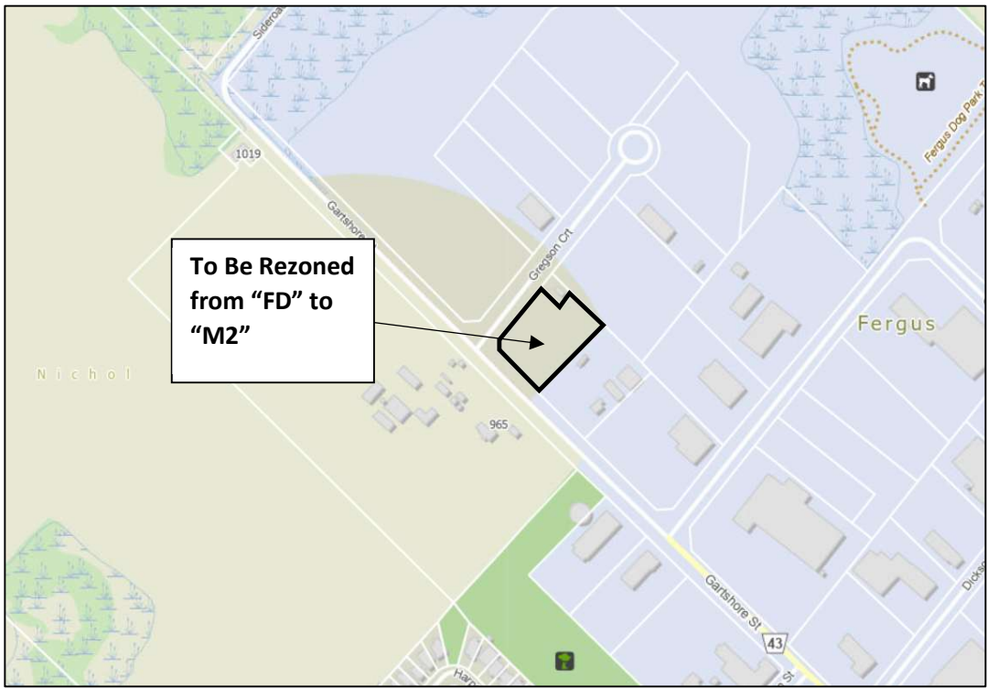
Mayor – Shawn Watters Clerk – Kerri O'Kane

Township of Centre Wellington

Schedule "A"

By-law 2023-XX

An Amendment to the Township of Centre Wellington
Zoning By-law No. 2009-045 as amended



This is Schedule "A" to By-law 2033-XX passed this XX day of XXXX, 2023

Mayor – Shawn Watters

Clerk – Kerri O'Kane

Appendix No. 4

Authorization for Agent/Solicitor to act for Owner

(If affidavit is signed by an Agent/Solicitor on Owner's behalf, the Owner's written authorization below should be completed)

I (we) _____ of the _____ of

_____ County/Region of _____ do hereby authorize

_____ to act as my agent in this application.

_____ _____

Signature of Owner(s) *Date*

Affidavit

I (we) Valerie Schmidt of the City of Waterloo County/Region of Waterloo solemnly declare that all the statements contained in this application are true, and I, (we), make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the CANADA EVIDENCE ACT.

DECLARED before me at the city of Kitchener
in the County/Region of Waterloo this 18th day of May, 2023

V. Schmidt May 18, 2023

Signature of Owner or Authorized Solicitor or Authorized Agent *Date*

K. Barisdale May 18, 2023

Signature of Commissioner *Date*

Kristen Alexia Barisdale,
a Commissioner, etc., Province of Ontario,
for GSP Group Inc.
Expires June 7, 2025

Application fee of $_____ received by the municipality:	**Application deemed complete:**
_____	_____
Signature of Municipal Employee	*Signature of Municipal Employee*
_____	_____
Date	*Date*

BURNSIDE

Building Condition Assessment
965 Gartshore Street, Fergus

Township of Centre Wellington

Building Condition Assessment
965 Gartshore Street, Fergus

Township of Centre Wellington

R.J. Burnside & Associates Limited
128 Wellington Street West, Suite 301
Barrie, Ontario, L4N 8J6, CANADA

November 17, 2022
300055234.0000

Distribution List

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0	Yes	Yes	The Township of Centre Wellington

Record of Revisions

Revision	Date	Description
0	September 9, 2022	Initial Submission to the Township of Centre Wellington
1	November 17, 2022	Second Submission to the Township of Centre Wellington

R.J. Burnside & Associates Limited

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Disclaimer

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1.0 Background

1.1 Scope of Work

This report outlines the results of the Building Condition Assessment (BCA) conducted by R.J. Burnside & Associates Limited (Burnside) at 965 Gartshore Street, Fergus. The purpose of the BCA was to visually assess the condition of the structural, mechanical, electrical, and building envelope components during a walk-through survey, and report any obvious physical material deficiencies, along with our opinion of cost.

The BCA was conducted in general accordance with the ASTM Standard E 2018-15: Standard Guide for Property Condition Assessments. Accessible areas were reviewed during the walk-through survey. No destructive testing, test pits or physical sampling was completed. Deficient conditions were documented and photographed as described herein. Photographs referenced in the report are enclosed within **Appendix B**.

As per ASTM E 2018-15 the reporting threshold is $3,000 for individual items or $10,000 for similar items in the aggregate. We have provided our opinion of cost for items that are expected to require repair or replacement within 10 years found in **Appendix A**. Items that are cosmetic enhancements to the property, or part of normal preventative maintenance were excluded from our report. Costs associated with upgrades to the facility or changes required to facilitate future use are also outside the scope of this report.

Our opinion of costs is based on our experience with contractors specializing in these fields, historical cost data from similar projects, and/or current construction cost data published by the R.S. Means Company. These cost estimates should be used as a guide only, as costs may vary according to the time of year, quality of materials used, volume of work, actual site conditions, etc.

Reviewed Components

Building Structure:	Foundation walls (visible extents only), concrete slabs, and structural framing members.
Envelope:	Windows, doors, roofs, brick cladding
Mechanical:	Building HVAC system, plumbing system
Electrical:	Main electrical power, and interior and exterior lighting systems

1.2 Property Description

The building at 965 Gartshore Street, Fergus, consists of a two-storey residential farmhouse structure. It appears that it may have been constructed in the late 1800s based on building materials and practices used to build it. The superstructure appears to be a combination of wood framing and multi-wythe load bearing masonry. The foundations are of rubble wall construction. The sloped roofs have overlapped, corrugated sheet metal panels protecting them.

A small wood framed/clad addition was constructed within the last 20 to 40 years which is used as a mud room. There is also a small green **house** attached to this structure and partially to the main building. A covered porch was constructed adjacent the greenhouse structure.

Heating is provided to the building via a gas fired furnace. A pass-through window air-conditioner is also installed along with ceiling fans.

Domestic hot water is provided to the building by an electrical hot water tank. Plumbing systems include incoming water service and sanitary drainage piping.

There are no fire extinguishers installed throughout the building.

No documents or drawings were made available to review at the time of our site visit. A copy of RDH Architects Inc. drawings A1-01 – A1-03 which have since been prepared by RDHA has been included in Appendix D for reference.

1.3 Site Visit

On August 3, 2022 the property was visited by Wyatt Poulton, B.A.Sc., EIT., of Burnside to record observations and take photographs.

Rolf Weidelich, P.Eng. authored all of the building envelope and structural components of the report, having more than 27 years of experience in building renewal and capital planning.

Dan Beaudoin, C.E.T. authored all of the mechanical, electrical, and life safety components of the report, having more than 15 years of experience in building systems renewal and capital planning.

The assessment was conducted during a sunny day and outdoor temperatures of approximately 25°C. Burnside was provided access to the building interior. The various building cladding elements were reviewed from grade.

2.0 Building Components

2.1 Structure

2.1.1 Below Grade Structure

The foundation walls are of rubble wall construction (Photo 6), with one section of the basement stabilized with poured concrete which appears to be in good condition (Photo 5 -Located on RDHA drawing in Appendix D). The basement height varies, with most areas appearing to be 6 feet high or less. There are timber columns (logs) within the interior of the basement which pass through the concrete slab-on-grade. The concrete floor slab is likely not original to construction and was cast-in-place around the timber columns. The clay brick masonry extends below grade (likely 2 to 4 courses though no test pits were completed to verify) with active leakage at the transition from foundation to masonry at the first-floor level framing, with some of these transitions being foamed to mitigate the leaks. The rubble wall foundations were generally covered with efflorescence, and active leaks were noted throughout both basement areas. The timber columns that pass through the slab-on-grade have moisture wicking stains and possible wood rot extending up from the concrete slab surface (Photo 5) though we were not able to determine the extent or severity of the deterioration without further testing.

There is an exterior access hatch structure for the basement (Photo 11). Active water penetration was noted below the door, which could not be opened. The exterior hatch could also not be opened.

The mudroom addition appears to be constructed on a slab-on-grade. The greenhouse structure appears to rest on logs directly on grade. The covered porch support columns extend below grade and are likely supported in a “fence post concrete mix”. (Photo 2)

Recommendations

- To remediate the moisture issues in the basement, a general excavation, waterproofing and weeping tile (complete with a sump pump) installation program will be required. This will also require general regrading of the exterior such that the foundation is exposed at least 6”. The exterior face of the rubble wall foundation will require a general parging surface application to provide a suitable substrate for the waterproofing and to cover the exposed portion of the foundation after regrading. It is likely that the lime binder in the original mortar has leached out over time, so lime grout injection to stabilize the rubble foundation walls may also be required. A further evaluation of the foundation wall by extracting cores should be considered at an expected cost of about $8,000. The cost to complete the waterproofing work would be in the order of $200,000. Further review would be required to ascertain the cost of any required structural repairs to the stone rubble foundation wall and to

better understand the extent of deterioration and its impact to the existing timber columns.

2.1.2 Superstructure

It appears the building superstructure is constructed of multi-wythe clay masonry (brick or in combination with clay tile or rubble stone back-up), with wood framed floors, interior walls, and roof structures. Where seen at the attic hatch the roof framing is rough sawn lumber and the roof is sheathed with wood planks (not tongue and groove). Large “log beams” support the first-floor level that have been hewn to have flat surfaces on two sides (Photo 5 and 6), along with log columns as discussed in section 2.1.1. Additional log columns and HSS posts were added to shore up the first floor. Moisture staining and possible wood rot was observed on exposed structural wood members in the basement and within the attic.

The mudroom addition which is “attached” to the house appears to be supported on a concrete slab-on-grade, which is not appropriate given the possibility of heaving. Likewise, the greenhouse and covered porch is also inappropriately supported on grade and attached to the house (Photo 2). The porch is supported on a ledger that is bolted to the clay masonry, which is not ideal and is generally not acceptable even if the house has multi-wythe load bearing clay masonry (Photo 14) due to risk of the anchors failing as masonry deteriorates. The porch’s wood support posts extend below grade, likely within concrete similar to how a fence is constructed, and are generally not plumb (Photo 2).

Recommendations

- A structural review should be completed to determine if any of the structural wood members in the basement and attic have suffered moisture related damage, at a cost of about $10,000 depending on access needed and any testing.

- The mudroom addition, the greenhouse structure and the covered porch should all be removed as they are not original to the structure (detract from building aesthetics), were constructed improperly, and are in poor condition. Further, when the foundation walls are excavated and waterproofed as discussed in 2.1.1, these structures would impede this work. The cost to demolish and dispose these structures would be in the order of $10,000 if completed in conjunction with the foundation wall work.

2.2 Building Envelope

2.2.1 Roofing

The sloped roofs are protected with a low quality, prefinished, corrugated metal roofing system with overlapped joints. The metal panels are aged, and some panels have been replaced (Photos 4 and 8).

The second floor has cathedral ceilings with small roof attic spaces near the peak. From ground level only three small vents near the roof ridges were observed (2 appear to be dryer vents), with at least one belonging to a bathroom vent exhaust. Individual soffit vents (perforated metal panels) were provided at 6 to 8 foot spacings and at the one attic hatch accessed, insulation was reduced at rafters some with plywood bulkheads at several locations (Photo 7), but no Moore vents or plywood baffles were observed. The exposed roof framing and sheathing is moisture stained because of the inadequate ventilation. No obvious signs of past leaks were observed at interior finishes.

Cellulose insulation was blown into the attic, which was likely done within the last 30 to 40 years, with levels varying from 5 to 7 inches near the attic hatch (Photo 7). The hatch was not weather-stripped. The roof attic, and most likely the sloped cathedral ceilings, are not adequately insulated.

Eavestroughs have been provided to control water runoff at all eaves, with downpipes draining to grade. Soffits at the eaves and rakes have been clad with solid sheet metal panels, with perforated panels inserted at various spacings. Rakes and eaves are clad with prefinished sheet metal (Photos 2 and 8). The sheet metal is generally in fair to good condition, with some localized damage and discolouration of the painted finish.

Recommendations

- The sheet metal roofing system is aged and will likely require replacement within the next 10 years. The driver for its replacement will be determined on this building's future use. If the farmhouse is to remain in full use with all of the interior space being heated and cooled year-round, and the Township wishes to restore the exterior aesthetics in general conformance to any heritage "requirements" (building does not appear to have any designation / listing), all of the roof components discussed above should be replaced at the same time, including a retrofit of roof insulation and ventilation. The sheet metal cladding elements would be replaced with painted wood cladding (possibly adding ornate wood accents), and troughs replaced with period materials and fabrication techniques. The roofing may have to become tin/zinc/lead, cedar, copper or even slate depending on the Township's wishes. To complete all this work, save the insulation and ventilation retrofit, using conventional sheet metal systems, like for like, the cost would be in the order of $40,000.

2.2.2 Cladding

The building is clad with a multi-wythe clay masonry wall system that is likely load bearing. There are decorative masonry Quoins at corners, patterns around windows and at eaves level, with lighter coloured brick. The clay brick extends below grade which can accelerate freeze-thaw damage (Photo 9) due to the quantity of moisture they are exposed to. Windows have either sandstone or concrete sills (most have a cementitious coating applied to them, likely as a repair).

In general, the clay brick veneer is in fair to poor condition with extensive spalling and mortar joint deterioration on all elevations, which is more extensive at grade. Some step cracking and mortar repairs were observed. Some form of parging “repair” was completed overtop the clay masonry at the porch/greenhouse area (Photo 14).

Recommendations

- A significant masonry repair program will be required to properly restore the clay brick veneer. This will require extensive masonry unit replacement and mortar joint pointing repairs. Reclaimed brick will have to be sourced to match colour and dimensions of the existing brick. If it is not possible to source some or all of the brick required and consistent aesthetics is desired by the Township, tinting of the brick may be an option. A more detailed study should be undertaken to evaluate the true extent of repairs needed, which would likely cost in the order of $10,000 depending on if openings and site access requirements. A preliminary budget of $80,000 should be assumed for repairs until the study is completed, with work completed in conjunction with the foundation wall project recommended in 2.1.1, to take advantage of economies of scale, mobilization, and since the masonry extends below grade. If this work is completed separately, costs would be higher.

2.2.3 Windows

Most of the windows are newer (relative to the age of the building), with glazing spacer date stamps indicating 1997. They are vinyl framed containing insulating glazing units (IGUs) in fixed, fixed over awning, and double hung configurations. All of the newer vinyl framed windows were inserted into the old wood frames which were capped with sheet metal (Photo 10 to 11). A single window that is likely 40 years old or more above the main door is wood framed with a casement sash topped with a cathedral fixed unit above, both containing IGUs. They are all in good condition, except one IGU is cracked in the window adjacent the greenhouse structure.

The windows in the mudroom and the clear plastic of the greenhouse structure are not included in this assessment since these structures are recommended to be demolished.

Recommendations

- The windows can remain in service well beyond the 10 year horizon of this assessment, IGU replacement completed as necessary out of operating budgets. Depending on the Township's requirements, replacement in the near term would result only if heritage considerations became the driver of that decision.

2.2.4 Doors

There are three doors, two are insulated steel with vision units containing IGUs, and one at the building entrance within the mudroom being solid wood. They are all in serviceable condition (Photos 13 and 14). The main entrance door assembly (the original main entrance) was reduced in size, whereby the original door was likely larger and had a curved vision unit above. The arched door opening bounded by the ornate brick pattern was infilled with wood to accommodate the insertion of the existing conventional insulated steel door (Photo 13).

Recommendations

- The doors can remain in service for the next ten years and beyond, and once replacement is required, they are generally replaced as needed which is below the threshold of this report. Painted finishes should be renewed as necessary under operating budgets. It is likely the Township will want to investigate what type of door assembly originally existed at the main entrance, and possibly fabricate a replica door assembly which may cost upwards of $20,000 (this cost not included in the summary table as it is optional).

2.3 Mechanical Systems

The building mechanical systems were visually examined, where accessible, during the walk-through review. The system components were randomly reviewed to assess their overall condition. This assessment was based on visual observation of accessible equipment only, no measurements or testing was completed. Information concerning adequacy, efficiency, and condition of the electrical and mechanical systems, where possible, was obtained from the review. For the purpose of the report, a preventive maintenance plan is assumed to be in place for all major equipment and is not discussed throughout unless noted otherwise. Major replacement will be considered at its approximate end of life. Actual replacement could vary based on appropriate maintenance, water quality (if appropriate), as well as indoor and outdoor environmental factors.

2.3.1 HVAC Systems

The building's heating, ventilation, and air conditioning (HVAC) system is provided by a gas fired furnace and a pass-through air conditioner, along with ceiling fans installed throughout the building.

We have included an allowance of $3,000 every 3 years for minor/repairs or replacement for the HVAC equipment.

2.3.1.1 Gas Fired Furnace

The gas fired furnace (Photo 15) is manufactured by Luxaire and has a model #TG9S080B12MP11B, serial # W1H6953550, with an input heating capacity of 80,000 BTU/hr and was manufactured in 2016.

The furnace vent termination (Photo 16) and gas meter (Photo 17) are located at grade in shrubbery.

A typical gas fired furnace is expected to have an average life expectancy of 10-15 years based on appropriate maintenance, usage, indoor/outdoor environmental factors etc.

Recommendations

- Continue to maintain the furnace. In addition to the maintenance, a detailed review of each unit should be completed annually by a certified technician. A report from the technician should be provided stating any deficiencies. The shrubbery around the vent termination and gas meter should be cleared for access and maintenance.

- We recommend cleaning / replacing the furnace air filters at least every three (3) months or as per manufacturer recommendations as part of regular building maintenance. Additional cleaning may be required depending on the interior environment (dust, etc.).

- Major replacement is expected to occur around 2031, or once maintenance / service frequency increases, replacement parts are no longer readily available, or once any other major issues arise. In our opinion the cost to replace the furnace is in the order of $8,000.

2.3.1.2 Pass-through Window Air Conditioner (PTAC)

There is a pass-through air conditioner installed to provide localized air-conditioning (Photo 18). The PTAC is manufactured by Haier and has a model # QHM08LXW1, a serial # FR030920H. A manufactured date cannot be confirmed.

A typical PTAC is expected to have an average life expectancy of 15 years based on appropriate maintenance, usage, etc.

In our opinion the cost to replace the PTACs would fall below the ASTM 2018-15 reporting threshold of $3,000 individually and $10,000 in the aggregate.

Recommendations

- Major replacement is considered to occur around 2024, or once maintenance / service frequency increases, replacement parts are no longer readily available, or once any other major issues arise.

The PTAC may have R22 refrigerant and if so, any cooling issue will likely require replacement of the unit at that time

2.3.2 Wood Fireplace

There is a cast iron wood fireplace (Photo 19). A manufactured date was not able to be determined. However, based on a visual review the fireplace appears to be in good shape.

Typically, a cast iron fireplace could last 30 years, pending the amount of use and quality of the wood burnt.

Recommendations

- A WETT (Wood Energy Transfer Technology) inspection should be completed by a certified technician. This inspection would be covered in the general HVAC allowance.

- In our opinion a wood burning fireplace could cost $3,000, major replacement would be considered beyond the scope of this report.

2.3.3 Ceiling Fans

Ceiling fans have been provided for throughout the building (Photos 20 & 21). A manufacturer, model and serial number could not be obtained. For the purpose of this report, the fans are assumed to be half-way through their life expectancy.

A typical ceiling fan and ceiling exhaust fan is expected to have an average life expectancy of 10-15 years.

Recommendations

- The ceiling fans appear to be in serviceable condition, otherwise major replacement is expected to occur around 2030, once maintenance / service frequency increases, replacement parts are no longer readily available, or once any other major issues arise. In our opinion, the cost to replace the ceiling fans falls below the ASTM 2018-15 reporting threshold of $3,000 individually or $10,000 in the aggregate

2.3.4 Plumbing Systems

2.3.4.1 Electrical Hot Water Tank

The fixtures throughout the building are supplied with hot water from one electrical hot water tank (Photo 22) and was manufactured by A.O. Smith and has a model # E80TE-45240 250, serial #1724106540175 with a capacity of 287 L, a rating of 3,000 W and was manufactured in 2017. It appears to be in serviceable condition.

A typical electrical hot water tank is expected to have an average life expectancy of 15 years based on appropriate maintenance, usage, water quality, etc.

Recommendations

- The HWT appears to be in good condition, and major replacement is expected to occur around 2031, or once maintenance / service frequency increases, replacement parts are no longer readily available, or any other major issues arise. In our opinion the cost to replace each HWT is in the order of $3,500.

2.3.4.2 Water Softener

There is a water softener (Photo 23) installed and was manufactured by Myers and has a model # 7370, a serial # 5799768 and appears to have been manufactured in 2005.

A typical water softener is expected to have an average life expectancy of 10-15 years based on appropriate maintenance, usage, water quality, etc.

Recommendations

- The water softener appears to be in good condition, and major replacement is expected to occur around 2023, or once maintenance / service frequency increases, replacement parts are no longer available, or once any other major issues arise. In our opinion the cost to replace the water softener falls below the ASTM2008-15 threshold of $3,000 individually or $10,000 in the aggregate.

2.3.4.3 Sump Pump

There is a sump pump installed in the building (Photo 24), a manufacturer, model, and serial number were not able to be obtained. For the purpose of this report, we will assume these pumps are half-way through their life expectancy.

A typical sump pump is expected to have an average life expectancy of 10-15 years based on appropriate maintenance, usage etc.

Recommendations

Major replacement is expected to occur around 2030 or once maintenance / service frequency increases, replacement parts are no longer readily available or once any other major issues arise. In our opinion the cost to replace each sump pump is expected to fall below the ASTM 2008-15 reporting threshold of $3,000 individually or $10,000 in the aggregate.

2.3.4.4 Plumbing Fixtures

There are two toilets (Photos 25 & 26), a lavatory (Photo 25), laundry sink (Photo 27) and a double kitchen sink (Photo 28).

The fridge, stove, chest freezer, washer, and dryer are removable and are not considered building components and are not considered within the scope of this report.

In general, the plumbing fixtures appear in good condition. The typical service life of plumbing fixtures is approximately 30-35 years. In our experience fixtures generally do not require major repair or replacement unless subject to damage by external forces. Their replacement is usually governed by the need for updated aesthetics.

Recommendations

- We have included for replacing broken or damaged fixtures as part of the plumbing allowance. Updating plumbing fixtures for aesthetic purposes is cosmetic in nature and is therefore excluded from the scope of this report.

2.3.4.5 Plumbing

The plumbing systems in the building include the incoming water services, domestic cold and hot water distribution piping, and sanitary drainage.

Exposed hot and cold-water piping was observed to be copper, while sanitary drainage was abs dwv (Photo 29).

Given the age of the building, inspection of the sanitary lines using scoping should be considered every 5-8 years to determine the condition of the lines and any potential problems such as collapsed piping or tree roots. Scoping of the lines is considered an operating expenditure.

Typical piping systems are expected to have an average life expectancy of 30-40 years; however, in our experience, piping, if properly maintained, can last much longer.

Recommendations

- We have included an allowance of $4,500 every 3 years for minor repair / replacement of sanitary and domestic water piping.

2.4 Electrical Systems

2.4.1 Electrical Supply

Electrical service to this building enters through the exterior wall (Photo 30). Burnside was unable to locate the hydro meter. The power is supplied to the main 100A electrical panel in the basement (Photo 31) and a 60A sub-panel and disconnect switch on the second floor. (Photo 32).

