Terra-Dynamics inc.
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August 6, 2025

Madan CPA Professional Corporation
c/o Allan Madan, CPA, CA
145 Traders Boulevard East, Unit #20
Mississauga, ON L4Z 3L3

Re: Wetland Water Balance, 7525 Garner Road, Niagara Falls, ON

Dear Mr. Madan,

1.0 Introduction, Background Information and Purpose

Terra-Dynamics Inc. (Terra-Dynamics) (formerly Terra-Dynamics Consulting Inc.) respectfully submits this Wetland Water Balance for residential development of 7525 Garner Road, in the City of Niagara Falls (the Site, Figure 1). The Site is 0.81 hectares and includes approximately 0.11 hectares of the Provincially Significant Thompson Creek Wetland Complex (or 14% of the Site).

This Wetland Water Balance was completed to complement the Site's Environmental Impact Statement (EIS) completed by others. Terra-Dynamics submitted a Terms of Reference to complete the Wetland Water Balance to Niagara Region and the Niagara Peninsula Conservation Authority (NPCA) on April 10th, 2024 (Terra-Dynamics, 2024). Terra-Dynamics received responses on April 16th and 17th from the NPCA and Niagara Region respectively, with both responses outlining no objections to the proposed work program (NPCA, 2024 and Niagara Region, 2024).

The Wetland Water Balance was completed to confirm that the proposed wetland buffer widths will be sufficient to ensure that the hydrologic function of the wetland will not be negatively impacted. The Wetland Water Balance is to inform stormwater management design at the Site in such a manner that post-development conditions do not negatively affect the wetland.

This Wetland Water Balance meets the requirements for a "medium risk "investigation as specified by the TRCA (2017).

2.0 Methodology

Primary tasks completed as part of the Wetland Water Balance included:

A. Submission of a Proposed Wetland Water Balance Terms of Reference (Appendix A) to Niagara Region and NPCA for review and comment.

B. Characterization of the physical setting using published information from government agencies: (i) the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), (ii) the Ministry of Natural Resources and Forestry (MNRF), (iii) the Ministry of the Environment, Conservation and Parks (MECP), (iv) the Niagara Peninsula Conservation Authority (NPCA), (v) Ontario Geological Survey (OGS) and (vi) the City of Niagara Falls;

C. Review of the Lower Welland River Characterization Report (NPCA, 2011);

D. Field investigations which included the installation of a wetland staff gauge in spring 2024 (SG-1, Figure 2) and wetland soil grain-size analysis, and (ii) April 25, 2024, to April 28, 2025, manual measurements and water level datalogger measurements for surface water levels; and

E. Modelling of pre-development monthly water balance conditions through consideration of the following: surface water catchment, land cover, soils, climate normals, precipitation data and wetland hydroperiod in order to inform future site design.

3.0 Physical Setting

The Site is regionally located on the Haldimand Clay Plain (Chapman and Putnam, 1984), a physical feature that "…*prevents significant infiltration to depth*…" (NPCA, 1999). The location of the site is displayed is displayed in Figure 3 below, a cross section from the Geological Association of Canada publication Urban Geology of Canadian Cities by Dr. John Menzies of Brock University (Menzies and Taylor, 1998).