The age of the electrical panels and disconnect switch is unknown, but they are operational. Wiring material (copper or aluminum) could not be determined based on a non-destructive visual review. Typical manufacturer quoted life expectancy of switches and circuit breakers are 30 years, but experience shows that well-maintained equipment can remain in service for much longer periods. The biggest threat to electrical equipment is heat (overloaded circuits). Equipment that has reached its useful life should be considered for future replacement but in the meantime, continue to be maintained. Due to their age, as a preventive maintenance measure, infrared imaging of the equipment every two or three years would provide thermographs which would reveal potential hot spots and other problems.

We have included an allowance of $4,500 every 3 years for minor/repairs or replacement for the electrical equipment.

Recommendations

- The main electrical panel appears to have been replaced recently and major replacement would be considered beyond the scope of this report. The main sub-panel appears to be dated but is operational and should be considered for major replacement. In our opinion the cost to replace the 60A sub-panel is expected to fall below the ASTM 2008-15 reporting threshold of $3,000 individually or $10,000 in the aggregate.

2.4.2 Lighting

Indoor lighting is provided via various lighting fixtures, (Photos 33, 34 & 35). Exterior lights were provided by wall mounted light packs (Photos 36, 37 & 38).

Based on the varying condition and styles of light fixtures and bulbs, we expect lighting has been replaced on an as-needed basis throughout the building's service life. Wall mounted exterior lights appear to be in serviceable condition.

Recommendations

- Replace ceiling and wall mounted light fixtures on an as-needed basis. In our opinion replacement of light fixtures as needed falls below the ASTM E 2018-15 reporting threshold of $3,000 individually and $10,000 in the aggregate.

- Ongoing maintenance and bulb replacement to be completed as required. Visual inspection and operation should be completed on an on-going basis. Costs associated with regular maintenance including bulb replacement are not considered a capital expenditure and therefore is not included in this study. We recommend replacing fixtures with more energy efficient fixtures such as LED when fixtures are replaced.

2.5 Life Safety Systems

2.5.1 Fire Protection

A single smoke alarm has been installed. (Photo 39). For the purpose of this report, the smoke alarm is assumed to be half-way through its life expectancy.

A typical smoke alarm is expected to have an average life expectancy of 10 years.

There were no carbon monoxide alarms or fire extinguishers visible during the visit.

Recommendations

- Maintain the smoke alarm and continue to test and replace the batteries. Replacing the batteries is considered an operational expense.

- Install carbon monoxide detectors on each floor of the building.

- Add fire extinguisher(s) to suit the Ontario Fire Code.

- Major replacement is expected to occur around 2025, in our opinion replacement of the smoke alarm, installation of the carbon monoxide alarms and fire extinguishers

falls below the ASTM E 2018-15 reporting threshold of $3,000 individually and $10,000 in the aggregate.

2.5.2 Emergency Lights and Exit Signs

Battery powered emergency lighting was noted at the stairs to the second level (Photo 11). No illuminated exit signs are present.

Recommendations

- As discussed in 2.5.1 above, with the change in occupancy additional emergency lighting will be required along with illuminated exit signs. This would be part of any renovation project budgets.

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix A

10 Year Capital Plan

965 Gartshore Street, Fergus - Building Condition Assessment

Category/ Report Section No.	Item Description	Condition Rating	Priority	Estimated Repair or Replacement Cost	Annual Opinion of Costs										Total Cost
					2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	
					Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
2.1 BUILDING STRUCTURE															
2.1.1	Below Grade Structure - Waterproofing repairs (Note this opinion of cost can increase significantly pending the recommended coring investigation)	4 - Poor	2 - High (Years 2 or 3)	$200,000		$200,000									$200,000
2.1.1	Below Grade Structure - Foundation coring investigation	4 - Poor	1 - Immediate (Year 1)	$8,000	$8,000										$8,000
2.1.2	Superstructure - Structural review of wood members in basement and attic	4 - Poor	1 - Immediate (Year 1)	$10,000	$10,000										$10,000
2.1.2	Superstructure - Demolish and dispose of the mudroom addition, greenhouse structure, and the covered porch	4 - Poor	2 - High (Years 2 or 3)	$10,000		$10,000									$10,000
2.2 BUILDING ENVELOPE															
2.2.1	Roofing - Replacement (Opinion of cost is for replacing like for like)	4 - Poor	4 - Low (Beyond Year 6)	$40,000						$40,000					$40,000
2.2.2	Cladding - Masonry evaluation and repairs (Note this opinion of cost for repairs can increase significantly pending the recommended evaluation)	4 - Poor	2 - High (Years 2 or 3)	$80,000	$10,000	$80,000									$90,000
2.3 MECHANICAL SYSTEMS															
2.3.1 HVAC Systems															
2.3.1	HVAC Systems - Minor repair allowance	2 - Good	2 - High (Years 2 or 3)	$3,000			$3,000			$3,000			$3,000		$9,000
2.3.1.1	Gas Fired Furnace - Replacement	2 - Good	4 - Low (Beyond Year 6)	$8,000										$8,000	$8,000
2.3.3 Plumbing Systems															
2.3.3.1	Electrical Hot Water Tank - Replacement	2 - Good	4 - Low (Beyond Year 6)	$3,500										$3,500	$3,500
2.3.3.5	Plumbing - Minor repair allowance	2 - Good	2 - High (Years 2 or 3)	$4,500			$4,500			$4,500			$4,500		$13,500
2.4 ELECTRICAL SYSTEMS															
2.4.1	Electrical Supply - Minor repair allowance	2 - Good	2 - High (Years 2 or 3)	$4,500			$4,500			$4,500			$4,500		$13,500
				TOTALS (2021 Dollars)	$28,000	$290,000	$7,500	$0	$0	$47,500	$0	$0	$7,500	$11,500	$392,000
			Annual Rate	2.0%	1.00	1.020	1.040	1.061	1.082	1.104	1.126	1.149	1.172	1.195	n/a
				TOTALS (factored)	$28,000	$295,800	$7,803	$0	$0	$52,444	$0	$0	$8,787	$13,744	$406,578

Note: Costs associated with future upgrades or improvements are not included. Further investigations recommended may identify additional items requiring repair that are not captured in this summary.

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Appendix B

Photographs

Photo 1: View of north east elevation.

Photo 2: View of south west elevation, note the mudroom, greenhouse and canopy structures. Note canopy posts extend below grade.

Photo 3: View of south west elevation.

Photo 4: View of south east elevation.

Photo 5: View of concrete foundation angle, wood and steel post supports.

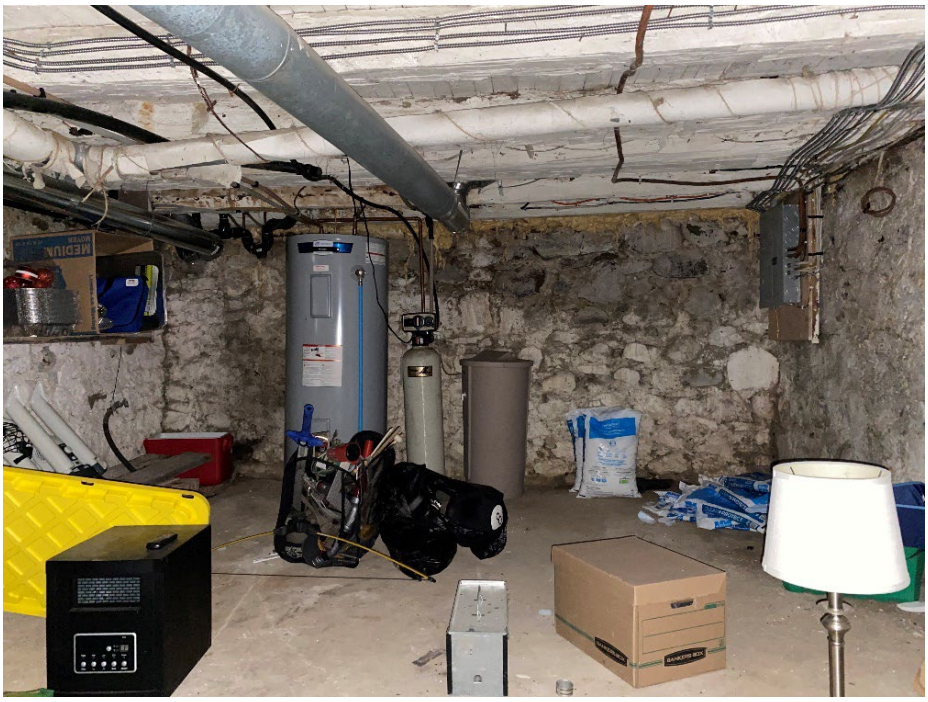

Photo 6: View of rubble wall foundation, note the extensive efflorescence.

Photo 7: View of attic insulation, likely bulkhead for soffit ventilation.

Photo 8: View of metal roofing and replaced panel section.

Photo 9: View of masonry deterioration. Note masonry extends below grade.

Photo 10: View of deteriorated brick.

Photo 11: View of windows, basement hatch.

Photo 12: View of wood framed gothic arch window.

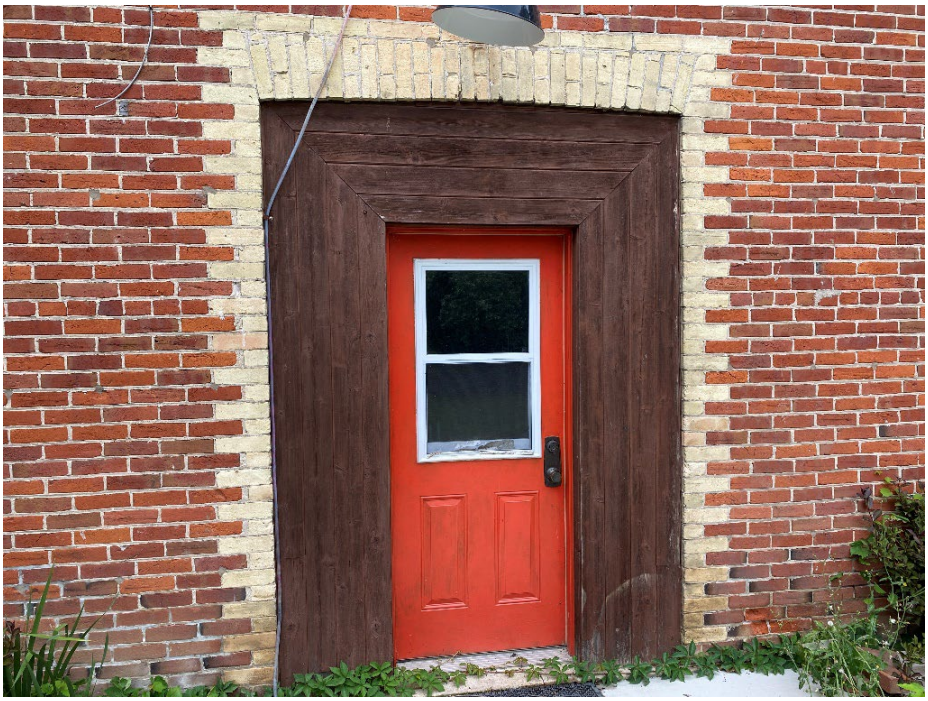

Photo 13: View of front door with infilled wood cladding.

Photo 14: View of side door. Note canopy supported by the brick veneer (white arrow). Note cementitious parging over brick (red arrow).

Photo 15: View of typical

Photo 16: View of

Photo 17:

Photo 18:

Photo 19:

Photo 20:

Photo 21:

Photo 22:

Photo 23:

Photo 24:

Photo 25:

Photo 26:

Photo 27:

Photo 28:

Photo 29:

Photo 30:

Photo 31:

Photo 32:

Photo 33:

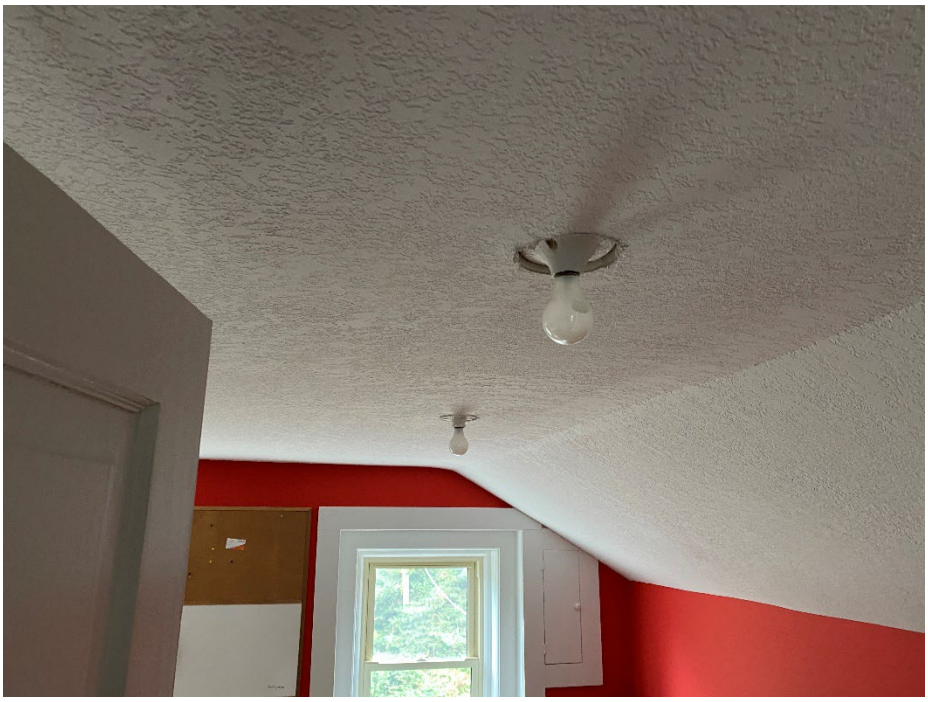

Photo 34:

Photo 35:

Photo 36:

Photo 37:

Photo 38:

Photo 39:

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Appendix C

Limitations

APPENDIX C - LIMITATIONS

- This report is intended solely for the Client(s) named in the report. The material in it reflects our best judgment in light of the information reviewed by R.J. Burnside & Associates Limited at the time of preparation. Unless otherwise agreed in writing by Burnside, it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. This report is not a certification of compliance with past or present regulations. No portion of this report may be used as a separate entity; it is written to be read in its entirety. No other party shall be entitled to rely on this report without the written consent of the consultant. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

- This assessment does not wholly eliminate uncertainty regarding the potential for existing or future costs, hazards or losses in connection with a property. No physical or destructive testing and no design calculations have been performed unless specifically recorded. Conditions existing but not recorded were not apparent given the level of study undertaken. We can perform further investigation on items of concern if so required.

- Only the specific information identified has been reviewed. The Consultant is not obligated to identify mistakes or insufficiencies in the information obtained from the various sources or to verify the accuracy of the information. The Consultant may use such specific information obtained in performing its services and is entitled to rely upon the accuracy and completeness thereof.

- Responsibility for detection of or advice about pollutants, contaminants or hazardous materials is not included in our mandate. In the event the Consultant or any other party encounters any hazardous or toxic materials, or should it become known to the Consultant that such materials may be present on or about the jobsite or any adjacent areas that may affect the performance of the Consultant's services, the Consultant may, at its option and without liability for consequential or any other damages, suspend performance of its services under this Agreement until the Client retains appropriates consultants to identify and abate or remove the hazardous or toxic materials and warrants that the jobsite is in full compliance with all applicable laws and regulations.

- Budget figures are our opinion of a probable current dollar value of the work and are provided for approximate budget purposes only. Accurate figures can only be obtained by establishing a scope of work and receiving quotes from suitable contractors.

- Any time frame given for undertaking work represents an educated guess based on apparent conditions existing at the time of our report. Failure of the item, or the optimum repair/replacement process, may vary from our estimate.

- We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time. Any user of this report specifically denies any right to claims against the Consultant, Sub-Consultants, their Officers, Agents and Employees in excess of the fee paid for professional services.

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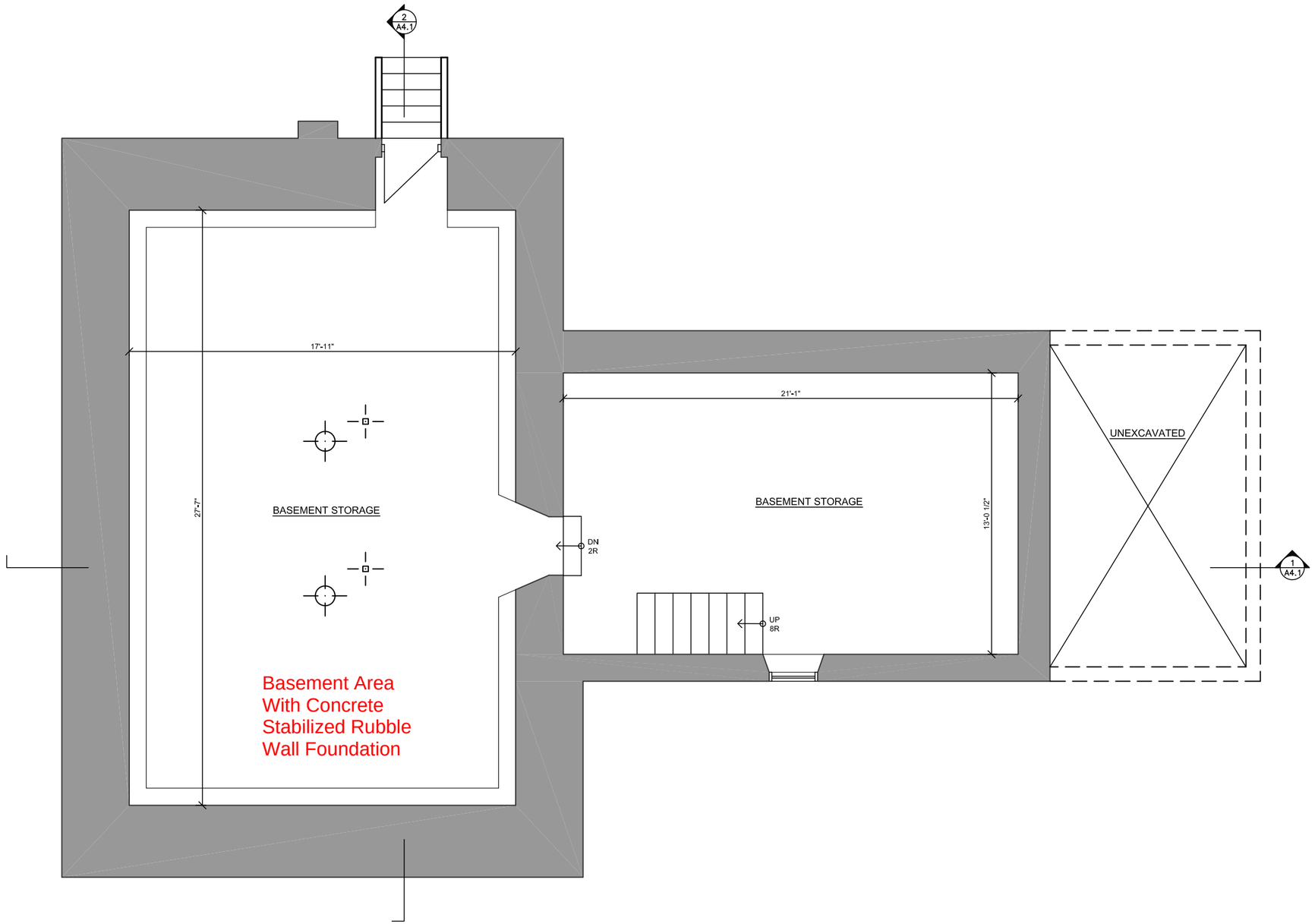
Appendix D

RDHA Reference Drawing



1
A1-01

BASEMENT FLOOR PLAN

3/16" = 1'-0"

RDHA

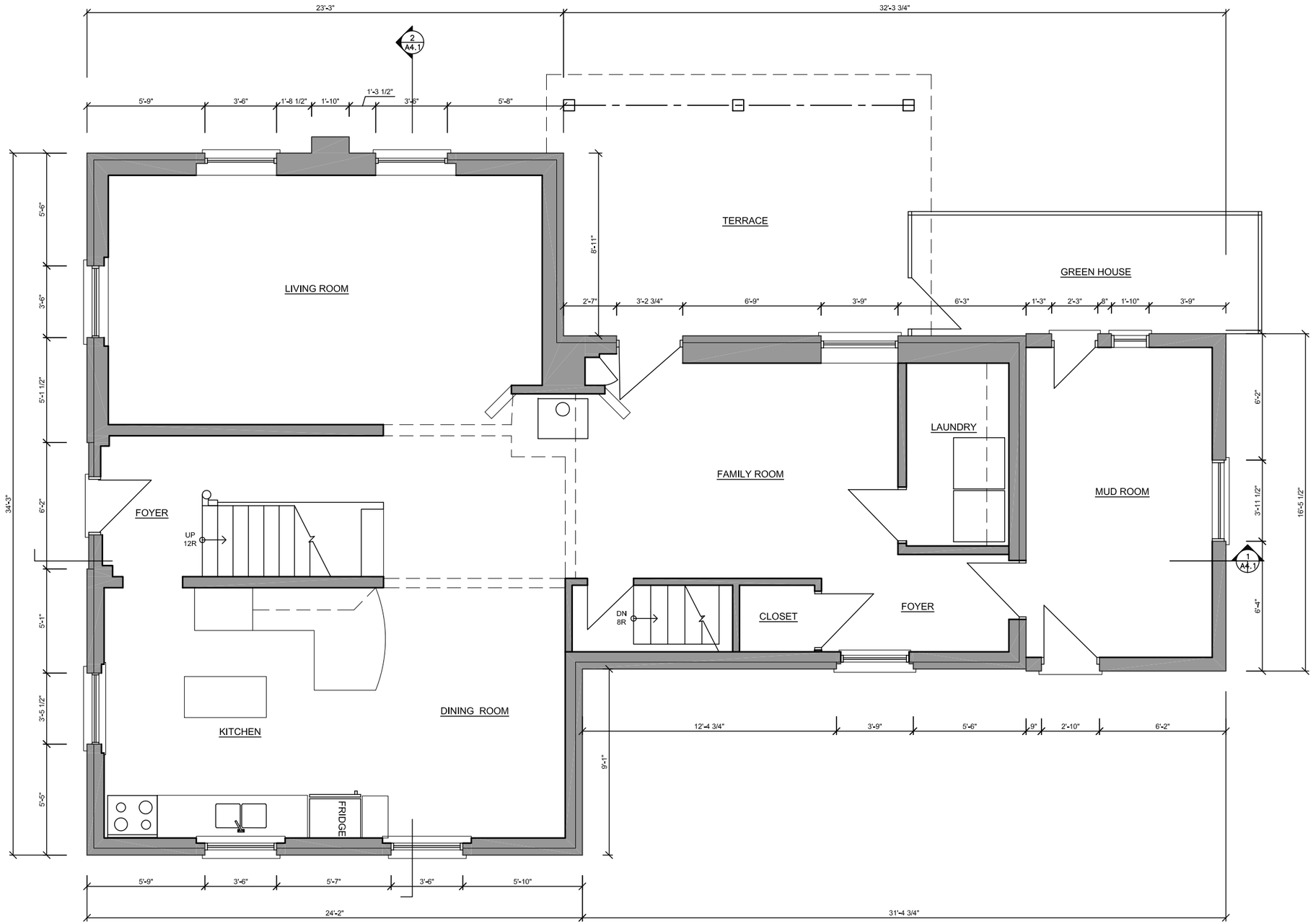
RDH Architects Inc.
695 Queen Street West, Suite 100, Toronto, Ontario, M6J 1E6
t (416) 204-1399
e Info@rdharch.com www.rdharch.com

Township of Centre Wellington
Operations Centre
Site Development
965 Gartshore Street, Fergus, Ontario

SCALE: 3/16" = 1'-0"
DATE: SEPT 12 2022
PROJECT NO. 202113

FARM HOUSE PLANS

PN A1-01



1
A1-02

GROUND FLOOR PLAN

3/6" = 1'-0"

RDHA

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Township of Centre Wellington
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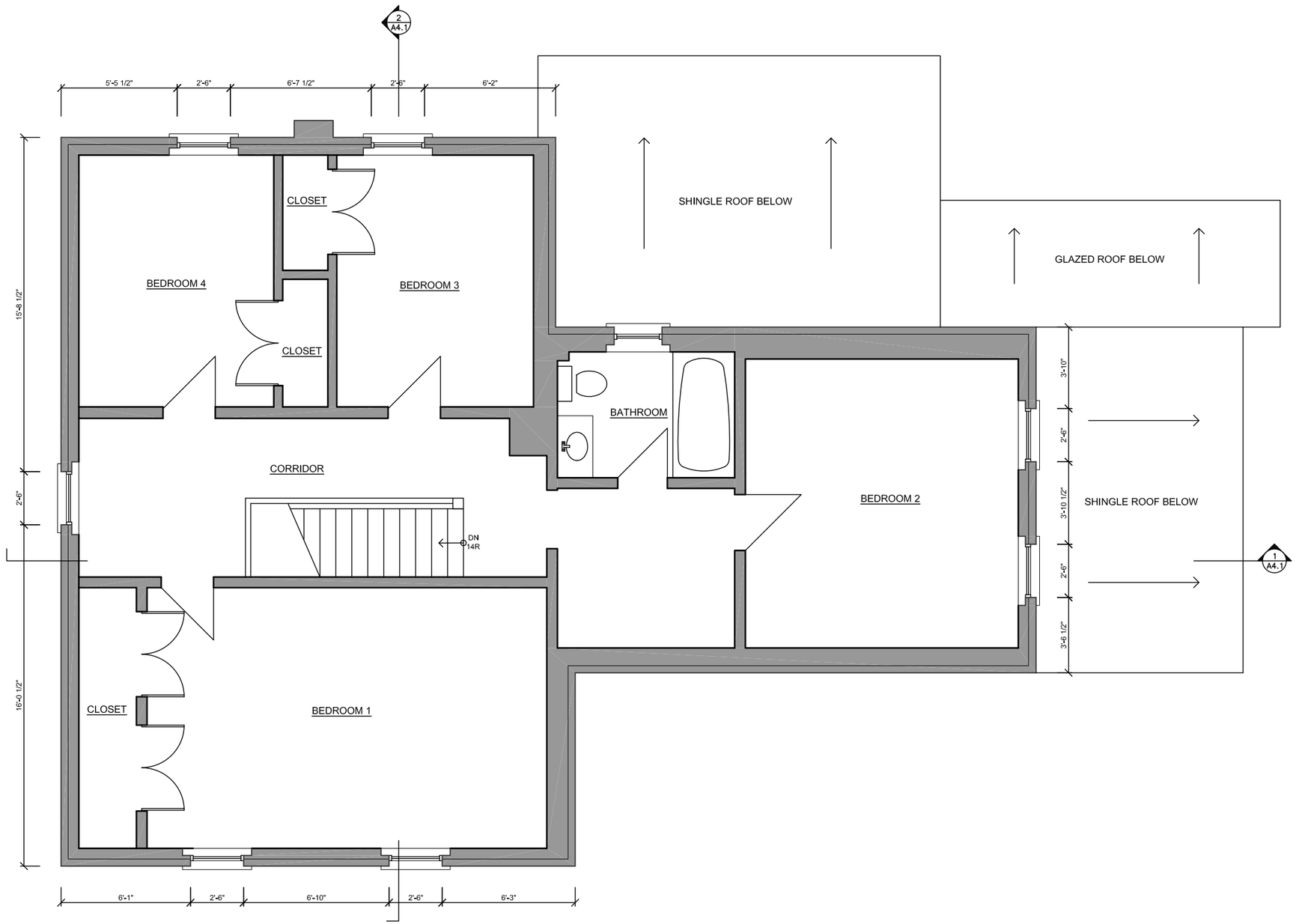
965 Gartshore Street, Fergus, Ontario

SCALE: 3/16" = 1'-0"
DATE: SEPT 12 2022
PROJECT NO. 202113

FARMHOUSE PLANS

PN

A1-02



1
A1-03

SECOND FLOOR PLAN

3/6" = 1'-0"

RDHA

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Township of Centre Wellington
Operations Centre
Site Development
965 Gartshore Street, Fergus, Ontario

SCALE: 3/16" = 1'-0"
DATE: SEPT 12 2022
PROJECT NO. 202113

FARMHOUSE PLANS

PN A1-03

R.J. Burnside & Associates Limited

Designated Substances and Hazardous Materials Survey
965 Gartshore Street
Fergus, Ontario

Township of Centre Wellington
1 MacDonald Square
Elora, Ontario

R.J. Burnside & Associates Limited
15 Townline
Orangeville ON L9W 3R4 CANADA

January 30, 2023
300055234.0000

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January 30, 2023
ONTARIO

Executive Summary

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of Centre Wellington (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of buildings proposed for demolition at the property located at 965 Gartshore Street, Fergus, Ontario (the "Site").

The Site is a rural property occupied by a residential dwelling, a garage, a barn, and several outbuildings/storage sheds. The work was conducted to evaluate the potential presence of designated substances and hazardous materials within the buildings proposed for demolition.

The DSHMS included visual inspections of the buildings to identify the presence or potential presence of substances designated by the Occupational Health and Safety Act (OHSA) and other hazardous materials that may require special handling. The key findings of the DSHMS are as follows:

- Asbestos was identified in pipe wrap material on pipes in the basement of the residential dwelling.
- Silica was identified in building materials that are known to commonly contain silica (concrete, brick, and cement).

No other designated substances or hazardous materials were identified.

The recommendations included:

1. A copy of this report should be provided to contractors involved in renovations and/or building demolitions at the Site.
2. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.
3. The removal of asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05.
4. Appropriate worker precautions should be taken as per the OHSA when cutting, coring, or breaking up silica containing concrete, brick, and masonry materials.
5. Beneath newly painted surfaces, it is possible that older paint layers could potentially contain lead. Demolishing or sanding painted surfaces could potentially reveal old lead-based paint beneath newly painted surfaces. Appropriate worker precautions should be taken as per the OHSA when sanding or demolishing painted surfaces that may have underlying layers of lead-based paint.
6. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.
7. The contents of this report should be reviewed and updated periodically, based on facility requirements.

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Disclaimer

Other than by the addressee, and any regulatory agency, copying or distribution of this document, in whole or in part, is not permitted without the express written consent of R.J. Burnside & Associates Limited.

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) was retained by the Township of Centre Wellington (Township) to conduct a Designated Substances Survey and Hazardous Materials Survey (DSHMS) of buildings proposed for demolition at the property located at 965 Gartshore Street, Fergus, Ontario (the "Site"). Figure 1 shows the Site location and Figure 2 is a Site Plan which shows the boundary of the Site.

The work was conducted to evaluate the potential presence of designated substances and hazardous materials within the buildings proposed for demolition.

The DSHMS included visual inspections of the buildings to identify the presence or potential presence of substances designated by the Occupational Health and Safety Act (OHSA) and other hazardous materials that may require special handling. This report should be provided to contractors and workers who will be conducting demolition or renovation of the buildings included in the DSHMS.

2.0 Property Description

The Site is a rectangular shaped rural property with an area of approximately 8 hectares, which is occupied by a residential dwelling, a garage, a barn, a chicken coop, and several outbuildings/storage sheds.

The residential dwelling is a two-storey farmhouse constructed of wood and brick, with a stone-rubble wall foundation. The sloped roofs are covered with corrugated sheet metal panels. The building materials and construction style of the house indicate it may have been constructed in the late 1800s.

A wood framed/clad addition at the back of the house is used as a mud room. There is a small greenhouse attached to the mud room.

A forced air, natural gas-fired furnace in the basement heats the house. An electrical hot water tank in the basement provides hot water.

2.1 Plan of Survey

Plan 61R-22127 is a plan of survey prepared in November 2021 which shows the Site boundary and indicates the total area of the Site is 8.0974 hectares. Plan 61R-22127 is provided in Appendix A.

A topographical plan of survey prepared in September 2022 shows the location of the the house, barn, and storage buildings. The 2022 survey is provided in Appendix A.

3.0 Scope of Work

This DSHMS was conducted based on current conditions and the understanding that the buildings on Site may be renovated or demolished at some point in the future.

Chase Beck (Burnside) conducted the Site visit on November 24, 2022, to inspect the buildings for the potential presence of designated substances and potential concerns regarding other hazardous building materials. Samples of suspect materials were collected from the buildings and submitted for laboratory analysis. Photographs of the buildings are provided in Appendix B.

This DSHMS was conducted in accordance with Section 30 of the Occupational Health and Safety Act (OHSA) “Duty of Project Owners”.

Asbestos is the one designated substance specifically governed by two regulations under the Act – Ontario Regulation (O. Reg.) 490/09 and O. Reg. 278/05 “Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.” O. Reg. 278/05 includes, but is not limited to, governance of ongoing asbestos management in buildings, information for workers, owner and employer responsibilities, types of abatement operations and their measures and procedures, applicable respirator usages, instruction and training requirements, asbestos work reports and workers register, provision of equivalent measures, notice to inspector requirements and bulk and air sampling requirements.

There are two specific regulations that are relevant to a DSHMS:

- O. Reg. 490/09: Designated Substances filed December 16, 2009, under Occupational Health and Safety Act, R.S.O. 1990, c. O.1
- O. Reg. 278/05: Designated Substance - Asbestos on Construction Projects and In Buildings And Repair Operations under Occupational Health and Safety Act, R.S.O. 1990, c. O.1

These regulations were applied where relevant in this DSHMS report. When evaluating the impact of hazardous materials and other issues the requirement for action and associated liability will be related to Ontario Regulation 347 General Waste Management.

3.1 Designated Substances and Hazardous Materials Survey

3.1.1 Designated Substances

An inspection of the Site was conducted to document the potential presence of the eleven (11) Designated Substances which include:

- Asbestos;
- Lead;
- Silica;
- Mercury;
- Ethylene Oxide;
- Vinyl Chloride;
- Benzene;
- Arsenic;
- Coke Oven Emissions;
- Acrylonitrile; and
- Isocyanates.

3.1.2 Hazardous Materials

The Site was also inspected for additional items that, under Provincial or Federal regulations, may require special handling and/or disposal during or after renovation and/or demolition of the buildings including:

- Polychlorinated biphenyls (PCBs) in transformers and/or light ballasts;
- Ozone depleting substances (ODS) found in old air conditioning and/or refrigeration equipment;
- Radioactive devices and equipment;
- Urea formaldehyde foam insulation (UFFI);
- Miscellaneous chemicals and waste materials that may require special handling or disposal; and
- Mould, gross amounts which would require special handling during renovations or demolition.

It should be noted that hazardous materials such as chemicals and cleaning products in small quantities used for Site operations such as janitorial supplies, oil, greases, and antifreeze for equipment maintenance, are not considered a liability and will not be sampled or addressed. It was assumed for the purposes of this DSHMS that all process chemicals, materials, and equipment that were used as part of daily operations and not permanently affixed to the structures would be removed prior to any reconstruction activities and were not included in this DSHMS.

3.2 Applicable Regulations

A DSHMS is conducted in accordance with Section 30 of the Occupational Health and Safety Act (OHSA) “Duty of Project Owners”.

The main purpose of the OHSA is to protect workers from health and safety hazards on the job. It sets out duties for all workplace parties and rights for worker. It establishes procedures for dealing with workplace hazards and provides for enforcement of the law where compliance has not been achieved voluntarily. Fundamental to the successful working of OHSA, is the workplace Internal Responsibility System (IRS).

The OHSA applies to almost every worker, supervisor, employer, and workplace in Ontario, including workplace owners, constructors and suppliers of equipment or materials to workplaces covered by the Act.

The OHSA does not apply to work done by the owner or occupant, or a servant, in a private residence or on the connected land Section 3(1).

In this case, the Site can be considered a “workplace” as the owner will be retaining a contractor to conduct demolition of buildings.

There are two specific regulations that are relevant to a DSHMS:

- O. Reg. 490/09: Designated Substances filed December 16, 2009, under Occupational Health and Safety Act, R.S.O. 1990, c. O.1
- O. Reg. 278/05: Designated Substance - Asbestos on Construction Projects and In Buildings And Repair Operations under Occupational Health and Safety Act, R.S.O. 1990, c. O.1

When evaluating the impact of hazardous materials and other issues the requirement for action and associated liability will be related to Ontario Regulation 347 General Waste Management.

The applicable regulations were applied where relevant in this DSHMS report.

3.2.1 O. Reg. 490/09: Designated Substances

3.2.1.1 Designated Substances

The following chemical agents are prescribed as designated substances:

- Acrylonitrile.
- Arsenic.
- Asbestos.
- Benzene.
- Coke Oven Emissions.

- Ethylene Oxide.
- Isocyanates.
- Lead.
- Mercury.
- Silica.
- Vinyl Chloride.

3.2.1.2 Application

The application of this regulation with respect to these substances is as follows:

Acrylonitrile

(1) Subject to subsection (2), this Regulation applies, with respect to acrylonitrile, to every employer and worker at a workplace where acrylonitrile is present, produced, processed, used, handled, or stored and at which a worker is likely to be exposed to acrylonitrile.

(2) With respect to acrylonitrile, this Regulation does not apply to an employer or the workers of an employer at a workplace where acrylonitrile is not produced, processed, or used, if a worker's exposure to acrylonitrile results only from the presence, use, handling, or storage of goods made in the last stage of a process using polymers made from acrylonitrile.

Arsenic

(1) Subject to subsection (2), this Regulation applies, with respect to arsenic, to every employer and worker at a workplace at which arsenic is produced, processed, used, handled, or stored or is a waste product or by-product of a process and at which a worker is likely to be exposed to arsenic.

(2) With respect to arsenic, this Regulation does not apply to mining operations, including concentrating, milling, washing, crushing, grinding, sifting, or conveying of a metallic or non-metallic mineral or mineral-bearing substance or rock, unless the operations are carried on,

(a) in a plant where smelting, roasting or refining is carried on; or

(b) in or at a place that is contiguous with a plant where smelting, roasting or refining is carried on.

Asbestos

(1) This Regulation applies, with respect to asbestos to:

(a) every employer operating a mine or mining plant for the purpose of mining, crushing, grinding or sifting asbestos and to those workers of such an employer who are likely to be exposed to asbestos;

(b) every employer processing, adapting or using asbestos in connection with the manufacturing or assembling of goods or products and to those workers of such an employer who are likely to be exposed to asbestos;

(c) every employer engaged in the activities set out in subsection (2), and to those workers of such an employer who are engaged in those activities and are likely to be exposed to asbestos, if:

(i) on or before December 16, 1985, the employer,

(A) put into effect and maintained measures and procedures to control the exposure of workers to asbestos, and

(B) incorporated the measures and procedures into an asbestos control program in accordance with the regulations, and

(ii) the employer has maintained the control program referred to in sub-subclause (i) (B) in accordance with the regulations.

(2) The activities mentioned in clause (1) (c) are:

1. The repair, alteration or maintenance of machinery, equipment, aircraft, ships, locomotives, railway cars and vehicles.

2. Work on a building that is necessarily incidental to the repair, alteration or maintenance of machinery or equipment.

Benzene

(1) Subject to subsection (2), this Regulation applies, with respect to benzene, to every employer and worker at a workplace where a worker is likely to be exposed to benzene or a product containing benzene,

(a) during its transportation or transfer; or

(b) during its manufacture, processing, use, handling, or storage.

(2) With respect to benzene, this Regulation does not apply to the delivery of gasoline by a gasoline pump into the fuel tank of a motor vehicle, motorboat or other watercraft or into a portable container at a service station or other premises.

Coke oven emissions

This Regulation applies, with respect to coke oven emissions, to every employer and worker who works at a metallurgical coke oven and is likely to be exposed to coke oven emissions.

Ethylene oxide

This Regulation applies, with respect to ethylene oxide, to every employer and worker at a workplace where ethylene oxide is present.

Isocyanates

This Regulation applies, with respect to isocyanates, to every employer and worker at a workplace where isocyanates are produced, used, handled, or stored and at which a worker is likely to be exposed to isocyanates.

Lead

This Regulation applies, with respect to lead, to every employer and worker at a workplace where lead is present, produced, processed, used, handled, or stored and at which a worker is likely to be exposed to lead.

Mercury

(1) Subject to subsection (2), this Regulation applies, with respect to mercury, to every employer and worker at a workplace where mercury is present, produced, processed, used, handled, or stored and at which a worker is likely to be exposed to mercury.

(2) With respect to mercury, this Regulation does not apply to,

(a) an employer,

(i) who is engaged in the practice of dentistry, within the meaning of the Dentistry Act, 1991, or

(ii) who has one or more workers who engage in the practice of dentistry, within the meaning of the Dentistry Act, 1991;

(b) a worker who works in the office of an employer described in clause (a).

Silica

This Regulation applies, with respect to silica, to every employer and worker at a workplace where silica is present, produced, processed, used, handled, or stored and at which a worker is likely to be exposed to silica.

Vinyl chloride

This Regulation applies, with respect to vinyl chloride, to every employer and worker at a workplace where vinyl chloride is present, produced, processed, used, handled, or stored and at which a worker is likely to be exposed to vinyl chloride.

This DSHMS report assesses the designated substances in accordance with the requirements of an owner/employer under the regulation.

3.2.1.3 Assessment

The DSHMS is designed to meet the following assessment requirements of an owner/employer as outlined in the regulation:

(1) An employer shall carry out an assessment of the exposure or likelihood of exposure of a worker to a designated substance in the workplace and record it in writing.

(2) In carrying out the assessment, the employer shall consider and take into account,

(a) in the case of acrylonitrile, benzene, ethylene oxide, isocyanates or vinyl chloride, the methods and procedures used or to be used in the production, processing, use, handling and storage of the acrylonitrile, benzene, ethylene oxide, isocyanates or vinyl chloride;

(b) in the case of arsenic, lead, mercury or silica, the methods and procedures used or to be used in the processing, use, handling and storage of the arsenic, lead, mercury or silica;

(c) in the case of asbestos, the methods and procedures used or to be used in the processing, mining, use, handling and storage of the asbestos;

(d) in the case of coke oven emissions, the methods and procedures used or to be used in the metallurgical coking operation;

(e) the extent and potential extent of a worker’s exposure to the designated substance; and

(f) the measures and procedures that are necessary to control exposure to the designated substance by means of engineering controls, work practices and hygiene facilities and practices.

(3) The employer shall carry out the assessment in consultation with the joint health and safety committee and the committee may make recommendations respecting the assessment.

(4) The employer shall provide a copy of the assessment to every member of the joint health and safety committee.

3.2.2 O. Reg. 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations

It is the duty of an owner/employer to follow the requirements of this regulation when asbestos containing materials are identified or suspected as defined in the regulation.

The DSHMS identifies the presence or potential presence of asbestos containing materials and indicates if the Site complies with regulations. A DSHMS does not include such things as asbestos abatement (remediation) or any actions to bring a facility into compliance with regulations such as the preparation of an Asbestos Management Plan.

The DSHMS refers to this regulation when recommending next steps and potential costs.

3.2.3 Environmental Abatement Council of Ontario Lead Guideline

In Ontario, industrial organizations such as the Environmental Abatement Council of Ontario (EACO) have developed guidelines for lead concentrations in paint. The EACO is a contractor-based organization formed by professionals within the environmental abatement industry. In the absence of any specific provincial or federal regulation regarding lead containing materials in the workplace the EACO Lead Guideline, October 2014 is an accepted industry standard in Ontario.

This DSHMS refers to this guideline in the assessment of lead.

3.2.4 Other Regulations

The scope of the DSHMS is in accordance with O. Reg. 490/09 as described above. Depending on the findings, comments are included relating to other regulations or standards, such as O. Reg. 278/05 and the EACO Lead Guideline. When applicable, Burnside will note any significant issues relating to materials and waste management regulations and guidelines such as:

- PCB Regulations (SOR/2008-273) – if PCB containing materials are identified.

- O. Reg. 347 General - Waste Management – if hazardous or registerable wastes are identified.
- O. Reg. 463/10 Ozone Depleting Substances and other halocarbons – should refrigerants and other similar substances be identified.
- ECAO Mould Abatement Guidelines – If gross amounts of mould are identified (as per section 25(2)(h) of the Occupational Health and Safety Act to take every precaution reasonable in the circumstances for the protection of workers).

This DSHMS references the Standards, Test Methods and Protocols that relate to specific laboratory analysis as required by the above noted regulations and standards such as:

- United States Environmental Protection Agency (U.S. EPA) Test Method EPA/600/R 93/116 for asbestos containing materials.
- U.S. EPA Flame Atomic Absorption (AA) Method SW846-7000B for lead in paint.

3.2.4.1 Mould

The buildings on the Site are inspected for the presence of gross mould. A visual examination is conducted for the evidence and characterization of water damaged/impacted building materials, visible mould colonization of the exposed surfaces, and for the areas of the Site where moisture and substrates may encourage fungal growth will be conducted. The assessment will focus primarily on finishes, building structure and interior finishes.

3.2.4.2 Ozone Depleting Substances

A visual assessment is conducted of building equipment related to the heating ventilation and air conditioning (HVAC) systems for components likely to contain refrigerants including ozone depleting substances (ODS) such as R-11, R-12, and R-22. The presence of ODSs is determined by gathering label information such as the manufacturer, model numbers, serial numbers, and date codes, where present.

3.2.4.3 Urea Formaldehyde Foam Insulation

A visual assessment is conducted for the potential presence of urea formaldehyde foam insulation (UFFI). This will involve the inspection of exterior and interior walls for evidence of repaired openings (i.e., nozzle holes) made to facilitate the installation of the insulation. Although the inspection will be non-intrusive, wherever possible, an inspection of wall cavities through existing openings will be made.

Construction after 1980 did not use UFFI and it was rare in industrial/commercial buildings.

4.0 Results

4.1 Asbestos

Due to the age of the structures, asbestos was suspected to be present in various types of building materials. Samples of suspect materials were collected from the buildings such as pipe wrap, plaster, drywall, drywall tape, tiles, and various types of insulation materials. The samples were submitted to AGAT Laboratories for analysis of asbestos.

A total of 24 samples of suspect asbestos-containing material were collected and submitted to AGAT Laboratories for analysis of asbestos by polarized light microscopy (PLM). Sample descriptions and laboratory analytical results are listed in Table 1.

Table 1: Asbestos Samples and Analytical Results

Sample	Description	Asbestos Concentration
ASB 1	Outbuilding green insulation	<0.5% (no asbestos detected)
ASB 2	Outbuilding yellow insulation	<0.5% (no asbestos detected)
ASB 3	Garage yellow foam	<0.5% (no asbestos detected)
ASB 4	Garage green insulation	<0.5% (no asbestos detected)
ASB 5	Vinyl tile	<0.5% (no asbestos detected)
ASB 6 - A, B, C	Drywall (3 samples)	<0.5% (no asbestos detected)
ASB7 - A, B, C	Insulation (3 samples)	<0.5% (no asbestos detected)
ASB 8	Drywall stairs	<0.5% (no asbestos detected)
ASB 9	Insulation stairs	<0.5% (no asbestos detected)
ASB 10	Spray foam	<0.5% (no asbestos detected)
ASB 11	Yellow Insulation	<0.5% (no asbestos detected)
ASB 12	Black pipe wrap	50% - 75% Asbestos
ASB 13	White pipe wrap	<0.5% (no asbestos detected)
ASB 14 - A, B	Drywall upstairs (2 samples)	<0.5% (no asbestos detected)
ASB 15 - A, B	Insulation green (2 samples)	<0.5% (no asbestos detected)
ASB 16	Plaster	<0.5% (no asbestos detected)
ASB 17	Drywall tape	<0.5% (no asbestos detected)
ASB 18	Attic insulation	<0.5% (no asbestos detected)

Under O. Reg. 278/05 Section 1.0, “asbestos-containing material” is defined as material that contains 0.5% or more asbestos by dry weight.

Laboratory analytical results indicate a sample of black pipe wrap (Sample ASB 12) sampled from the residential dwelling contained 50% to 75% asbestos in the form of Chrysotile Asbestos. There was no asbestos detected in any of the other samples. The analytical results for all of the other samples are noted as less than 0.5% (<0.5%) asbestos. Sample locations are shown on floor plans provided in Appendix C. Laboratory certificates of analysis with analytical results are included in Appendix C.

It should be noted that some items, such as pipe gaskets and sealants could contain asbestos; however, these components could not be sampled as pipes were sealed. It is expected that gaskets and sealants would be removed as a component within the valves and piping during renovation or demolition. Precautions should be taken when dismantling these components.

The farmhouse foundation walls are constructed of stone and rubble. One section of the farmhouse basement appeared to be stabilized with poured concrete.

Vermiculite, which may contain asbestos, was sometimes used to insulate concrete block buildings. Concrete coring to verify the interior of the concrete walls was not in the scope of work for this DSHMS. Sampling to check for asbestos in vermiculite insulation within the wall requires coring of the concrete walls to visually inspect the wall interior and sample the insulating material (if present). There were no concrete block walls identified during the Site visit that were suspected of containing vermiculite.

4.2 Lead

In Ontario, industrial organizations such as the Environmental Abatement Council of Canada (EACC) have developed guidelines for lead concentrations in paint. The EACC Lead Guideline (2014) provides a good due diligence approach.

For the purposes of this DSHMS, we consider:

- Paint samples with detections of lead that are less than 1,000 ppm (µg/g) lead (less than 0.1% lead) are referred to as “low-level lead paint”;
- Paint with a lead concentration between 1,000 ppm (µg/g) to 5,000 ppm (µg/g) lead (0.1 to 0.5% lead) is considered “lead-containing paint”; and
- Paint with a lead concentration that is greater than 5,000 ppm (µg/g) lead (more than 0.5% lead) is considered “lead-based paint”.

Although all paints that contain lead must be given consideration when there is worker exposure, it is the lead-based paints that are of most concern to workers and specifically identified as an item of concern when assessing the results of a DSHMS.

Painted surfaces in the farmhouse were determined to be recently painted. Paint cans were observed on a shelf in the farmhouse basement during the survey. The cans of paint in the basement appeared to contain paint that matched the colours of the newly painted surfaces. Information on the paint cans indicated that the paint did not contain lead, therefore, samples of paint were not collected from the newly painted surfaces. Paint samples were not collected from the other buildings or structures as surfaces did not appear to be painted. Photograph 17 and Photograph 18 in Appendix B show the paint cans that were observed on a shelf in the farmhouse basement.

It is possible that older paint layers beneath the newly painted surfaces could potentially contain lead. Demolishing or sanding painted surfaces could potentially reveal older lead-based paint beneath newly painted surfaces. Appropriate worker precautions should be taken as per the OHSA when sanding or demolishing painted surfaces that may have underlying older layers of lead-based paint.

4.3 Mercury

Mercury is most commonly present in buildings as a liquid in thermostats, switches and switchgears, pressure and/or temperature gauges, flow relays, and pressure transmitter units. Compact fluorescent light (CFL) bulbs contain a small amount of mercury sealed within the glass tubing.

As per the DSHMS regulations, the concern with mercury is the potential for airborne exposure so the inspection focused on identifying raw mercury or mercury compounds with the potential to become airborne. Visual inspection and identification of materials was used to determine the potential presence of mercury.

All thermostats and switches identified during the survey were electric/digital and did not appear to contain mercury (no mercury vial observed). Photograph 6 shows an ecobee digital thermostat that was on the main floor of the farmhouse, in the hallway between the kitchen and living room. Photograph 10 is a Stelpro digital thermostat that was in the bathroom on the second floor. Photograph pages are provided in Appendix B.

Compact fluorescent light (CFL) bulbs were identified in light fixtures in an outbuilding. As noted above, CFL bulb are known to contain a small amount of mercury sealed within the glass tubing. It is assumed that prior to demolition activities, the intact CFL bulbs will be carefully removed from the light fixtures and set aside for disposal, prior to removing the light fixtures from the ceiling. Photograph 24 in Appendix B shows the light fixtures with CFL bulbs that were identified in an outbuilding.

4.4 Silica

Free crystalline silica in the form of silica sand is commonly used in the construction of concrete block, poured concrete, brick, and masonry products within structures.

As per the DSHMS regulations, the concern with silica is the potential for airborne exposure so the inspection focused on identifying materials with silica compounds with the potential to become airborne. Visual inspection of building materials was used to determine the potential presence of silica.

Building materials that are known to contain silica, such as concrete, brick, and cement, were identified during the survey. The farmhouse foundation and barn foundation are

constructed of stone and rubble. One section of the farmhouse basement appeared to be stabilized with poured concrete. Outbuildings were constructed on concrete slabs.

Gravel and sand, which contain silica in their natural chemical composition, are common components in concrete. Sand, silt, and clay particles, which contain naturally occurring silica, are common components of cement and are commonly used for manufacturing bricks and brick veneer.

Laboratory analysis of concrete, brick, and cement were not conducted as the chemical compositions of these building materials are known to commonly contain silica.

Coring, sawing, or breaking up the materials containing silica should be completed only with appropriate dust suppression methods, proper respiratory protection, and general worker safety precautions as outlines in the Occupational Health and Safety Act.

4.5 Acrylonitrile

Acrylonitrile may be present in stable form within paints, adhesives, and piping (i.e., black plumbing piping known as ABS – Acrylonitrile Butadiene Styrene). If present on-site in adhesives or as piping, these stable forms of acrylonitrile would not be expected to be a source of concern during demolition work related to any portion of the buildings. Should acrylonitrile be present within the materials, it is not expected that it would become airborne at concentrations above regulatory limits. Visual inspection and identification of materials was used to determine the potential presence of acrylonitrile. No suspected materials were identified that required laboratory confirmatory analysis.

4.6 Arsenic

Arsenic would not be expected in the building or building materials and was not noted during the inspection. No suspected arsenic containing materials were noted that required laboratory confirmatory analysis.

4.7 Benzene

Benzene is a component in petroleum-based products such as hydraulic oils and fuels (gasoline, diesel, fuel oil); however, no evidence of bulk benzene was noted.

Benzene may be present in roofing materials. Should benzene be present within the roofing materials, it is not expected that it would become airborne at concentrations above regulatory limits. No suspected benzene containing materials were noted that required laboratory confirmatory analysis.

4.8 Coke Oven Emissions

Coke oven emissions would not be expected related to the structure and no evidence was noted during the inspection. No suspected materials were identified that would require confirmatory analysis.

4.9 Ethylene Oxide

Ethylene oxide would not be expected in the structure and no evidence was noted during the inspection. No suspected materials were identified that would require confirmatory analysis.

4.10 Isocyanates

Free isocyanate compounds would not be expected except for the possible inclusion of small amounts in paint finishes. Should isocyanate compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits. No bulk or significant amounts of isocyanates were suspected or noted. No suspected materials were identified that would require confirmatory analysis.

4.11 Vinyl Chloride Monomer

Vinyl chloride monomer is typically a component of PVC piping and conduits. Should vinyl chloride monomer compounds be present within the materials, they would not be expected to become airborne at concentrations above regulatory limits.

Vinyl chloride monomer would not be expected in these buildings and was not noted in any form during the inspection.

4.12 Other Substances of Potential Environmental Concern

4.12.1 Polychlorinated Biphenyls (PCBs)

Fluorescent light ballasts and transformers are a potential source of PCBs. Ballasts containing PCBs were phased out by manufacturers prior to July 1980. Based on the age of the building PCBs are not likely to be present.

It is expected that during renovation or demolition, any electrical equipment would be removed as a whole component without dismantling. Light ballasts were identified in many areas of the building; however, no identification tags or date of manufacture was listed on the light ballasts. It should be noted that not all light ballasts could be inspected due to height restrictions.

No suspected PCB containing materials were identified that required confirmatory sampling to determine if the content met regulatory requirements.

4.12.2 Ozone Depleting Substances

Older air conditioning units or systems may use ODS as refrigerant. No suspected ozone depleting substances were noted.

4.12.3 Radioactive Materials

Ionization smoke detectors use a small amount of radioactive material to make the air within the sensing chamber conduct electricity. Prior to any construction activities involving ionization smoke detectors, these devices should be removed.

Smoke detectors were identified on Site during inspection. The detectors were in use and should only be removed during renovation or demolition.

4.12.4 Urea Formaldehyde Foam Insulation (UFFI)

No evidence of the presence of UFFI was identified.

4.12.5 Mould

Although mould is not a designated substance, it is included as an additional component of Burnside's DSHMS as it can be a significant workplace issue and is important to owners. Typically, the mould of concern at a workplace is gross amounts that have the potential to impact the air quality and is indicative of a serious moisture control problem.

Gross mould is typically long-term growth that covers or penetrates a substrate fueled by constant moisture and air temperatures conducive to growth. Minor mould is defined as surficial, in a limited area, and a result of limited moisture and growth potential such as along the edge of a window that lacks caulking.

No significant amounts of mould (in gross amounts) or significant mould related issues were observed during the inspection. No sampling of suspected mould containing materials or air quality testing was deemed necessary.

4.12.6 Other Materials and Conditions

Except for small quantities of cleaners and maintenance products no hazardous materials are stored in the building.

No significant evidence of an environmental impact such as leaks, or spills were noted or suspected.

Wastes were managed appropriately and no impacts from waste management were observed or suspected.

5.0 Conclusions

A DSHMS was completed for the buildings located at 965 Gartshore Street, Fergus, Ontario. The study was conducted based on current conditions and the understanding of the potential future use of the facility as a workplace as defined in the OHSA.

The key findings of the DSHMS are:

- Asbestos was identified in black pipe wrap sampled from the residential dwelling. The laboratory results indicated the black pipe wrap material contained 50% to 75% asbestos in the form of Chrysotile Asbestos. There was no asbestos detected in any of the other samples.
- Silica was identified in building materials that are known to commonly contain silica (concrete, brick, and cement).
- No other designated substances were identified.
- No significant environmental issues or hazardous materials were suspected.

6.0 Recommendations

Based on the findings, the following recommendations are provided:

1. A copy of this report should be provided to contractors involved in renovations and/or building demolitions at the Site.
2. New or undocumented suspect materials discovered in currently inaccessible areas (behind concrete walls or in plenum spaces) be sampled prior to removal to ensure worker safety and compliance with regulatory requirements.
3. The removal of asbestos-containing materials must be conducted in accordance with the requirements in O. Reg. 278/05.
4. Appropriate worker precautions should be taken as per the OHSA when cutting, coring, or breaking up silica containing concrete, brick, and masonry materials.
5. Beneath newly painted surfaces, it is possible that older paint layers could potentially contain lead. Demolishing or sanding painted surfaces could potentially reveal old lead-based paint beneath newly painted surfaces. Appropriate worker precautions should be taken as per the OHSA when sanding or demolishing painted surfaces that may have underlying layers of lead-based paint.
6. Handling and disposal of building materials and hazardous waste including, but not limited to the designated substances and hazardous materials identified within this DSHMS, should be conducted as per the requirements of O. Reg. 347.
7. The contents of this report should be reviewed and updated periodically, based on facility requirements.

7.0 Limitations and Use of Report

R. J. Burnside & Associates Limited (Burnside) has conducted this study in accordance with generally accepted standards and field practices.

The conclusions in this report are professional opinions based upon visual observations of the Site conditions and data existing at the time of our assessment. Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies and does not claim responsibility for undisclosed or non-visible environmental concerns that may result in costs for environmental clean-up or remediation.

This report was prepared for the exclusive use of the Township of Centre Wellington and its contractors and consultants. Any use of reliance on or decisions based on this report by a third party are the responsibility of such third parties. Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report. Reports or memoranda resulting from this assignment are not to be used, in whole or in part, outside the client's organization without prior written permission.

8.0 References

Environmental Abatement Council of Canada, Canadian Chapter of the EIA. EACC Lead Guideline for Construction, Renovation, Maintenance or Repair (October 2014).

Environmental Abatement Council of Ontario. Mould Abatement Guidelines (2004 – Edition 1).

Ontario Ministry of Labour, Immigration, Training and Skills Development: Lead on Construction Projects (Issued September 2004, Content last reviewed April 2011).

Ontario Occupational Health and Safety Act, R.S.O. 1990, c. O.1 (updated July 1, 2022).

Ontario Regulation 278/05: Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations.

Ontario Regulation 347: General – Waste Management.

Ontario Regulation 463/10: Ozone Depleting Substances and Other Halocarbons.

Ontario Regulation 490/09: Designated Substances, under the Occupational Health and Safety Act, R.S.O. 1990, C. O. 1 (updated January 1, 2020).

PCB Regulations (SOR/2008-273), under the Canadian Environmental Protection Act, 1999 (last amended October 31, 2021).

Chemical & Engineering News Archive 1976 54 (31), 7-8

BURNSIDE

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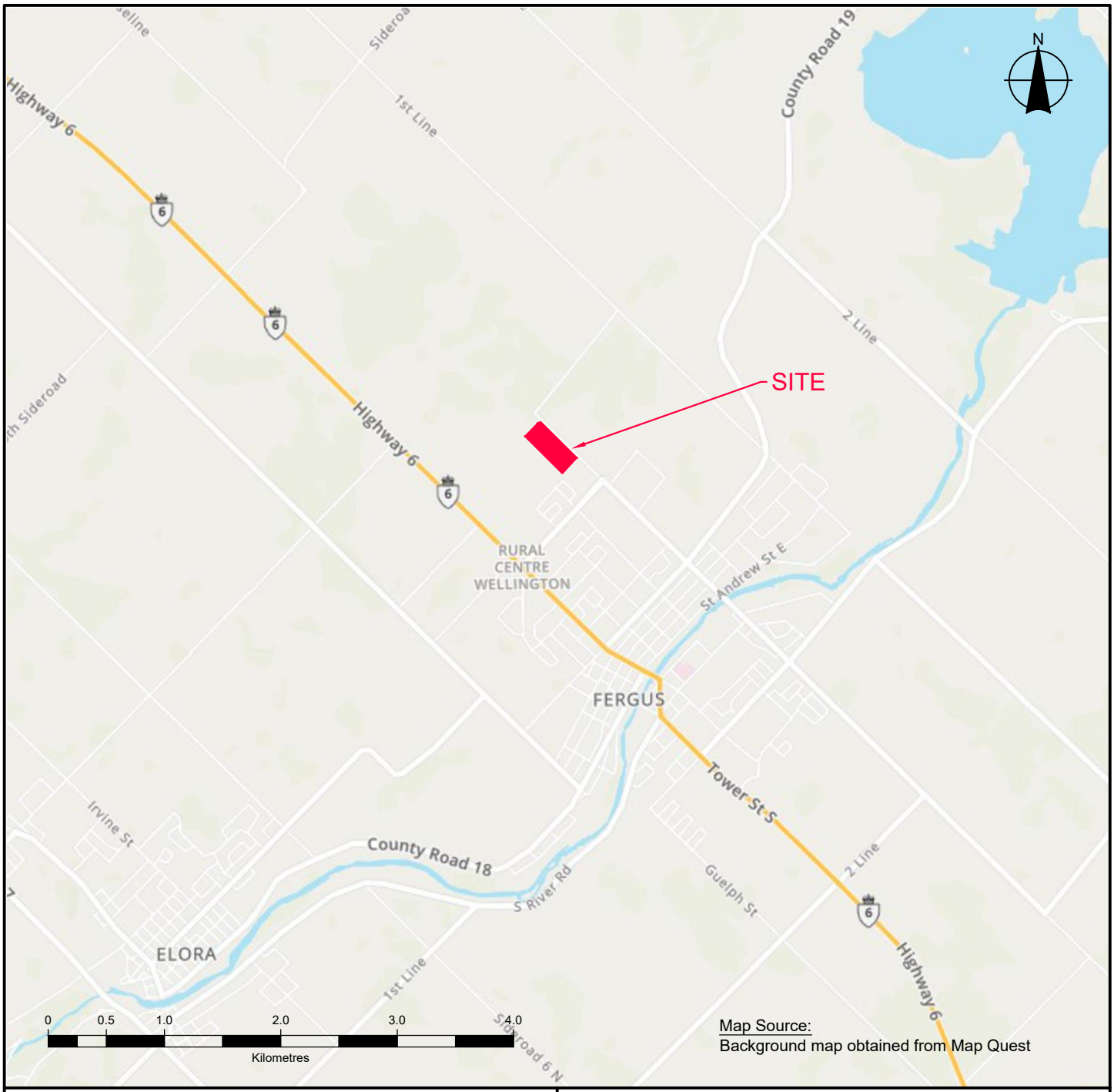
Figures



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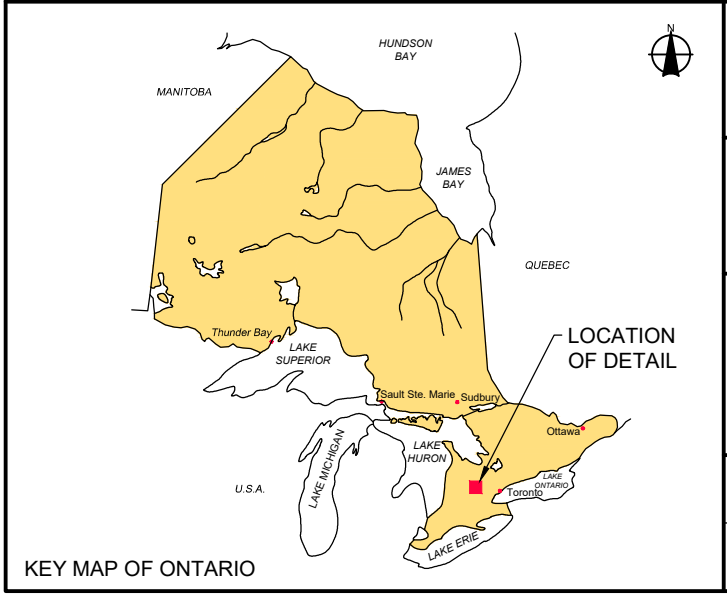
Background map obtained from Map Quest



KEY MAP OF ONTARIO

BURNSIDE

Client

TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Figure Title

DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SITE LOCATION MAP

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	1
Scale		Project No.	
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File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS SL.dwg Date Plotted: September 14, 2022 - 3:41 PM

LEGEND

APPROXIMATE SITE BOUNDARY

0 40 80 120 160
Metres

Satellite & Air Photo Source:
Background satellite / air photo circa 2019 obtained from Google Earth Professional
© Google Earth, use of products are subject to the Terms and Conditions of Licensed Google Earth Software.

BURNSIDE

Client

TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

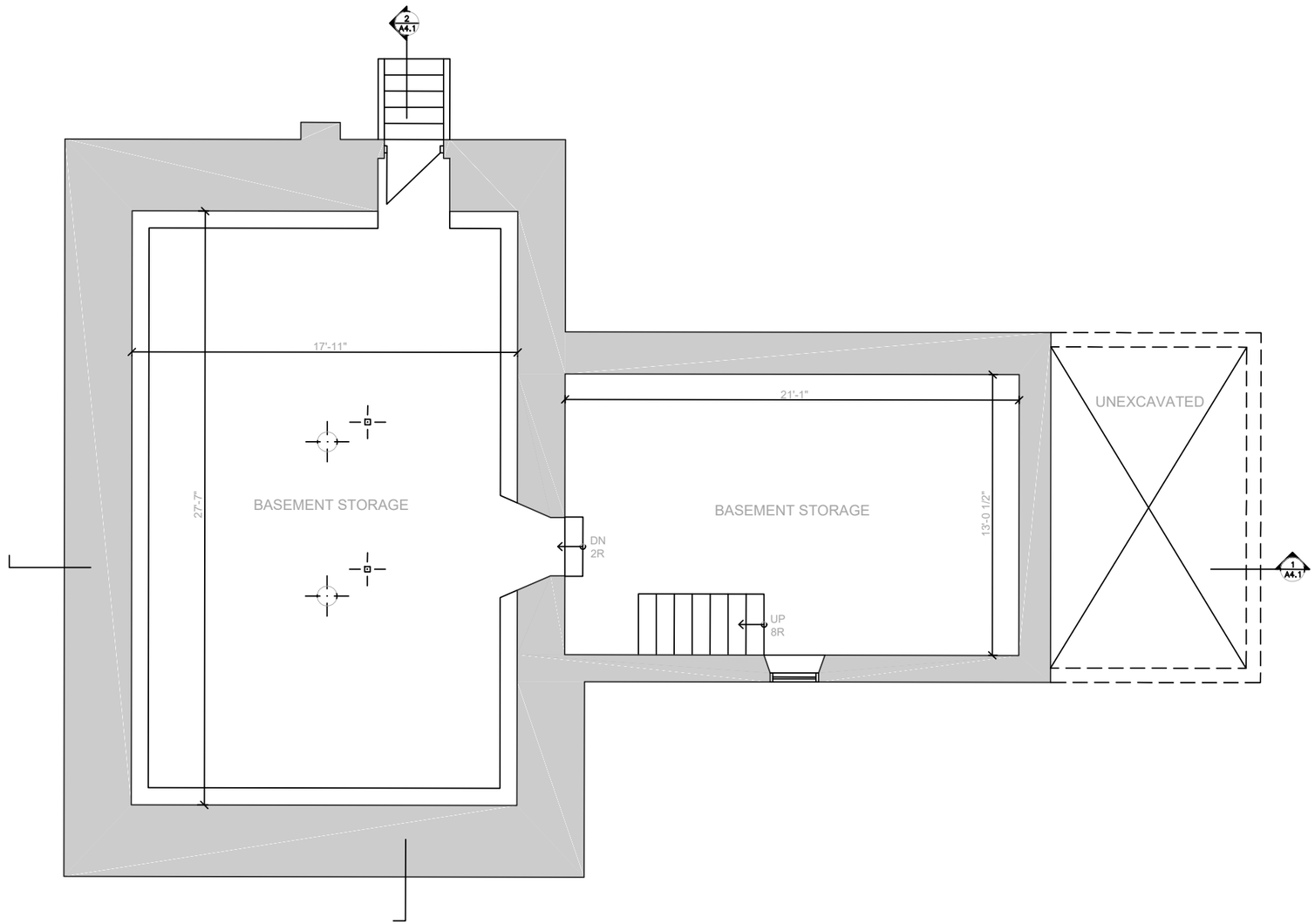
Figure Title

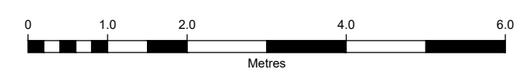
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SITE PLAN

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	**2**
Scale		Project No.	
1:2,000		300055234	

File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS SP.dwg Date Plotted: September 14, 2022 - 3:00 PM





LEGEND

Floor Plan Source:
Farmhouse Basement Floor Plan obtained from RDH Architects Inc., Project: 202113, Drawing A1-01, 2022

BURNSIDE

Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

BASEMENT PLAN

Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	3
Scale 1:75		Project No. 300055234	

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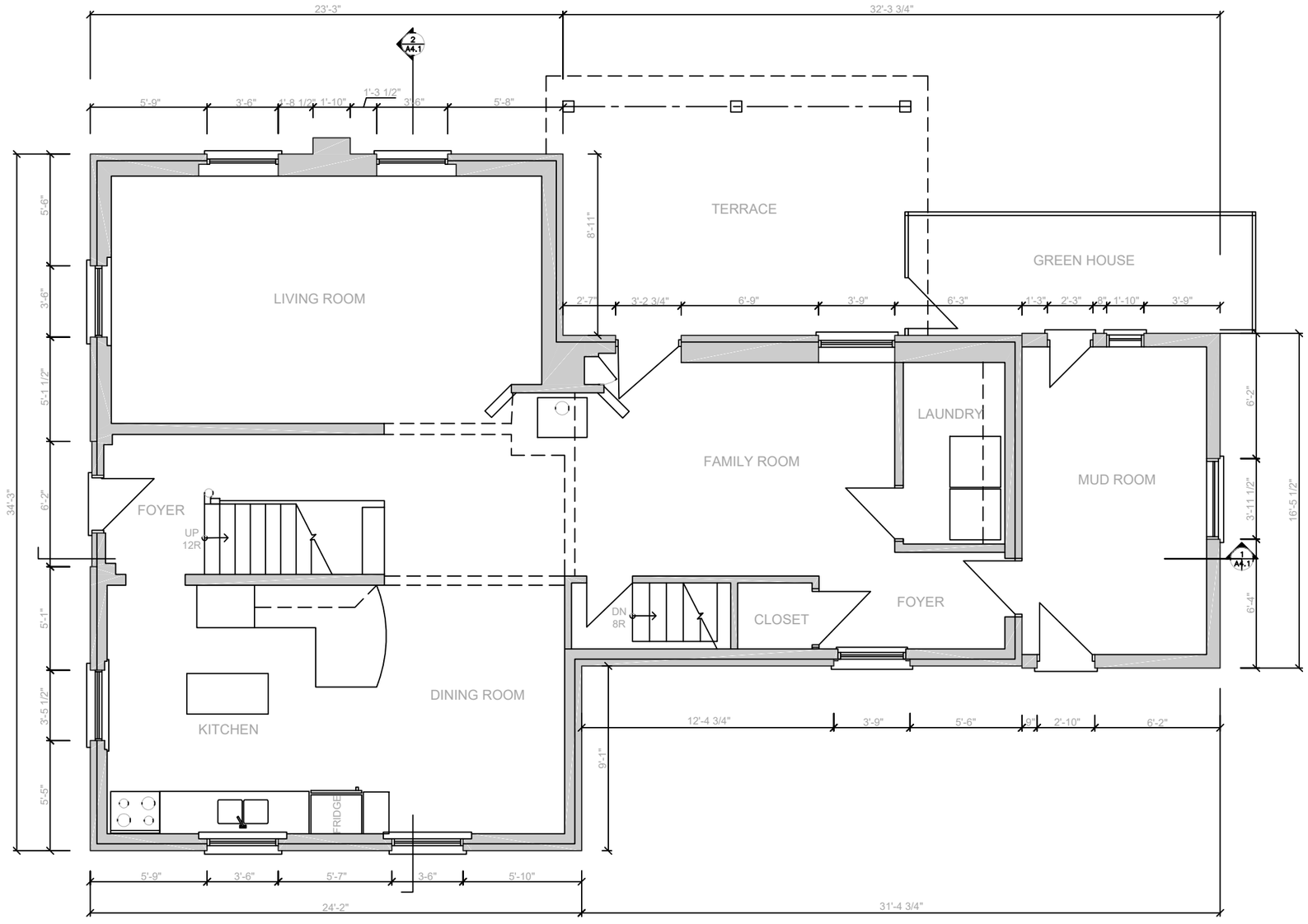

LEGEND

Floor Plan Source:
Farmhouse Ground Floor Plan obtained from RDH Architects Inc.,
Project: 202113, Drawing A1-02, 2022

BURNSIDE

Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

GROUND FLOOR PLAN

Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	4
Scale 1:75		Project No. 300055234	

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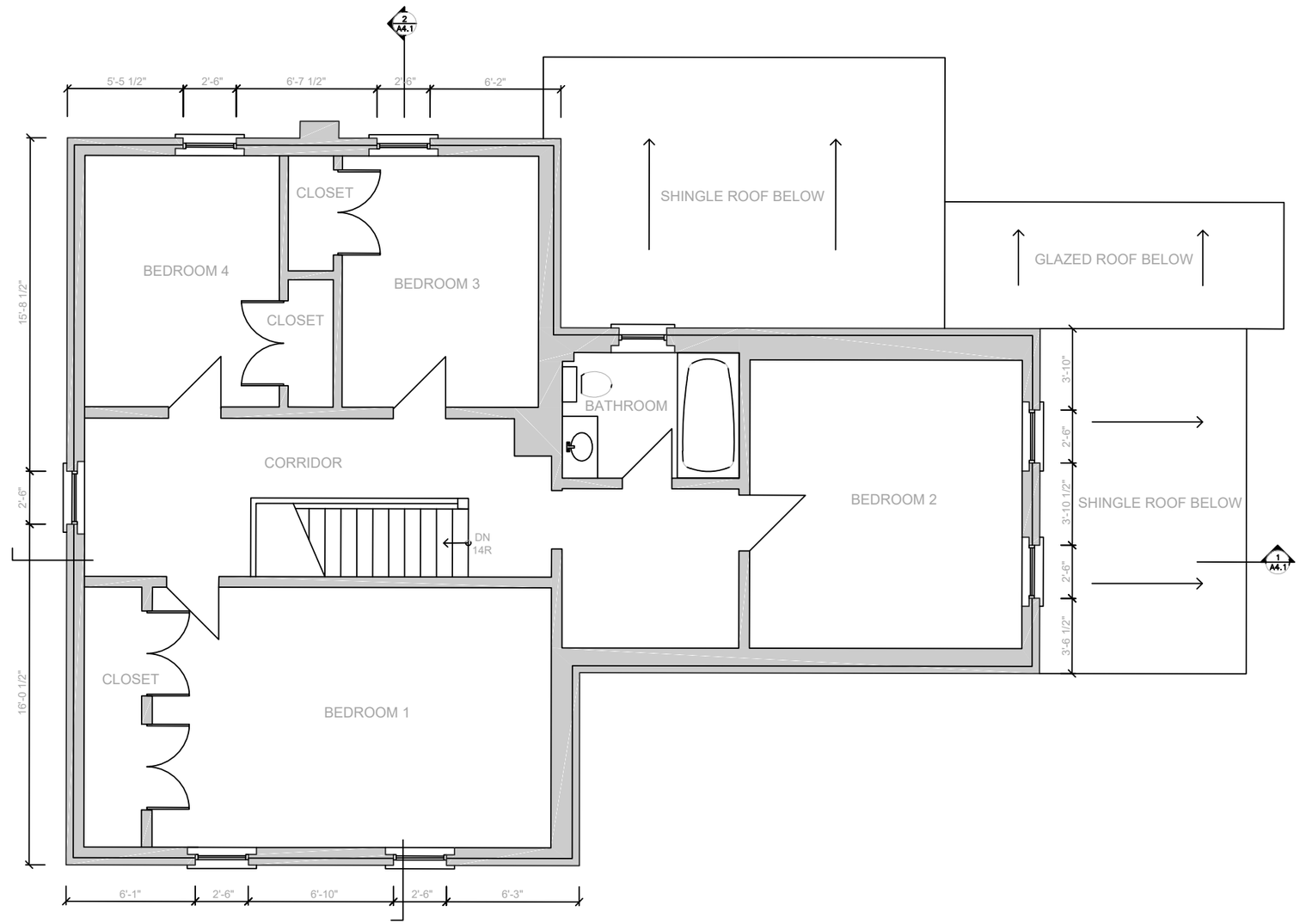

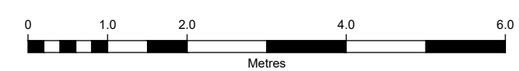

LEGEND

Floor Plan Source:
Farmhouse Second Floor Plan obtained from RDH Architects Inc.,
Project: 202113, Drawing A1-03, 2022

BURNSIDE

Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SECOND FLOOR PLAN

Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	5
Scale		Project No.	
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File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS FP.dwg Date Plotted: September 14, 2022 - 11:18 AM

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Appendix A

Plan of Survey documents

TOPOGRAPHICAL PLAN OF SURVEY

OF PART OF

LOTS 17 & 18
CONCESSION 16

(GEOGRAPHIC TOWNSHIP OF NICHOL)

IN THE

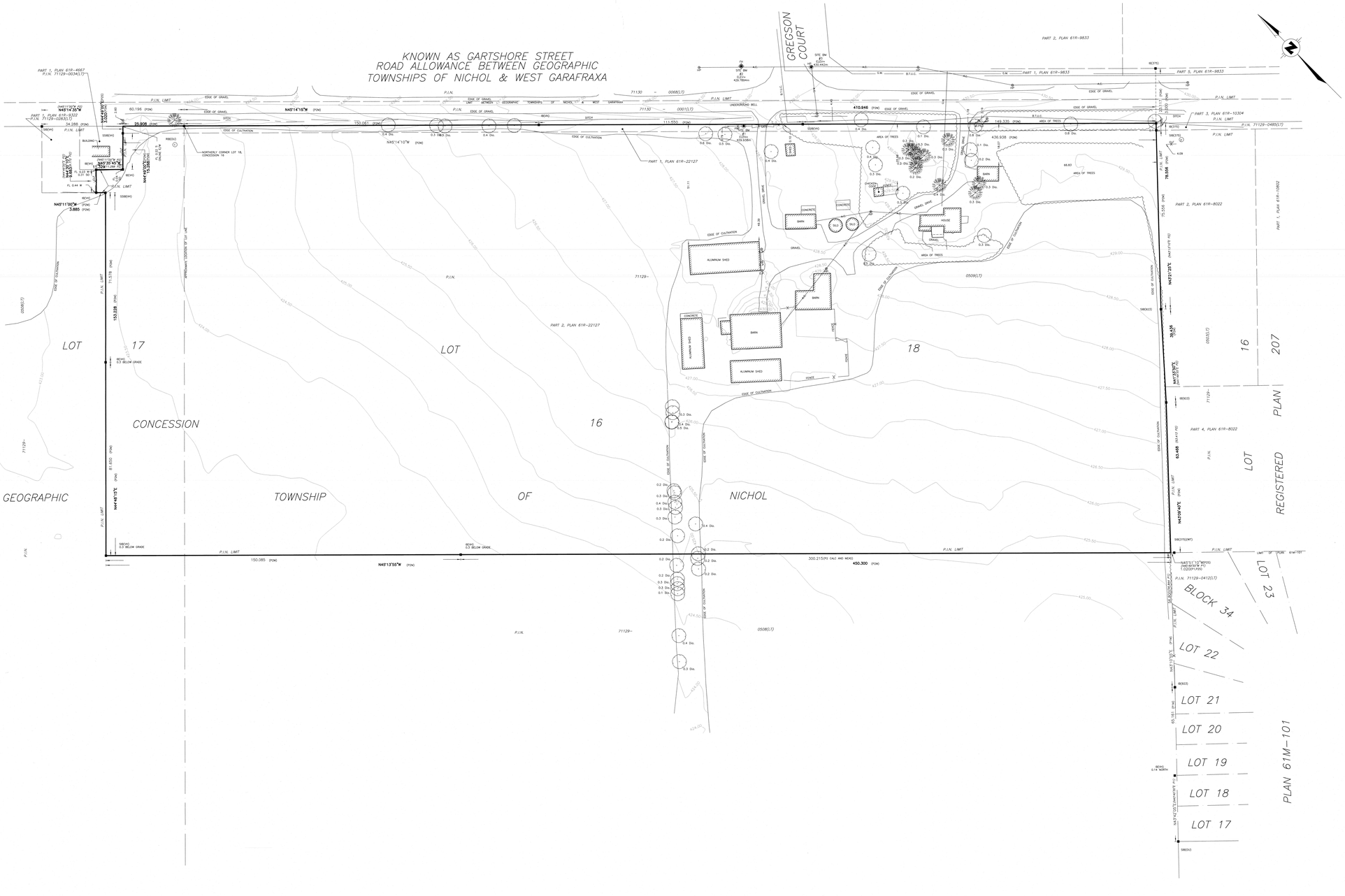
TOWNSHIP OF CENTRE WELLINGTON
COUNTY OF WELLINGTON

SCALE 1:500 (METRIC)

10 5 0 10 20 30 40

(SCALE IN METRES)

JAKE SURGENOR
ONTARIO LAND SURVEYOR



LEGEND

☐	DENOTES SURVEY MONUMENT SET
■	DENOTES SURVEY MONUMENT FOUND
⊗	DENOTES IRON BAR
OU	DENOTES ORIGIN UNKNOWN
RIB	DENOTES 19mm DIAMETER ROUND IRON BAR
SCP	DENOTES SPECIFIED CONTROL POINT
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
WIT	DENOTES WITNESS
1017	DENOTES CALLON DIETZ, O.L.S.'s
375	DENOTES BLACK SHOEMAKER ROBINSON & DONALDSON LTD., O.L.S.'s
923	DENOTES WALTER PETER TARASICK, O.L.S.'s
VH	DENOTES VAN HARTEN SURVEYING INC., O.L.S.'s
B	DENOTES BURIED
M	DENOTES MEASURED
S	DENOTES SET
P1	DENOTES PLAN 61M-101
P2	DENOTES PLAN 61R-22127
FL	DENOTES FENCE LINE
W	DENOTES WEST
SO	DENOTES SOUTH
AHW	DENOTES AERIAL HYDRO WIRES
BTUC	DENOTES UNDERGROUND TELEPHONE CABLES
BP	DENOTES BELL POLE
CB	DENOTES CATCH BASIN
CLF	DENOTES CHAIN LINK FENCE
DCB	DENOTES DITCH INLET CATCH BASIN
FH	DENOTES FIRE HYDRANT
GM	DENOTES GAS MAIN
GP	DENOTES GUARD POST
GV	DENOTES GAS VALVE
HP	DENOTES HYDRO POLE
HUC	DENOTES UNDERGROUND HYDRO CABLES
JB	DENOTES JUNCTION BOX
MH	DENOTES MAN HOLE
PL	DENOTES PRIVATE LAMP POST
PWF	DENOTES POST & WIRE FENCE
SA	DENOTES SANITARY
ST	DENOTES STORM
SL	DENOTES STREET LIGHT
TS	DENOTES TRAFFIC LIGHT
TVUC	DENOTES UNDERGROUND TELEVISION CABLES
WV	DENOTES WATER VALVE
	DENOTES CONIFEROUS TREE
	DENOTES DECIDUOUS TREE
	DENOTES GATE

INTEGRATION DATA

BEARINGS ARE UTM GRID DERIVED FROM SPECIFIED CONTROL POINTS 00820060057 AND 00820060058, UTM-17 NAD-1983:CSRS:CBN-6-2010.0.

ALL DIMENSIONS SHOWN ARE MEASURED, UNLESS OTHERWISE NOTED.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.999631.

SPECIFIED CONTROL POINTS (SCP's): UTM-17, NAD83:CSRS:CBN-6-2010.0 COORDINATES TO URBAN ACCURACY PER SEC. 14 (2) OF O.REG. 216/10		
POINT ID	NORTHING	EASTING
00820060057	4807166.311	554345.551
00820060058	4807039.558	555623.066
PLAN COORDINATES, UTM ZONE 17, NAD83:CSRS:CBN-6-2010.0		
1	4841507.676	549253.736
2	4841216.118	549543.466
COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH CORNERS OR BOUNDARIES SHOWN ON THIS PLAN		

VERTICAL CONTROL DATA

MONUMENT NUMBER: CITY OF GUELPH MONUMENT No. 00820178070
TYPE: RIB WITH CAP
LOCATION: LOCATED ON THE SOUTH SIDE OF HWY 7, 0.7km WEST OF WATSON ROAD, 3.5km WEST OF WATSON PARKWAY NORTH.
DATUM: COVQ2B78
ORDER: THIRD ORDER
GEODETIC ELEVATION: 318.574m

MONUMENT NUMBER: CITY OF GUELPH MONUMENT No. 00119663695
TYPE: TABLET IN A CONCRETE
LOCATION: WEST_MONTROSE TABLET IN A CONCRETE PIER 30 CM IN DIAMETER, AT GROUND LEVEL, SOUTHWEST SIDE OF VICTORIA ROAD, APPROXIMATELY 91M NORTHWEST FROM SPEEDVALE AVENUE, 17.8 M EAST FROM NORTH CORNER OF NO. 308 VICTORIA ROAD, 9.3 M NORTHWEST FROM EAST CORNER OF NO. 304, 11.9M NORTH FROM NORTH CORNER OF HOUSE NO. 302, 30 CM NORTHWEST FROM EDGE OF ASPHALT DRIVEWAY AND 30 CM SOUTHWEST FROM EDGE OF SIDEWALK.
ESTABLISHED BY TOPOGRAPHICAL SURVEY. Township: WEST_MONTROSE TABLET IN A CONCRETE PIER 30 CM IN DIAMETER, AT GROUND LEVEL, SOUTHWEST SIDE OF VICTORIA ROAD, APPROXIMATELY 91 M NORTHWEST FROM SPEEDVALE AVENUE, 17.8 M EAST FROM NORTH CORNER OF NO. 308 VICTORIA ROAD, 9.3 M NORTHEAST FROM EAST CORNER OF NO. 304, 11.9 M NORTH FROM NORTH CORNER OF HOUSE NO. 302, 30 CM NORTHWEST FROM EDGE OF ASPHALT DRIVEWAY AND 30 CM SOUTHWEST FROM EDGE OF SIDEWALK. ESTABLISHED BY TOPOGRAPHICAL SURVEY.
DATUM: COVQ2B78
ORDER: SECOND ORDER
GEODETIC ELEVATION: 347.819m

SITE BENCHMARKS

SITE BM #1
TYPE: NAIL IN FENCE POST
LOCATION: WEST CORNER OF INTERSECTION OF GARTSHORE STREET AND GREGSON COURT AS SHOWN ON FACE OF PLAN
GEODETIC ELEVATION: 429.938m

SITE BM #2
TYPE: TOP OF FIRE HYDRANT
LOCATION: NORTH CORNER OF INTERSECTION OF GARTSHORE STREET AND GREGSON COURT AS SHOWN ON FACE OF PLAN
GEODETIC ELEVATION: 429.784m

SITE BM #3
TYPE: NAIL IN HYDRO POLE
LOCATION: EAST CORNER OF INTERSECTION OF GARTSHORE STREET AND GREGSON COURT AS SHOWN ON FACE OF PLAN
GEODETIC ELEVATION: 430.442m

NOTES

ALL BURIED SERVICES (WITH THE EXCEPTION OF SEWER INVERTS) WERE DERIVED FROM FIELD LOCATES. THE EXISTENCE OR PRECISE LOCATION WAS NOT DETERMINED BY THIS SURVEY. ALL SERVICES SHOULD BE VERIFIED BY FIELD LOCATES PRIOR TO CONSTRUCTION.

SPOT ELEVATIONS ARE FROZEN ON LAYER: "SPOT_ELEVATIONS"

TIES TO BUILDINGS ARE AT RIGHT ANGLES TO THE BOUNDARY LINES, UNLESS OTHERWISE INDICATED.

METRIC DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:
(1) THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
(2) THE SURVEY WAS COMPLETED ON THE 5th DAY OF AUGUST, 2022.

12 SEPT 2022
DATE

JAKE SURGENOR
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2195462.

H:\PROJECTS\2022\22-24957 MED Gartshore St Fergus\Drawings\Plan of Survey (E-1640).dwg September 12, 2022

Callon Dietz INCORPORATED
ONTARIO LAND SURVEYORS
CARLETON PLACE LONDON NORTH BAY
info@callondietz.com callondietz.com

ISO 9001 REGISTERED

SURVEY BY: Z.D.	DRAWN BY: D.Y./S.S.	FILE No: 22-24957	PLAN No: E-1640

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PLAN OF SURVEY OF

PART OF LOTS 17 & 18, CONCESSION 16

GEOGRAPHIC TOWNSHIP OF NICHOL

TOWNSHIP OF CENTRE WELLINGTON

COUNTY OF WELLINGTON

SCALE 1 : 750

0 5 10 20 30 40 50 metres

VAN HARTEN SURVEYING INC.

THE INTENDED PLOT SIZE OF THIS PLAN IS 915mm IN WIDTH BY 508mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:750

SCHEDULE

PART	LOT	CONCESSION	PIN	AREA ha.
1	PART OF 17 & 18	16	PART OF 71129-0284 (LT)	0.1310
2				7.9664

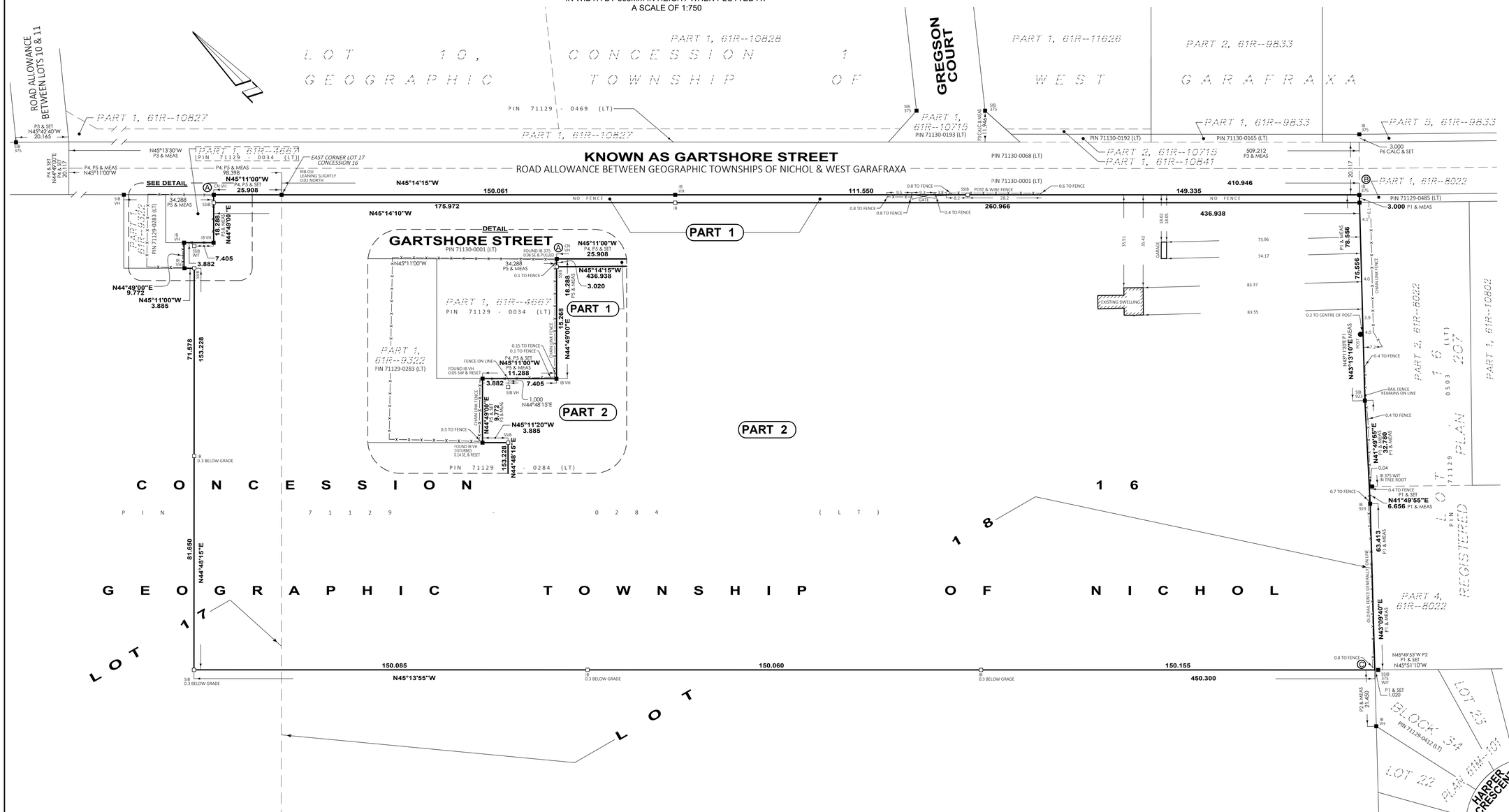
PLAN 61R-22127

Received and deposited

November 29th, 2021

Carolyn Adsett

Representative for the Land Registrar for the Land Titles Division of Wellington (No.61)



LEGEND:

○	DENOTES SURVEY MONUMENT SET
■	DENOTES SURVEY MONUMENT FOUND
SIB	DENOTES .025 X .025 X 1.20 STANDARD IRON BAR
IB	DENOTES .015 X .015 X 0.60 IRON BAR
SSIB	DENOTES .025 X .025 X 0.60 SHORT STANDARD IRON BAR
RP	DENOTES .015 DIA. X 0.07 ROUND IRON BAR WITH STAMPED WASHER
PB	DENOTES .025 X .025 X 0.30 PLASTIC BAR
CC	DENOTES CUT CROSS
WIT	DENOTES WITNESS
OU	DENOTES ORIGIN UNKNOWN
375	DENOTES BLACK SHOEMAKER ROBINSON & DONALDSON LIMITED
923	DENOTES WALTER PETER TARASICK, O.L.S.
1288	DENOTES DEREK G. GRAHAM LIMITED
VH	DENOTES VAN HARTEN SURVEYING INC., O.L.S.'S
P1	DENOTES DEPOSITED PLAN 61R-8022 BY (375)
P2	DENOTES REGISTERED PLAN 61M-101 BY (VH)
P3	DENOTES DEPOSITED PLAN 61R-10715 BY (375)
P4	DENOTES DEPOSITED PLAN 61R-4667 BY (1288)
P5	DENOTES DEPOSITED PLAN 61R-9322 BY (VH)
P6	DENOTES DEPOSITED PLAN 61R-9833 BY (375)

BEARING AND COORDINATE NOTE:

1. BEARINGS ARE GRID BEARINGS AND ARE DERIVED FROM GPS OBSERVATIONS AND ARE REFERRED TO THE UTM PROJECTION, ZONE 17, NAD 83 (CSRS-2010) ADJUSTMENT.
2. DISTANCES SHOWN ON THIS PLAN ARE ADJUSTED GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY AN AVERAGED COMBINED SCALE FACTOR OF 0.99999532
3. COORDINATES ON THIS PLAN ARE UTM, ZONE 17, NAD83 (CSRS-2010) ADJUSTMENT AND ARE BASED ON GPS OBSERVATIONS FROM A NETWORK OF PERMANENT GPS REFERENCE STATIONS.

UTM COORDINATES (METRES)

POINT ID	NORTHING	EASTING
A	4,841,525.23	549,236.01
B	4,841,217.71	549,546.05
C	4,841,084.88	549,422.62

THESE COORDINATE VALUES COMPLY WITH SECTION 14(2) O.REG 216/10. THESE COORDINATES CANNOT, IN THEMSELVES, BE USED TO RE-ESTABLISH THE CORNERS OR BOUNDARIES SHOWN ON THIS PLAN.

BEARING COMPARISONS:

FOR THE PURPOSES OF BEARING COMPARISONS, PREVIOUS SURVEYS HAVE BEEN ROTATED TO UTM BEARINGS BY THE ANGLES SHOWN BELOW.

PLAN	ROTATION FOR NORTHEAST BEARINGS
P1	-0°20'20"
P3	-0°18'40"
P4 & P5	-0°24'20"

METRIC: DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT, THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.
2. THIS SURVEY WAS COMPLETED ON THE 17th DAY OF NOVEMBER, 2021.

DATE: NOVEMBER 18, 2021

JEFFREY EDWARD BUISMAN
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2179249.

Van Harten SURVEYING INC.
LAND SURVEYORS and ENGINEERS

Kitchener/Waterloo	Guelph	Orangeville
Ph: 519-742-8371	Ph: 519-821-2763	Ph: 519-940-4110

www.vanharten.com info@vanharten.com

DRAWN BY: S.A.P.	CHECKED BY: J.E.B.	PROJECT No. 30501-21

Nov 26, 2021-2:53:39 PM
G:\NICHOL\Con16\ACAD\RPTLOT 16 (CENTRE WELLINGTON) UTM-17 NR.dwg

BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix B

Photographs

Photo 1: Front of residential dwelling at 965 Gartshore Street, Fergus.

Photo 2: Mud room and greenhouse addition at the back of residential dwelling.

Photo 3: Kitchen in residential dwelling.

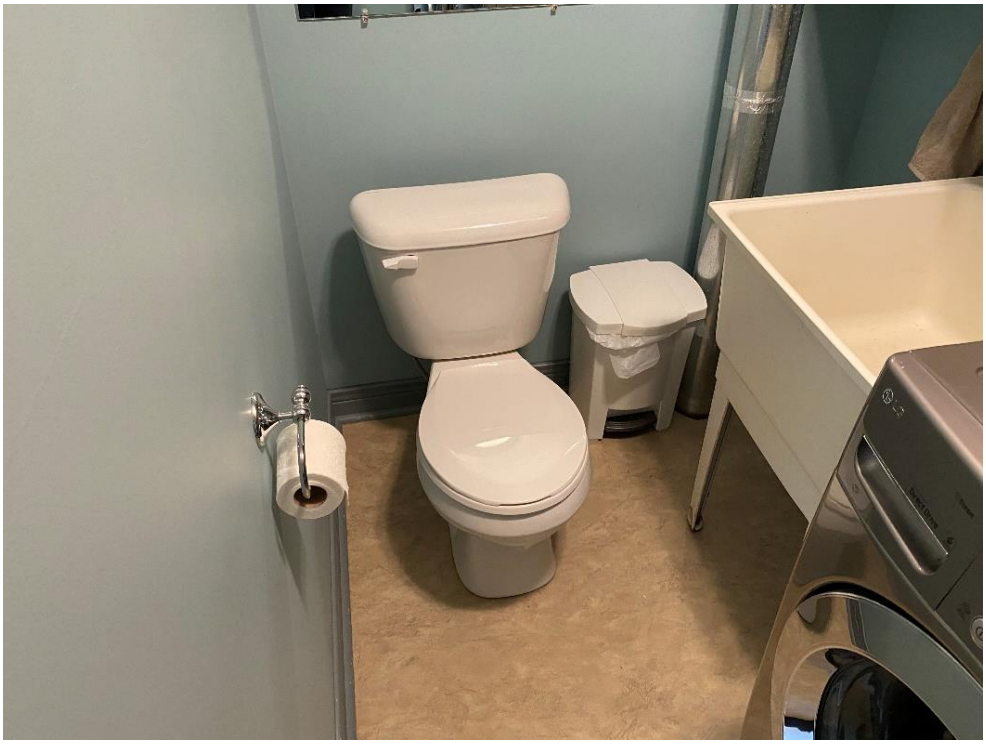


Photo 4: Bathroom / Laundry room on main floor in residential dwelling.

Photo 5: Wood stove on tile floor between kitchen and living room.

Photo 6: Digital thermostat (ecobee) in hallway on main floor, between kitchen and living room.

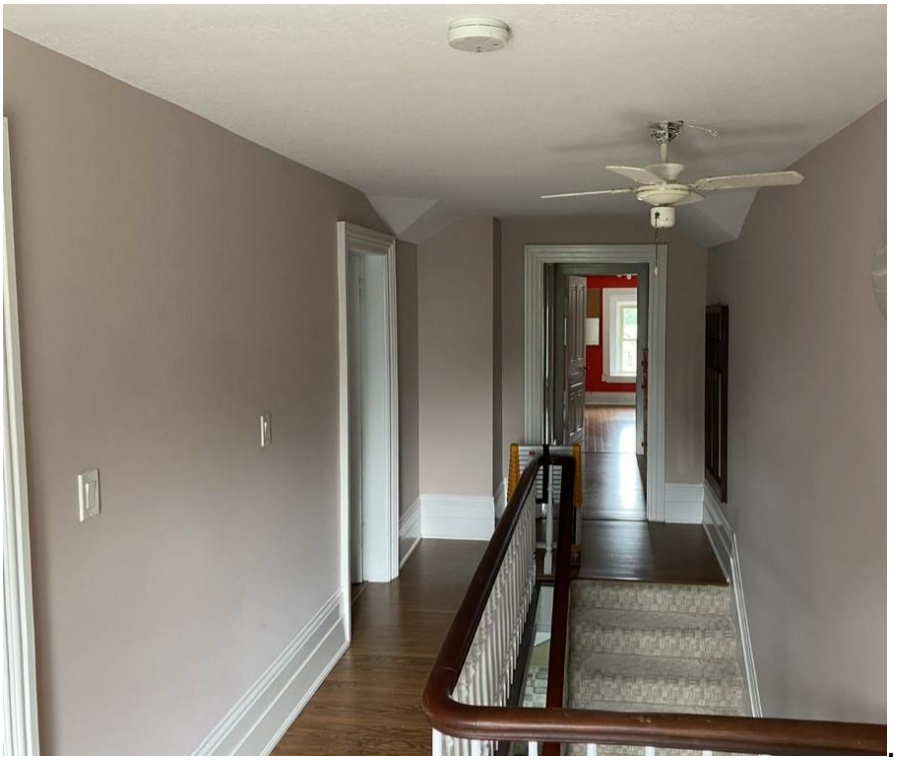


Photo 7: Second level of residential dwelling.

Photo 8: Entry to attic is through ceiling on second floor.

Photo 9: Bathroom on second level of residential dwelling.

Photo 10: Digital thermostat (Stelpro) in second floor bathroom of residential dwelling.

Photo 11: Insulation in attic.

Photo 12: Basement with stone and rubble foundation.

Photo 13: Furnace in newer portion of basement.

Photo 14: Pipe wrap in basement of residential dwelling.

Photo 15: Pink insulation in basement.

Photo 16: Yellow insulation in basement.

Photo 17: Paint cans stored on shelf in basement.

Photo 18: Label on paint can indicating that it does not contain lead.

Photo 19: Garage used for storage.

Photo 20: Barn and farm outbuildings.

Photo 21: Chicken coop and farm outbuildings.

Photo 22: Hay stored inside barn.

Photo 23: Stone and rubble foundation in lower level of barn.

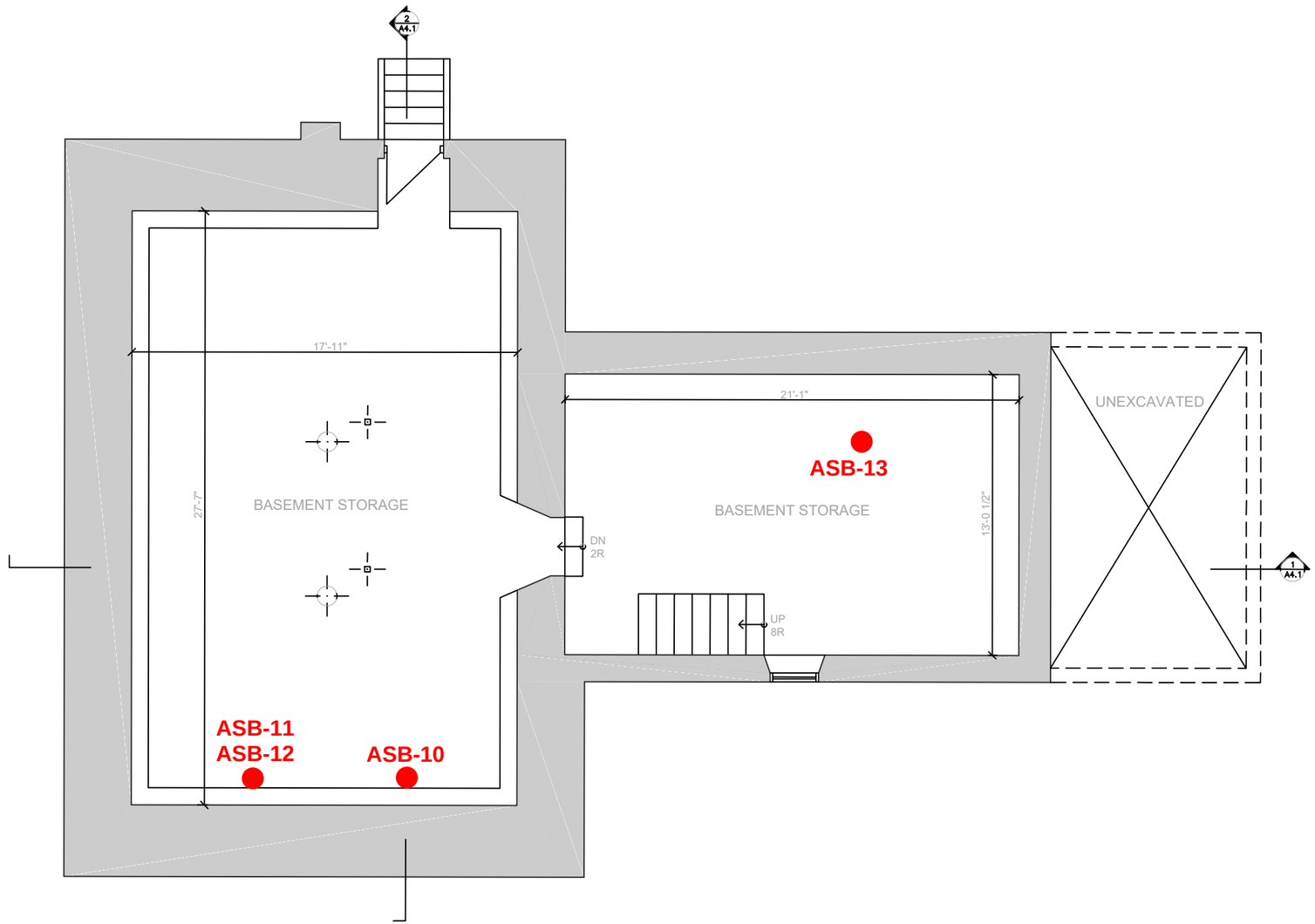
Photo 24: Compact fluorescent light fixture located in outbuilding.

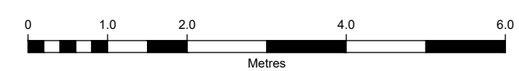
BURNSIDE

[THE DIFFERENCE IS OUR PEOPLE]

Appendix C

Sampling Locations and Analytical Results





LEGEND

Floor Plan Source:
Farmhouse Basement Floor Plan obtained from RDH Architects Inc., Project: 202113, Drawing A1-01, 2022

● ASB-# Approximate Location of Sample Collected for Asbestos Analysis

BURNSIDE

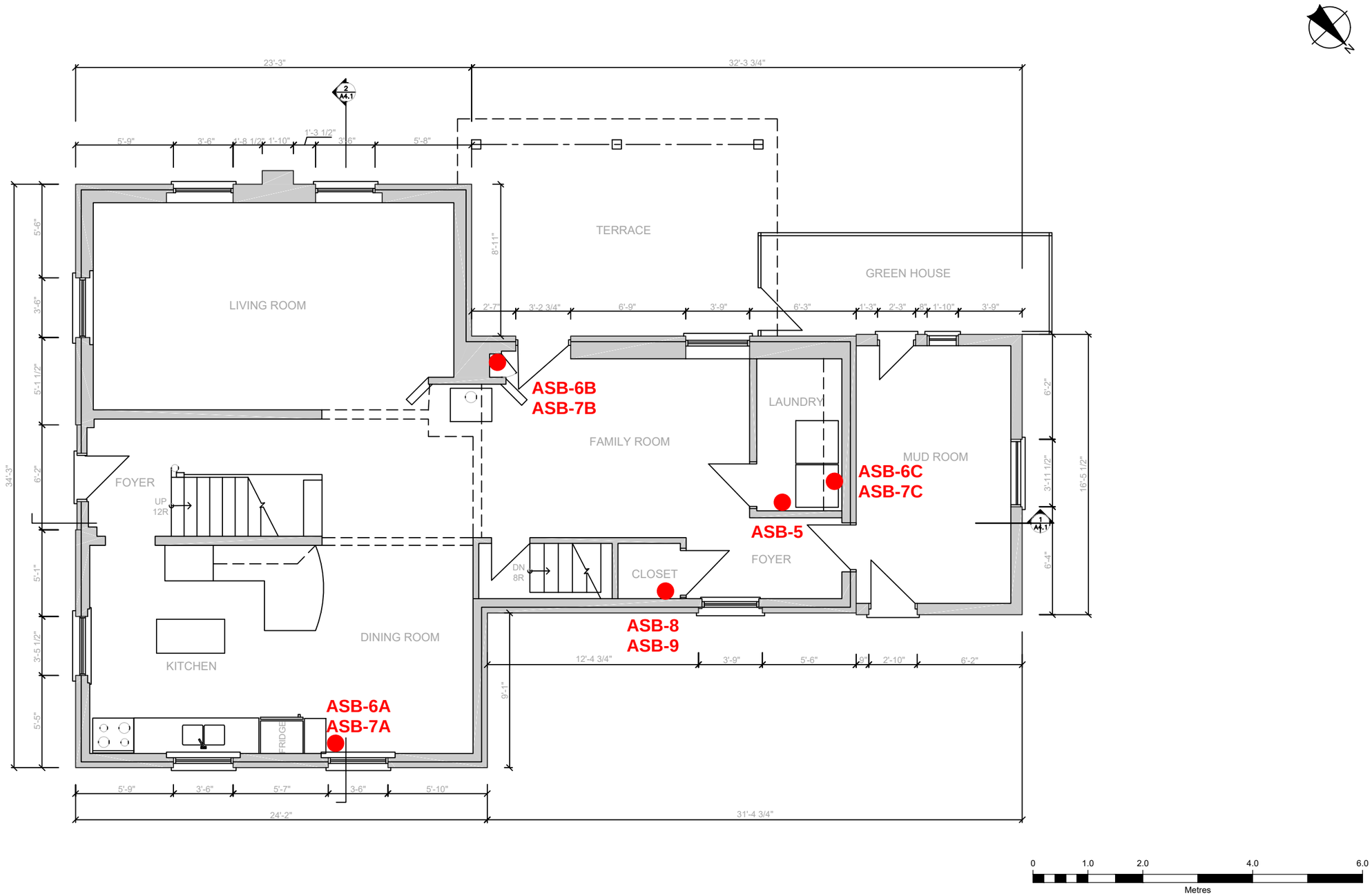
Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SAMPLE LOCATIONS - BASEMENT

Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	C-1
Scale 1:75		Project No. 300055234	

File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS FP.dwg Date Plotted: September 14, 2022 - 9:27 AM



LEGEND

Floor Plan Source:
Farmhouse Ground Floor Plan obtained from RDH Architects Inc.,
Project: 202113, Drawing A1-02, 2022

● ASB-# Approximate Location of Sample Collected for Asbestos Analysis

BURNSIDE

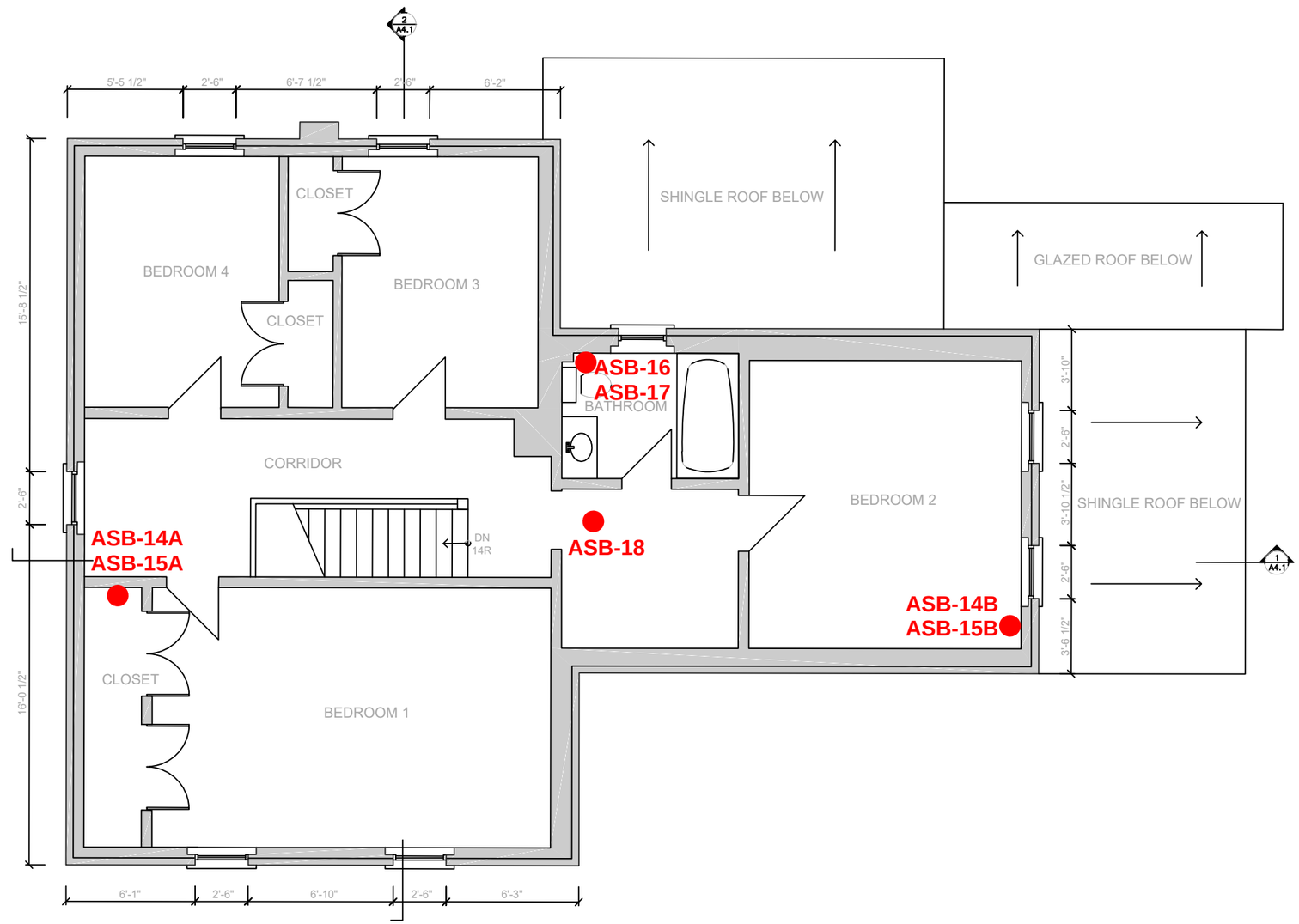
Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SAMPLE LOCATIONS - GROUND FLOOR

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	C-2
Scale 1:75		Project No. 300055234	

File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS FP.dwg Date Plotted: September 14, 2022 - 10:50 AM



0 1.0 2.0 4.0 6.0
Metres

LEGEND

Floor Plan Source:
Farmhouse Second Floor Plan obtained from RDH Architects Inc.,
Project: 202113, Drawing A1-03, 2022

ASB-# Approximate Location of Sample Collected for Asbestos Analysis

BURNSIDE

Figure Title
DESIGNATED SUBSTANCES AND HAZARD MATERIALS SURVEY

SAMPLE LOCATIONS - SECOND FLOOR

Client
TOWNSHIP OF CENTRE WELLINGTON
965 GARTSHORE ST., FERGUS

Drawn	Checked	Date	Figure No.
E.C.	J.W.	SEPTEMBER 2022	C-3
Scale 1:75		Project No. 300055234	

File: \\Elmo\Shared Work Areas\055234 Centre Wellington Operations Centre\03_Production\01 DSHMS\055234 DSHMS FP.dwg Date Plotted: September 14, 2022 - 11:18 AM

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: R.J. BURNSIDE & ASSOCIATES LTD.
15 Townline
Orangeville, ON L9W3R4
(519) 941-5331

ATTENTION TO: Chase Beck

PROJECT: 300055234

AGAT WORK ORDER: 22L976463

ASBESTOS REVIEWED BY: Ian Seddon, Analyst

DATE REPORTED: Dec 05, 2022

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*Notes

Disclaimer:

- *All work conducted herein has been done using accepted standard protocols, and generally accepted practices and methods. AGAT test methods may incorporate modifications from the specified reference methods to improve performance.*
- *All samples will be disposed of within 30 days following analysis, unless expressly agreed otherwise in writing. Please contact your Client Project Manager if you require additional sample storage time.*
- *AGAT's liability in connection with any delay, performance or non-performance of these services is only to the Client and does not extend to any other third party. Unless expressly agreed otherwise in writing, AGAT's liability is limited to the actual cost of the specific analysis or analyses included in the services.*
- *This report shall not be reproduced or distributed, in whole or in part, without the prior written consent of AGAT Laboratories.*
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- *All reportable information as specified by ISO/IEC 17025:2017 is available from AGAT Laboratories upon request.*

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 22L976463

PROJECT: 300055234

CLIENT NAME: R.J. BURNSIDE & ASSOCIATES LTD.

ATTENTION TO: Chase Beck

SAMPLING SITE:Fergus

SAMPLED BY:C. Beck

Bulk Asbestos

DATE RECEIVED: 2022-12-02 **DATE REPORTED: 2022-12-05**

		SAMPLE DESCRIPTION:		ASB 1	ASB 2	ASB 3	ASB 4	ASB 5	ASB 6A	ASB 6B	ASB 6C
		SAMPLE TYPE:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
		DATE SAMPLED:		2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24
Parameter	**Unit**	**G / S**	**RDL**	**4582941**	**4582942**	**4582943**	**4582944**	**4582945**	**4582946**	**4582947**	**4582948**
Asbestos (Bulk)	%	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND

		SAMPLE DESCRIPTION:		ASB 7A	ASB 7B	ASB 7C	ASB 8	ASB 9	ASB 10	ASB 11	ASB 12
		SAMPLE TYPE:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
		DATE SAMPLED:		2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24
Parameter	**Unit**	**G / S**	**RDL**	**4582949**	**4582950**	**4582951**	**4582952**	**4582953**	**4582954**	**4582955**	**4582956**
Asbestos (Bulk)	%	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	50-75

		SAMPLE DESCRIPTION:		ASB 13	ASB 14A	ASB 14B	ASB 15A	ASB 15B	ASB 16	ASB 17	ASB 18
		SAMPLE TYPE:		Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid
		DATE SAMPLED:		2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24	2022-11-24
Parameter	**Unit**	**G / S**	**RDL**	**4582957**	**4582958**	**4582959**	**4582960**	**4582961**	**4582962**	**4582963**	**4582964**
Asbestos (Bulk)	%	0.5	0.5	ND	ND	ND	ND	ND	ND	ND	ND

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON OHSA - Reg. 278
Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

4582941-4582955 Condition of sample was satisfactory at time of arrival in laboratory.

"ND" - Not Detected

As per Reg 278/05 and AGAT SOP, all non-detect results have been analyzed and confirmed three times.

4582956 Condition of sample was satisfactory at time of arrival in laboratory.

Asbestos present - Chrysotile

4582957-4582964 Condition of sample was satisfactory at time of arrival in laboratory.

"ND" - Not Detected

As per Reg 278/05 and AGAT SOP, all non-detect results have been analyzed and confirmed three times.

Analysis performed at AGAT Toronto (unless marked by *)

Certified By:

Results relate only to the items tested. Results apply to samples as received.

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: R.J. BURNSIDE & ASSOCIATES LTD.

AGAT WORK ORDER: 22L976463

PROJECT: 300055234

ATTENTION TO: Chase Beck

SAMPLING SITE:Fergus

SAMPLED BY:C. Beck

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Asbestos (Bulk)	INOR-249-6010	modified from EPA 600/R-93/116 & NIOSH 9002	PLM

Results relate only to the items tested. Results apply to samples as received.

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

RUSH

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 22L976463

Cooler Quantity: pl. boor

Arrival Temperatures: N/A

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes:

Report Information:

Company: RJ Burnside

Contact: Chase Beck

Address: 15 Townline, Orangeville, ON

Phone: 519 2151139 Fax:

Reports to be sent to:

1. Email: chase.beck@rjburnside.com
2. Email:

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ____ *Indicate One*
☐ Ind/Com
☐ Res/Park
☐ Agriculture

Soil Texture *(Check One)*
☐ Coarse
☐ Fine

☐ Excess Soils R406
Table ____ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐ Sanitary ☐ Storm
____ *Region*

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☑ No

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☑ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 300055234

Site Location: Fergus

Sampled By: C. Beck

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:

Contact:

Address:

Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC Y/N	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☐ Yes ☐ No	O. Reg 153: PAHs	O. Reg 153: PCBs	O. Reg 153: VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	ASBESTOS PLM							Potentially Hazardous or High Concentration (Y/N)
ASB1	11/24/22	AM PM			outbuilding green insulation												✓								
ASB2		AM PM			outbuilding yellow insulation												✓								
ASB3		AM PM			garage yellow foam												✓								
ASB4		AM PM			garage green insulation												✓								
ASB5		AM PM			vinyl tile												✓								
ASB6-A,B,C		AM PM		HA	mf drywall positive stop												✓								
ASB7-A,B,C		AM PM		HA	mf insulation positive stop												✓								
ASB8		AM PM			drywall stairs												✓								
ASB9		AM PM			insulation stairs												✓								
ASB10		AM PM			spray foam												✓								
ASB11		AM PM			yellow insulation												✓								

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Chase Beck Chase Beck			J. Smith JS	22-12-2	9:45
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
			Amber D. Clinders		
Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time

'22DEC 2 2:14PM

Page 1 of 2

Nº: T 132945

Document ID: DIV-78-1511-021

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

Date Issued: March 9, 2021

AGAT Laboratories

RUSH!

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Laboratory Use Only

Work Order #: 22L976463

Cooler Quantity: Pl. bag

Arrival Temperatures: N/A

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes:

Report Information:

Company:

Contact:

Address:

Phone: Fax:

Reports to be sent to:

1. Email:
2. Email:

Refer to Page 1

Regulatory Requirements:

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ *Indicate One*
☐Ind/Com
☐Res/Park
☐Agriculture

Soil Texture *(Check One)*
☐Coarse
☐Fine

☐ Excess Soils R406
Table ___ *Indicate One*

☐ Regulation 558

☐ CCME

☐ Sewer Use
☐Sanitary ☐Storm
___ *Region*

☐ Prov. Water Quality Objectives (PWQO)

☐ Other
___ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 300055234

Site Location:

Sampled By:

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis

Invoice Information:

Bill To Same: Yes ☐ No ☐

Company:

Contact:

Address:

Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI, DOC (Y/N)	O. Reg 153: Metals & Inorganics	O. Reg 153: Metals - ☐ CrVI, ☐ Hg, ☐ HWSB	O. Reg 153: BTEX, F1-F4 PHCs Analyze F4G if required ☐ Yes ☐ No	PAHs	PCBs	VOC	O. Reg 558: Landfill Disposal Characterization TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	O. Reg 406: Excess Soils SPLP Rainwater Leach SPLP: ☐ Metals ☐ VOCs ☐ SVOCs	O. Reg 406: Excess Soils Characterization Package pH, ICPMS Metals, BTEX, F1-F4	Salt - EC/SAR	Asbestos PLM						Potentially Hazardous or High Concentration (Y/N)
ASB 12		AM PM	1		black pipe wrap												✓						
ASB 13		AM PM	1		white pipe wrap												✓						
ASB 14 a,b		AM PM	~~1~~ 2	HA	drywall upstairs												✓						
ASB 15 a,b		AM PM	2	HA	insulation green												✓						
ASB 16		AM PM	1		plaster												✓						
ASB 17		AM PM	1		drywall tape												✓						
ASB 18		AM PM	1		attic insulation												✓						
		AM PM																					
		AM PM																					
		AM PM																					
		AM PM																					

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
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Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

22DEC 2 2:14PM

Page 2 of 2

Nº: T 132944

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Date Issued: March 2, 2021

Township of Centre Wellington

Operations Centre

Site Development Phase
965 Gartshore Road, Fergus Ontario

Outline Specification

February 08, 2024

Prepared by:

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1.0 Executive Summary

The master site plan for the Centre Wellington Operations Centre has been developed to accommodate the Township's Space Needs Program, which was finalized in late 2019 based on consultation between RDH Architects and Township staff. The program allows for staff growth to 2040, and the building layout has been conceptualized to accommodate further expansion in the future.

1.1 Program and Phasing

The space program identifies elements to be included in multiple phases of development. Phase 1 includes office space for Infrastructure Services, Corporate Services, Community Services and the Planning Department. It also includes staff change rooms, a lunch room, meeting spaces, a Supervisors Shop Office Area, and Operators Shared Workshop Area, Mechanics Maintenance Shop, Heavy Vehicle Maintenance Bays, a Storage Garage for materials and equipment, Warm Vehicle Storage Bays, and a Wash Bay. Other site development in Phase 1 includes a vehicle storage pole barn, covered material storage bunkers, and a waste bins storage area, fleet parking areas, a small greenhouse, and material pile areas for street sweepings, gravel and topsoil. The addition of Planning Department staff to the office area was a recent modification to the program.

Phase 2 will include the addition of more Warm Vehicle Storage Bays, the expansion of the pole barn, material bunkers and waste bins, construction of a salt and sand storage building with a brine making and dispensing facility, and a second greenhouse.

1.2 Gartshore Site

During the Operations Centre Feasibility Study in 2019 and 2020, RDHA created a non-site specific test fit site plan for the above program in order to optimize the site area requirements. This exercise suggested that approximately 20 acres (8 hectares) would be suitable to accommodate the program and future growth.

Subsequently, the site at 965 Gartshore Street was identified as a candidate. RDHA adapted the test fit site plan to work within the constraints of the Gartshore site, identifying that a storm pond would be required, sanitary connections would need to be made at Gregson Court, and the Wellhead protection area will all limit the construction of structures and paving at the north end of the site. The test-fit proved satisfactory and the Township proceeded with procuring the property.

In 2021, the Township retained RDHA and RJ Burnside to undertake a more detailed site development analysis and to finalize a concept plan. One main task was to have the property re-zoned as Industrial M1 from its current Agricultural designation. This will require a Zoning By-Law Amendment. The team has also initiated and organized the required site investigations that will inform the Township of any added scope and constraints to developing this site.

2. Building Code Summary

2.1 Construction Requirements

The Works building is classified and will conform to O.B.C. 3.2.2.69 “Group F Division 2, up to 4 Storeys, Increased Area, Sprinklered.”

Accordingly, the Works building shall be of non-combustible construction. Floor assemblies shall be fire separations and have a fire-resistance rating not less than 1 hour. Mezzanines will have, if of combustible construction, a fire-resistance rating not less than 1 hour. All loadbearing walls, columns and arches supporting an assembly shall have a fire-resistance rating not less than 1 hour, they will be of non-combustible construction. All loadbearing walls, columns and arches supporting a fire separation shall have a fire-resistance rating not less than 1 hour if of combustible construction, else they will be of non-combustible construction. Roof assemblies are not required to have a fire resistance rating.

The Determined Occupancy load for the administration building is 198.
Level 1 - 111
Level 2 - 87

The Determined Occupancy load for the Workshop and Storage bays is 79.

Total Occupancy is 277.

2.2 Spatial Separations

Facing Street: 1 Street, 2 Fire access points
The exposed building faces will apply the City’s minimum 18m from the centerline of the adjacent roads. This is more than the min. 9m required by 3.2.3.1 of the NBC. This will allow for an unlimited percentage of unprotected openings on the exterior walls.

2.3 Interior Fire Separations and Closures

2.3.1 Interior fire-resistance ratings include the following:

- 1 hr. exit stairs
- 1 hr. elevator shaft
- 1 hr. elevator machine room (except between machine room and adjoining elevator shaft.)
- 1 hr. service room with fuel fired appliances
- Janitors room to have smoke separations
- 1 hr. service rooms (except where a room contains a limited quantity of service equipment that does not constitute a fire hazard)
- 2 hr. separations between all non-F2 occupancies and the F2 occupancies, including stairs and service spaces.

2.3.2 Closures:

Door assemblies and fire damper within a fire-resistance rated separation will all have fire protection ratings. All rated doors must have labels and have equally resistant frames and hardware.

The ratings are as follows:

- ½ hr. Separation = 20 min. Closure rating
- 1 hr. separation = ¾ hr. Closure rating
- 2 hr. separation = 1 ½ hr. Closure rating

Penetrations through separations by pipes, ducts, or other services are to be sealed tight with firestop systems as per 3.1.9.1 of the OBC.

2.3.3 Interconnected Floor Space:

The mezzanine will be interconnected by one floor opening. The open stair between the first and second floor at the mezzanine. This space is wholly contained within the F2 Occupancy Classification and fall under the exception in OBC Division B - Sentence 3.2.8.2. (6)

2.4 Life Safety

2.4.1 The entire building complex will have an automatic sprinkler system designed in accordance with NFPA13. The building is under 3 storeys in height and will therefore not require a standpipe. (3.2.5.8. (1))

2.4.2 A Fire Alarm is required to be installed in accordance with CAN/ULC-SS24-M

2.5 Means of Egress

2.5.1 Rooms and suites will require two means of egress if:

- Occupant load is greater than 60.
- Travel distance to the egress exceeds 25m.
- The area of the room or suite exceeds 300m²
- and 200m² if an Assembly room.

2.5.2 Exits

Minimum doorway exit width for Level 2 is	6.1X 105=640.5mm	(3.4.3.2.1a)
Minimum Stair exit width for Level 2 is 9.2X105=966mm		(3.4.3.2.1c)
Minimum Stair width can be 900mm each		(3.4.3.2.7d)
Minimum doorway exit width for Level 1 is	6.1X 258=1573.8mm	(3.4.3.2.1a)
Double doors from the large open area on both floors should swing out		(3.4.6.11)
Stair treads should be from 255 to 355 and risers from 125 to 200		(3.4.6.7)

2.5.3 Travel Distance

Maximum travel distance is 45m (3.4.2.5.1c)

ITEM	ONTARIO BUILDING CODE DATA MATRIX PART 3	OBC REFERENCE
1	PROJECT DESCRIPTION: NEW CONSTRUCTION OF MAIN OPERATIONS CENTRE BUILDING ☒ NEW ☐ ADDITION ☐ CHANGE OF USE ☐ ALTERATION ☐ PART 11	☒ PART 3
2	MAJOR OCCUPANCY(S): • GROUP D & F-2	3.1.2.1.(1)
3	BUILDING AREA (m2): EXISTING: 0 NEW: 3,185.0 TOTAL: 3,185.0	1.1.3.2.
4	GROSS AREA (m2): EXISTING: 0 NEW: 4180.0 TOTAL: 4180.0	1.1.3.2.
5	NUMBER OF STOREYS: ABOVE GRADE: 2 BELOW GRADE: 0	3.2.1.1. & 1.1.3.2.
6	NUMBER OF STREETS/ACCESS ROUTES: FACING ONE STREETS	3.2.2.10. & 3.2.5.5.
7	BUILDING CLASSIFICATION: OBC 3.2.2.69 GROUP F DIV 2 UP TO 4 STOREYS INCREASED AREA	3.2.2.20.–83.
8	SPRINKLER SYSTEM PROPOSED: ☒ ENTIRE BUILDING ☐ BASEMENT ☐ IN LIEU OF ROOF RATING ☐ NOT REQUIRED	3.2.2.20.–83. 3.2.2.17.
9	STANDPIPE REQUIRED: ☐ YES ☒ NO	3.2.9.
10	FIRE ALARM REQUIRED: ☒ YES ☐ NO	3.2.4.
11	WATER SERVICE/SUPPLY IS ADEQUATE: ☒ YES ☐ NO	
12	HIGH BUILDING: ☐ YES ☒ NO	3.2.6.
13	PERMITTED CONSTRUCTION: ☐ COMBUSTIBLE ☒ NON–COMBUSTIBLE ☐ BOTH ACTUAL CONSTRUCTION: ☐ COMBUSTIBLE ☒ NON-COMBUSTIBLE	3.2.2.20.–83.
14	MEZZANINE(S) AREA (m2): NONE	3.2.1.1.(3)–(8).
15	OCCUPANT LOAD BASED ON: ☐ m2/PERSON ☒ DESIGN OF BUILDING 100 LEVEL GROUP D 2 PERSONS 200 LEVEL GROUP F–2 & D 116 PERSONS	3.1.17.
16	BARRIER–FREE DESIGN: ☒ YES ☐ NO	3.8.
17	HAZARDOUS SUBSTANCES: ☐ YES ☒ NO	3.3.1.2.(1) & 3.3.1.19(1)
18	REQUIRED FIRE RESISTANCE RATING (FRR):	3.2.2.20.–83. & 3.2.1.4.

HORIZONTAL ASSEMBLIES (FRR):		LISTED DESIGN NO. OR DESCRIPTION (SG–2):
FLOORS:	1 HR	ULC DESIGN F906
ROOF:	0 HOURS	N/A
MEZZANINE:	1 HR	ULC DESIGN D906
FRR OF SUPPORTING MEMBERS:		LISTED DESIGN NO. OR DESCRIPTION (SG–2):
FLOORS:	1 HR	ULC DESIGN Z804 (COLUMNS) ULC DESIGN D810 (BEAMS)
ROOF:	UNRATED	FULLY SPRINKLERED
MEZZANINE:	1 HR	ULC DESIGN Z803

19	SPATIAL SEPARATION – CONST. OF EXT. WALLS OF WEST FIRE COMPARTMENT (GROUP 'D')									3.2.3.1.D
	WALL	AREA OF EBF (m2)	LD (m)	PERMITTED MAX % OPENINGS	PROPOSED MAX % OPENINGS	FRR (HRS)	LISTED DESIGN OR DESCRIPTION	COMBUST. CONSTRUCT.	COMBUST. CONSTRUCT./ NON-COMBUST. CLADDING	NON-COMB. CONST. NON-COMB. CLADD.
	NORTH	74.7	+9m	100%	100%	NA	NA	NO	NO	YES
	EAST	NA	NA	NA	NA	NA	NA	NO	NO	YES
	SOUTH	60.9	+9m	100%	Below 100%	NA	NA	NO	NO	YES
	WEST	270.1	+9m	100%	Below 100%	NA	NA	NO	NO	YES
20	SPATIAL SEPARATION – CONST. OF EXT. WALLS OF EAST FIRE COMPARTMENT (GROUP 'F-2')									3.2.3.1.E
	WALL	AREA OF EBF (m2)	LD (m)	PERMITTED MAX % OPENINGS	PROPOSED MAX % OPENINGS	FRR (HRS)	LISTED DESIGN OR DESCRIPTION	COMBUST. CONSTRUCT.	COMBUST. CONSTRUCT./ NON-COMBUST. CLADDING	NON-COMB. CONST. NON-COMB. CLADD.
	NORTH	1008.6	+15m	100%	Below 100%	NA	NA	NO	NO	YES
	EAST	557.4	+15m	100%	Below 100%	NA	NA	NO	NO	YES
	SOUTH	1009.5	+15m	100%	Below 100%	NA	NA	NO	NO	YES
	WEST	243.1	+15m	100%	0%	NA	NA	NO	NO	YES
21	PLUMBING FACILITIES									

LEVEL	OCCUPANCY	OCCUPANT LOAD	WC's REQUIRED	WC's PROPOSED	
LEVEL 1	GROUP D	111 [56F, 55M]	4F, 4M	4F, 4M	3.7.4.7 & 3.7.4.9
LEVEL 2	GROUP D	87 [44F, 43M]	3F, 3M	3F, 3M	
LEVEL 1	GROUP F-2	79 [25F, 54M]	3F, 4M	3F, 4M	

3. Architectural Outline Specification

Operations Centre Works Building - Single building incorporating approximately 44,995 sq ft (4,180m²) of Administration, Locker & Change facilities, Workshops, Vehicle storage, Maintenance Garage and Washbay. The building has two wings: a single storey Operations wing, and a two storey Administration wing. Height varies but is approximately 10m.

Enclosed Vehicle Storage Pole Barn - Single building, 2,691 sq.ft. (250m²) unheated and not insulated. Metal roof, metal wall cladding all on structural steel. Height to be approx. 6m.

3.1 Exterior

3.1.1 Sub-structure

.1 Insulated foundation walls: will be reinforced concrete. On the exterior surface a modified bitumen waterproof membrane, 50mm of extruded polystyrene insulation, and a cellular drainage sheet will be provided.

.2 Non-insulated walls: will be reinforced concrete. On the exterior surface a modified bitumen waterproof membrane.

3.1.2 Structural System Options

.1 Steel frame structural system – As per Part 4 of the National Building Code.
.2 1 hr. F.R.R. for support assembly for D Occupancy areas.
.3 1 hr. F.R.R. for support assembly for F2 Occupancy areas.
.4 1 hr. mezzanine.
.5 Soft Sprayed Fireproofing AD Type FP on all structural steel, 16mm Gypsum Board On metal stud framing on all exposed structural steel columns.
.6 Exception – 1 hr. Intumescent fireproofing on all exposed Columns and Trusses in Administration wing.

3.1.3 Exterior Walls

.1 Cladding Type 1

- Glass & Spandrel Glass Curtain Wall by Alumicor or Kawneer
- At all vision glass, provide cap-less anodized aluminum curtain wall system.
- At spandrel glass provide cap-less anodized aluminum curtain wall system
- G1 Vision Glass - Triple-glazed sealed units with Low E coating on surface 2
- G2 Spandrel Glass - Shadow box spandrel panels with triple-glazed sealed units with Low E coating on surface 2, recessed prefinished aluminium panel, 75 semi rigid Insulation, & prefinished metal vapour barrier flush interior face of curtainwall section.

- Fenestrations - Areas of glazing to be horizontal window system 512 Ventrow ISOLock Ventilator by Kawneer, with triple-glazed sealed units with Low E coating on surface 2.

.2 Cladding Type 2 – Steel Panel

- 37mm Steel Cladding Panel - with anodized aluminum finish
- 25mm Horizontal Rails
- 125mm Vertical Z-Girts @ 400mm O.C.
- 100mm mineral fibre insulation
- self adhering Air/ Vapour Barrier
- back-up wall

.3 Cladding Type 3 – Insulated Metal Panels

- 102mm Insulated Metal Panel - Polyisocyanurate insulation (R-7 or better) sandwiched with anodized aluminum sheets. Sheets to have a Microrib profiles and anodized finish.
- 25mm Horizontal Rails
- All panels fastened to secondary steel structure

3.1.4 Air/ Vapour Barrier and Thermal Insulation

.1 Exterior wall Air/ Vapour Barrier to be a rubberized asphalt bonded to high density laminated polyethylene.

.2 Exterior wall Insulation to be 125mm thick mineral fibre insulation installed between Z-girts. Insulation to have an R-value of 5.04 per inch of thickness.

3.1.5 Roof Covering

.1 2 Ply Modified Bitumen membrane roof system
- Cover Sheet
- Base Sheet
- 6mm Cover Board, Densdeck Prime
- Polyisocyanurate slope package
- 150mm - 3 layers of 50mm Sarnatherm Polyisocyanurate insulation.
- Air/ Vapour Barrier, Sarnavap-10
- Glass fibre reinforced Gypsum Board, Densdeck
- 76mm prefinished metal deck

3.1.6 Caulking and Sealants

.1 Caulking at expansion joints and flashings to be Tremco Dynmonic or similar approved sealant to be used.

3.1.7 Large Overhead Doors

.1 Operations Building:

.1 For Garage Bays, Warm bays, and Washbay the Automatic overhead doors, 6.1m W x 6m H and, 7.3m W x 6m H (refer to elevations for locations and amounts for each). Insulated steel sectional doors with double glazed vision panels (12mm insulated

glass) including aluminum side panels. Tracks of solid aluminum profiles. Model 596 by Overhead Door Company. Refer to elevations for areas of glass and solid panels. Electric operation with bottom sensing edge.

.2 Sixteen (16) doors total.

.2 Vehicle Storage Pole Barn:
.1 Steel sectional doors with double glazed vision panels including aluminum side panels. Tracks of solid aluminum profiles. Model 430 by Overhead Door Company. Refer to elevations for areas of glass and solid panels. Electric operation with bottom sensing edge.

.2 Six (6) doors total.

3.1.8 Man Doors

.1 Exterior man doors to be, thermally broken, double glazed units in anodized aluminum frames. Twelve (12) doors total.

.2 Exterior automatic glazed aluminum sliding doors Access Technologies Dura-Glide Series 3000, by Stanley. Two (2) doors total.

.3 Interior doors in Workshops and Operations bays to be hollow metal doors in hollow metal steel frames. Twelve (12) doors total.

.4 Interior doors in Administration area (excluding storage rooms & mechanical room entrance) to be painted wood in steel frames. Twenty four (24) doors total.

3.1.9 Skylights

.1 Structural Skylight system in Lean-To configuration. (1) skylights 3.25m wide x 3.83m long by Wasco Products Inc. Four (4) total.

3.2 Interiors

3.2.1 Partitions

.1 All solid walls in the Amenities and Administration areas (excluding storage rooms & mechanical room entrance):
- Painted Gypsum wall board on metal stud framing.

.2 Solid walls in Workshops and Bays:
- Light weight Concrete Block, running bond with racked joints, painted.

.3 Gypsum drywall partitions, in general, shall have 16mm gypsum board both sides of 92mm metal studs.

- Office partitions shall include 64mm mineral glass fibre sound insulation batts.
- Acoustic partitions shall extend to underside of structure and shall be composed of 2-plies of 16mm gypsum board on one side of studs, 64mm sound attenuation batts, and one ply of 16mm gypsum board on resilient furring channels.

.4 Glazed Doors & Screens:
Interior Glazed screens to be PC350 Elite Glazing system. Four (4) total.

.5 Moveable Folding Partitions
Horizontal moveable folding partition with automatic motorized control and wood veneer finish. 3m high x 12.5m long. Located: in Lunchroom & Meeting Room / E.C.R. By Modernfold. One (1) total.

3.3 Finishes

3.3.1 Floor Finishes

.1 Porcelain Mosaic Tile:

- 50mm x 150mm, unglazed (matte) including abrasives. Locations: Washrooms and Showers.

.2 Concrete Sealer:

- Sealer for concrete slabs shall be a 3-coat high traffic system. Locations include Interior Corridor, Storage rooms, Workshop, Welding shop, Wood shop, Fleet Repair and Fleet Storage Spaces.

.3 Resilient Flooring

- Vinyl or linoleum resilient sheet flooring will be provided in Workshops, Workshop Offices.

.4 Non-Slip Resilient Flooring:

- Approx. 300mm x 300mm x 10mm, unglazed, as later selected. Locations: Locker rooms and Change rooms. Altro Maxis.

.6 Stonhard:

- Built-up epoxy, shatter proof coating over concrete slab. Location: Vehicle Repair Bays.

.7 Epoxy Floor Coating:

- In areas of high moisture and/ or chemical exposure, an bisphenol. Epoxal 100 by Niagara Coatings 1-800-461-1672 or approved alternate. Locations: Mechanical Rooms, and Bulk + Waste oil storage.

3.3.2 Ceiling Finishes

.1 Suspended Mineral Acoustic Ceilings:

- The suspension system for mineral acoustic ceilings shall be Armstrong Interlude XL

9/16”, white baked-on finish. Acoustic ceiling panels shall be 1220mm x 1100mm and 1220 x 150 mineral fibre, Optima square tegular edge, ‘Tech-Zone’ system by Armstrong, or other approved manufacturer. Locations include Offices, Boardrooms, Meeting rooms, and Reference rooms.

.2 Gypsum Drywall Ceilings:

- Drywall ceilings shall be 16mm gypsum drywall on metal furring channels at 600mm o.c. on metal carrying channels at 1200mm o.c. Locations include: Corridors, Admin Support, Locker Rooms, Wellness Room, Washrooms, Janitors Rooms.

.3 Exposed Structure:

- Locations include Mechanical, Electrical, Work Shops, Storage Rooms, Vehicle Storage bays and Washbay. In all spaces; structure, decking and piping above to be painted with dryfall paint.

.4 Porcelain Tile:

- 25mm x 25mm white ceramic wall tile to be adhered to the ceilings. To be used in Showers.

3.3.3 Wall Finishes

.1 Paint Finish:

- Paint finish on drywall and concrete block wall shall be premium grade latex enamel.

.2 Porcelain Ceramic Wall Tile:

- 25mm x 25mm Porcelain mosaic wall tile shall be provided in washrooms and showers and mud rooms, full height to ceiling and in janitors closets to a height of one meter above the floor.

.3 Window Film:

- 3M Scotchcal Dusted Crystal No. 7725-314. Locations include glazed screens of offices facing corridors.

3.4 Fittings and Equipment

3.4.1 Shower & Change Rooms and Locker Rooms (Men’s and Women’s)

- GWB ceilings paint finish.
- Continuous prefinished wall mounted solid surface bench around perimeter.
- Shower areas with 6 total individual showers with 1 shower head each, and fold-up wall mounted seat in barrier-free shower stall.
- 50mm x 150mm porcelain mosaic tile finish on walls, ceilings and floors in shower area.
- Water resistant GWB ceiling with paint finish in each shower and GWB ceiling in toilet (2400mm high).
- Shower curtain and rod for each shower stall.
- 11 wall mounted toilets - with touchless flush valves.
- 6 wall mounted sink and vanity - with touchless faucets.

- Solid phenolic floor mounted toilet partition.
- Solid Surface Vanity
- 4 wall mounted touchless soap dispenser
- 2 wall mounted stainless steel mirror.
- 3 hand dryers - touchless.
- 2 waste receptacle, wall mounted.

3.4.2 Lunch Room and Kitchenette

- Sheet vinyl floor finish on concrete slab.
- Paint finish on concrete block walls.
- Acoustic tile ceiling (3000mm high).
- Millwork counter and upper cabinets with solid plastic laminate.
- Solid Surface counter tops.

3.4.3 Universal Washroom

- Porcelain ceramic tile floor finish on concrete slab-on-grade.
- Porcelain mosaic tile wall finish on concrete block.
- GWB ceiling with paint finish (3000mm high).
- 1 wall mounted toilet
- (1) 760 x 760 L shape grab-bar, and (1) 600 horizontal bar.
- Solid Surface Vanity
- Basin millwork vanity, solid plastic on 19 plywood.
- 1 touchless faucet
- Wall mounted touchless soap dispensers
- Tilted vanity length mirror
- 1 semi recessed hand dryers
- 1 recessed waste receptacle
- 1 precast epoxy granite shower basin and 1 Shower head.
- 1 fold-up wall mounted seat

3.4.3 Entrance Floor Grilles

.1 Satin finish aluminum, 16mm depth, equal to Gridline by Construction Specialities. Quantities: 5 @ 40 sq ft each.

3.4.4 Projection Screens and Audio/Visual Equipment

.1 LED Television screens and audio/visual equipment for display in the following rooms: Two (2) 60” in the Lunch Room.

- One (1) in the Lobby
- One (1) in Small Meeting room
- One (1) in Large Meeting room

.2 Projection screen and audio/visual equipment for Meeting rooms.

3.4.5 Whiteboards, Bulletin Boards and Map Rails

.1 Whiteboards System shall be as manufactured by Egan Visual Inc. or other approved manufacturer. Locations include all Meeting Rooms and Muster Rooms.

3.4.6 Lockers

.1 Powder-coated steel, equal to Hadrian “Gladiator” Athletic Series, 16” wide x 20” deep, 72” high, single-tier, and double tier, with box base.
Quantities: 106 single tier in both the Men’s and Women’s locker areas.

3.4.7 Millwork

.1 Millwork items will include 100 Level Lobby and Reception area, 200 Level Reception area, Copy room counter and cabinets, Kitchen cabinets and Culinary counters in Lunch Room, Office storage cabinets, Small Meeting Room Counter and cabinets, Changerooms benches and locker surrounds, Laundry counter, First Aid/Wellness room counter and cabinets, and Washroom vanities. Millwork, in general, shall incorporate Through Body P-Lam doors and Melamine cabinet interiors with solid surface countertops and bench tops. All Workshop benches to be solid wood tops on Melamine cabinet interiors and doors.

3.4.8 Metal Fabrications

.1 Stairs shall be metal pan construction with formed galvanized steel channel stringers and metal pan risers with concrete fill and carborundum strips.

.2 Other metal fabrication requirements include:

1. Vanity support brackets
2. Roof access ladders
3. Supports for ceiling hung toilet partitions
4. Wall mounted panel supports
5. Bench brackets
6. Column guards

3.4.9 Roller Shades

.1 Automated roller shades shall be provided to exterior walls of: all Offices, Meeting Rooms, Training Room, Staff Lounge and Admin Support.

3.4.10 Steel Shelving Systems

.1 Steel shelving systems will be provided for the following locations; Storage rooms 1-3, Workshops, Inventory & Parts Storage, Fleet Inventory Storage

3.5 Maintenance Garage

3.5.1 Vehicle Hoists

.1 One (1) Light Duty 4 Post 25,000 lbs model: RFL25 by Rotary.
- Each with (2) Rolling Jacks model # RJ25000, with Light Kits model # APLIGHT

.2 Mobile – Rotary model # MCH618 – (6) post mobile hoists 18,000 lbs each. Cable tethered high mount with reels.
- 6 Jack stands, Rotary model # RS52YL – 15,000 lbs capacity.
- 1 Portable High Rise Tire Jack. Rotary model # GUWSFF20 – 4,400 lbs capacity.

.3 All hoists to have one open end (at ramps) and stops at front.

3.5.2 Oil Dispensing System

.1 One (1) central racking station with oil and anti-freeze dispensers. Handle and meters by Orion model # 24700. Contact Cummins Hydraulics 905-836-7750.

.2 Eight (4) IFH Portable Fluid Handling Carts. By Lubriguard, model # PCA653015-2AR with 3 tanks, one 60 gallon, one 30 gallon, and one 15 gallon.

3.5.3 Exhaust Hose Reels

.1 Four (4) ceiling suspended exhaust extraction reel stations by Nederman.

3.5.4 Air Line and Power Reels

.1 Eight (4) ceiling suspended reel stations for compressed air lines.

.2 Eight (6) suspended reel stations for power cords.

3.5.5 Catch Basins

.1 Catch Basins in each bay complete with galvanized grating as per floor plans.

3.5.6 Crane

.1 (1) 5 ton crane with 2 hooks and spreader. Bridge span 15m (50 foot) to run across Heavy Maintenance bays, 15m (50 ft) run. By Munck. Wireless remote control, strobe light with beeper.

3.5.7 Welding Shop

.1 Enclosed with fire rated partitions and spark resistant screens.

.2 Gas cylinder storage within a fire and blast rated closet with exterior ventilation.

3.6 Building Equipment

3.6.1 Mechanical

- Energy Efficient gas boilers with heat pumps
- Energy Reduction Ventilator (ERV)

3.6.2 Electrical

- Standard electrical and distribution.
- Emergency Generator: 150 kW natural gas generator with outdoor enclosure.

3.7 Vehicle Wash Bay

3.7.1 Interior tandem vehicular wash bays, each bay to have a removable 1M wide x 12M long galvanized steel grate and frame over a 1.8M deep, poured concrete pit with one oil interceptors.

3.7.2 Wash Water Filtration

.1 Oiltrap ElectroPulse electro coagulation water treatment and filtration system by Oiltrap Environmental Phone: 1-800-943-6495

.2 10 gallon per minute EP10 system.

3.7.3 Power Wash Unit

.1 VNG Natural Gas heated hot water washer by Landa. 10 gallon per minute, 3000 PSI.

.2 (2) wash wands - insulated, fatigue-free. Connected with 6000 PSI hoses.

3.7.4 Oil Interceptors

.1 One Oil Interceptor to service the sanitary connection.

3.7.5 Options

.1 Stop-Go lights at exterior of entry, and at interior of exit door.

3.8 Furniture

3.8.1 Training Tables and Seating

.1 Training tables will be Conductor, Signal Series C Base by Spec. Included will be surface mounted power and data communication, signal base with holes and castors, wire trough and folding design. Finish will be Maple veneer and aluminum. Chairs will be equal to Teknion Wood series or approved equivalent.
Quantities: 3 tables and 30 chairs

3.8.2 Meeting Room Tables and Seating

.1 Boardroom tables will be 44” wide by 120” long and incorporate modesty panels and tabletop power data insert. Chairs will be swivel type mounted on table pilasters. System shall be equal to Teknion Wood series conference tables and chairs.
Quantities: 1 table and 8 chairs

3.8.3 Office Workstations and Seating

.1 Office workstations will be 2.2m x 2.2m. System shall be equal to Teknion Wood series workstations and chairs.
Quantities: 12 workstations and 36 chairs

.2 Small Workstations will be 1.9m x 1.4m. System shall be equal to teknion Wood series workstations and chairs
Quantities: 38 workstations and 38 chairs.

3.8.4 Staff Lounge Tables and Seating

.1 Staff Lounge tables will be round and will seat groups of 6, 4 and 2. System shall be equal to Teknion Wood series tables and chairs.
Quantities: 24 tables of 4, and 96 chairs.

4.0 Landscape Outline Specification

4.1. Pedestrian Paving

.1 Concrete Sidewalk
- .1 1.5m wide sidewalks along north edge of parking lot and to main entrance of main building; concrete walkways along west side of building as per Paving Plan.
- .2 Sidewalks to be 150mm thick, 32 MPa cast in place concrete, broom finish, with a 250mm compacted Granular 'A' base.

.2 Cellular Concrete Pavers
- .1 Cellular paving around the east side of the administration wing and around Farm house. As per Paving Plan
- .2 Concrete pavers to be minimum 150mm thick, 32MPa, with a 250mm compacted Granular 'B' base.

.3 Curbs
- .1 Curbs abutting sidewalks shall be 450mm high x 250mm wide at base,150mm above finished grade of asphalt with a leading radius of 50mm. Cast in place concrete to be 32MPa with 250mm compacted Granular 'A' base surrounding curb.
- .2 Curb cuts to be provided at all pedestrian crossing (except in the case of raised asphalt walkway) and handicap parking spaces indicated on Landscape Layout Plan.

4.2. Planting

.1 Deciduous Tree Planting
- .1 Single row of Hackberry Trees to be planted adjacent sidewalk at south end of parking lot. Double row of Tulip Trees to be planted south of the Patio area.
- .2 All deciduous trees to be 70mm cal., ball and burlap.

.2 Coniferous Tree Planting
- .1 Buffer planting of White Spruce at adjacent berm on west side of yard.
- .2 All coniferous trees to be 1800mm height, wire basket, of no. 1 grade.

.3 Shrub Planting
- .1 Two rows of Bayberry to be planted side-by-side along south side of parking lot, as per Landscape Planting Plan. Buffer planting of Shadblow Serviceberry at east edge of property abutting Gartshore Street.
- .2 Serviceberry to be 2.0m height, potted. All other shrubs to be 600mm height, potted.
- .3 Planting soil to have a minimum depth of 250mm, with 200mm depth planting soil and subgrade mixed below.

.4 Ornamental Grass Planting
- .1 Pennsylvania Sedge, Switch Grass and Indian Grass to be planted along bioswales as per Landscape Planting Plan.

.2 Indian Grass to be 2 gallon pot size. All other grasses to be 1 gallon pot size.
.3 Planting soil for all ornamental grasses to have a minimum depth of 300mm.

.5 Sodding
.1 Sodding in open areas and parking lot islands as indicated on the Landscape Surface Treatment and Planting Plan.

.6 Staking
.1 All trees to be staked with two t-bars and galvanized guy wires threaded through rubber hose and secured around trunk and/or main branches.

.7 Mulching
.1 All trees to be mulched individually with minimum 100mm depth mulch, to at least 75mm from tree trunk.
.2 Bioswales and shrub planting beds on south island to have 100mm depth continuous mulch.
.3 Mulch shall be a shredded pine bark mulch.

.8 Warranty
.1 All landscape works to be guaranteed for one year following inspection. Plant material, which is not in a healthy growing condition one year after inspection, shall be replaced to the satisfaction for the City with an additional one-year maintenance guarantee period.

5.0 Works Yard Outline Specification

5.1 Yard Surfacing

5.1.1 Civil Design Brief

.1 Refer to the Functional Servicing Report

5.1.2 Asphalt Paving

.1 Light duty asphalt for visitor and staff parking. 5,134m²
.2 Heavy Duty asphalt for Works Yard as per Site Plan. 27,800m²
.3 Heavy Duty Concrete pad for Aprons, Fueling Area, Material Bins and Truck Wash exterior Wash Pad – approx. 1,030m²
.4 Granular surfacing for Future Storage Area/Temp. Storage - approx. 5,100m²

5.1.3 Concrete Sidewalks

.1 Poured Concrete sidewalks as per Site Plan.

5.1.4 Concrete Curbs

.1 Poured Concrete curbs at perimeter of all asphalt driveways, perimeter of works yard and parking as per Site Plan.

5.1.5 Concrete Apron

.1 Continuous 1800mm wide x 150mm deep poured concrete apron at overhead doors to main building, Truck Wash building, and Salt Shed as per Site Plan.

5.1.6 Catch Basins

.1 Catch basins as required preventing stormwater run-off. Refer to Civil.

5.1.7 Painted Line Markings for Vehicle Parking

.1 Alkyd traffic paint, colours yellow and white.

5.2 Yard Features

5.2.1 Materials Storage Bins & Drying Bins

.1 Materials Storage Perimeter walls, poured in place concrete foundation and retaining walls, with precast concrete Highway Blocks as retaining walls to form material storage bins. 6 foot blocks (1830L x 610w x 610h) by Stony Creek Ready Mix
Eight (8) bays/bins 6.2m wide x 9.3m deep x 1.83m high.

5.2.2 Bollards

.1 Approx. 80-150 dia. concrete filled steel bollards at vehicle entrances to Storage Garage buildings, at all corner locations of building and at fuelling area.

5.2.3 Storm Pond

.1 Storm Retention pond (5,740m²) with liner system. Refer to Stormwater Management plan

5.2.4 Landscaping

.1 Landscape Berm (15m wide x 3m high) along entire west perimeter
.2 $100,000.00 Allowance for soft landscaping.

5.2.5 Waste Storage

.1 Two (2) 40 yard roll-off metal waste bins

5.2.6 Water fill station

.1 Water Meter, Pump and domestic water connection at Gartshore street.
.2 Electrical panel with lock
.3 Concrete pad 4m long x 3m wide) with catch basin at filling area.

5.3 Site Perimeter

5.3.1 Site Lighting

.1 High mast LED lighting for all of Yard and staff and visitor parking. Refer to electrical.

5.3.2 Fencing

.1 Galvanized steel chain link fence (2.4m high) at North, East & South perimeter of Works Yard as per Site Plan. Fence to have galvanized steel wire - 4 point barbs.

.2 Precast concrete noise barrier. A post & panel system to be constructed along the west property line on top of the landscape berm.
- Galvanized steel posts spaced 4.5m centre to centre and 2.6m high above grade.
- Precast cementitious panels with textured finish. From grade to 2.6m high.
- The panels are to have a 20kg/m² minimum surface density.

5.3.3 Access Control Gate

.1 One (3) Automatic Sliding Cantilevered Security Fence Gate 12m wide. Located at main

entrance and exit to works yard. Posts mounted to concrete piers.
.2 Two (2) Card swipe sensors for each sliding fence gate.
.3 Two (2) Intercom Stations for each sliding fence gate.

5.3.4 Security

.1 CCTV and building perimeter security system.

5.4 Sand and Salt Storage Building (Phase 2)

5.4.1 Pre-Engineered enclosure by Legacy Building Solutions or approved alternate.
Legacy Building Solutions, Inc.
19500 County Road 142
South Haven, Minnesota USA 55382-9240
Phone : (320) 258-0500 Fax : (320) 259-0087
Contacts: Matt VonScoyoc, Structural Sales Manager

5.4.2 Enclosure General

To supply a 80' X 140'-1" (24.38m x 42.67m) building = (11,200 square feet) with 2 end walls. Includes 8 foot legs, 2 framed openings (16'X16') and 1 framed opening (16'X30').

The following items will be included in the structure:
1. Hot Dipped Galvanized Rigid Frame System
2. Fabric End Walls complete with Anchors
3. 15 oz. Fire Retardant Fabric Cover.
4. All Hardware for structure
5. 2 - 16' x 16' Overhead Doors (frames only)
6. 1- 16' x 30' Overhead Doors (frames only)

5.4.5 End Wall and Side Wall Cladding

.1 28 gauge metal cladding for end walls
.2 Galvanized and pre-painted to designers colour selection.

5.4.6 Foundation

.1 Consist of (3000mm) 10'-0" high above finished floor and 1'-6" thick, reinforced concrete retaining walls. Foundation to be reinforced with "black" rebar (double epoxy coated rebar) and designed as retaining walls to support load of sand and salt. Interior face of concrete walls in building to be coated with asphalt coating by spray application.

5.4.7 Enclosure Structural System

.1 Hot dipped galvanized rigid frame system, 20'-0" on center, and engineered to withstand wind and snow loads for the area of installation.
.2 All plate and angle steel ASTM 44W. All structural tubing ASTM A500 Grade C.

.3 All welding is in accordance with AWS D1, 1-2000. All welding GMAW with AWS ER70S.
.4 Galvanizing is required (corrosion protection), all steel is chemically suitable for galvanizing as per ASTM A385 and A143. All fabricated steel pieces are geometrically suitable for galvanizing as per ASTM A385; standard recommended practice for providing high quality zinc coatings (Hot Dip) and A384.
.5 All fabricated parts must be Hot Dip Galvanized after fabrication as per CSA G164-M92 including Hot Dip Galvanizing of irregularly shaped items.
.6 All framing members are shop fabricated for bolted field assembly. Field cutting or drilling when required are clearly noted on the drawings. Field cutting or drilling are not allowed with a cutting torch. Only approved drills or saws may be used.
.7 All shop connections are welded in accordance with AWS D1, 1-2000. All welding with E70XX low hydrogen.
.8 Anchorage shall be Hot Dip Galvanized and designed to resist the maximum frame reaction resulting from the site-specific combinations of loading.
.9 Drawings and certifications: complete erection drawings showing anchor-bolt settings, sidewalls, end wall and roof framing, transverse cross-sections, covering and trim details with accessory installation details to clearly indicate the proper assembly of all building parts. A letter of certification by a professional registered engineer will be provided for insurance and permits.
.10 Wind bracing consists of diagonal rod, cable and purlin bracing as designed by an engineer.
.11 Bolts and Fasteners. All filed connections are bolted. Structural bolts shall conform to ASTM A325 and shall be tightened by set pounds of torque determined by the engineer.

5.4.8 Fabric Cover Specifications

.1 Thickness: 26 mil
.2 Weight: 15oz/yd2 (Includes Keder rope)
.3 Coating Thickness: Average 4 mil per side
.4 Fire Requirement: Fire Retardant Material
.5 Color: White (translucent to permit 80% day light transmission)
.6 Warranty: 20 Year pro-rated Manufacturers Warranty
.7 Life Expectancy: UV protected, 20-25 years for North America
.8 Section Widths: Fabric installed in 20’ sections for easy removal and replacement in the event of uncontrollable damage
.9 Keder Paneled Fabric attachment system, individual bay roof panels

5.4.9 Interior floor

.1 25mm Heavy Duty asphalt paving on
.2 250mm Concrete slab on grade c/w type “black” epoxy coated rebar

5.4.10 Doors

.1 One (1) aluminum sectional overhead doors, 16’-0” x 30’-0”, panels, hardware by Richards-Wilcox or alternate.
.2 Install Heavy duty electric operator and controls by Manaras Model #MSJ or equivalent.

5.5 Brine Maker and Pump

.1 Accubrine by Cargill Canada.
.2 One (1) brine maker controller – Accubrine ATS2 by Cargill.
.3 One (1) brine maker salt hopper – 5 cubic yards capacity, Accubrine ATS2
.4 One (1) Remote Truck Filler – Accubrine RTS by Cargill

5.6 Fuel Station

5.6.1 General Requirements

.1 Above ground fuel storage tanks (AST).
.2 Storage tank submersible pumps.
.3 Dispensing equipment.
.4 Automated fuel management system (FMS).
.5 Concrete pad and island.

5.6.2 Above Ground Fuel Storage Tanks (AST)

.1 Supply and installation of three tank system, one (1) 10,000 litre tank, and one (1) dual tank (split into 20,000 litres and 10,000 litres) above ground double wall 360 vacuum monitored steel storage tank ULC S601. Complete with top coat white enamel, tank supported, slip resistant expanded metal platform and stair treads, 25 litre fill/spill collector, scully golden gallon level gauge, attached dispenser sump, overfill prevention valve, measuring stick and gauge charts, normal and emergency venting.

5.6.3 Dispensing System

.1 Gasboy Model 9853 Electronic Twin Dispenser - Two (2) total - up to 22 GPM for each product to be dispensed with the following features:

- Internal Filter Adapter
- Battery Back Up and Lighted Brand Panel
- Litres Registration
- Pulse output for FMS
- Mechanical Totalizer
- Automatic Temperature Compensation
- Pressure Regulating Valve for AST installation
- 1-1” Hosebun and High Hose Retriever
- 1” and ¾” Hanging Hardware to suit application
- 18’ hose lengths
- Submersible Quantum Red Jacket Pump 1/3 hp, one per Dispenser complete with EBW shear valve

5.6.4 Automated Fuel Management System (FMS)

.1 Provide a total fuel management solution via installation and implementation of a secure accurate, and timely automated fuel management system (FMS). The FMS shall auto-

mate dispensing fuel, provide report data to reorder inventory, automatically reconcile fuel inventories and produce mandated reports.

5.6.5 Concrete Pad and Island

.1 Provide a concrete slab-on-grade for fuelling vehicle parking, capable of supporting vehicle loads plus load of the fuel storage.
.2 150mm high Fuelling Island, for Above Ground Fuel Storage Tanks, Dispensers.

5.7 Greenhouses

5.7.1 Commercial type Curved roof Gutter connected Greenhouse.

.1 Two (2) greenhouses each: 9.0m x 14.3m (27.5’ x 48’) 127m² in area.
.2 Poly covered greenhouse with gutters
.3 Single piece gothic arch roof for optimal condensation control, shedding rain and snow, and ventillation.
.4 Galvanized gutters at a height of 4.5m (15’)
.5 Structure is hot dip galvanized steel posts and trusses.
.6 Mechanically ventillated with temperature control.
.7 Poured concrete slab-on-grade.
.8 Expandable for future growth.
.9 Recommended manufacturers:
- Decloet Greenhouse Manufacturing, Simcoe Ontario
- GGS Structures, Vineland Ontario