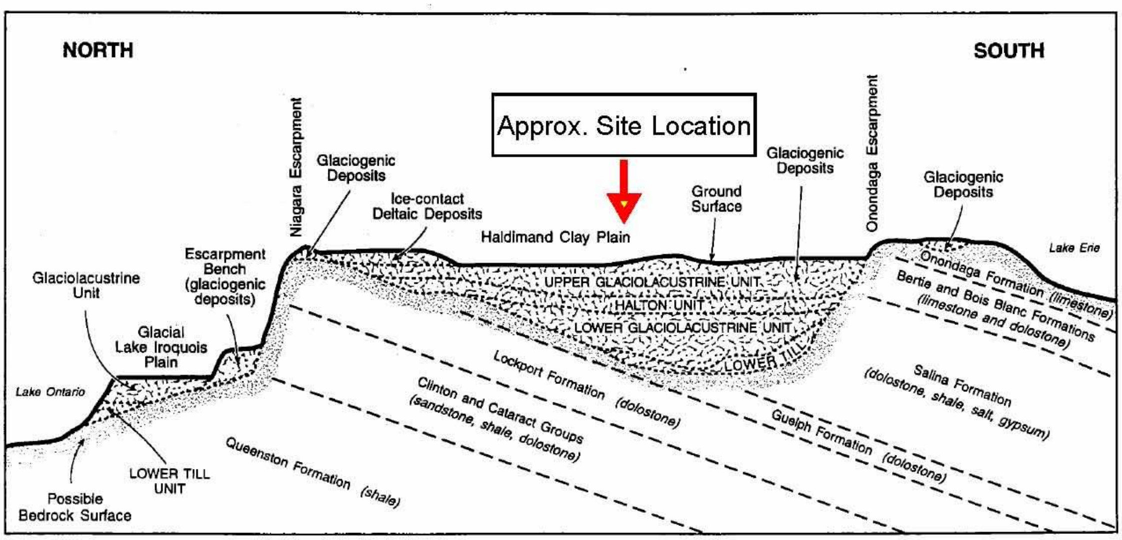

Figure 3 - Schematic Niagara Region Geologic Cross-section (Menzies and Taylor, 1998)

According to aerial photos, the eastern portion of the Site has been residential since at least 1965 (Niagara Navigator, 2024). The site's topography is generally flat, with a maximum slope grade of 2.2% and ground elevations are between 180-181 meters above sea level (m ASL) (Figure 2, Appendix F, MacKay, MacKay & Peters Limited (MMP), 2024). The Site contains two minor topographic highs associated with on-site mounds. The Site is generally the highest in the middle of the site and slopes to the east towards the ditch at Garner Rd, to the south to a drainage ditch along the property boundary, and in the western portion towards the wetland (Figure 4, NPCA, 2017, Appendix F MMP Site Survey)

3.1 Surface Water

3.1.1 Watershed and Catchments

The Site is located within the Lower Thompson Creek (LWR_TSC_W100) Subwatershed Area (NPCA and AquaResource Inc., 2009, Figure 1) and is less than 0.2% of the subwatershed. The implied overland runoff catchment for the wetland to the west was delineated on-site (Figure 4) and is described in Section 3.6.5 below.

3.1.2 Watercourses

There are no mapped watercourses on-site, however, there is a roadside ditch mapped along Garner Road and runs along the eastern boundary of the property (Figure 2, NPCA, 2017). A drainage ditch was also noted in the field along the southern boundary during an April 10, 2024, site visit and surveyed by MMP as flowing towards the storm water drain at Garner Rd (Figure 2, Appendix F, MMP Site Survey).

NPCA (2017) historically mapped an ephemeral watercourse within the wetland polygon 76 metres west of the Site, which extended north of the wetland polygon but now would begin at the northern extent of the wetland (Figure 2).

3.2 Soils

The OMAFRA mapped soils for the Site, including the on-site portion of the Provincially Significant Wetland (PSW), are mapped as a combination of Niagara-Loamy Phase and Welland soils (Figure 5) (Appendix C). Soil details include the following (Kingston and Presant, 1989):

i. Niagara- Loamy Phase – Imperfectly drained and moderate to slow permeability. These soils have high to moderate water-holding capacity and surface water runoff ranges from slow to high based on topography (Hydrological Soil Group (HSG) D, Table 1). These soils are often found as an inclusion within Welland Soils.
ii. Welland- Poorly drained and relatively impermeable except in the summer when surface cracking increases. These soils have slow to moderate surface water runoff and a relatively high water-holding capacity (Hydrological Soil Group (HSG) D, Table 1).

A soil-sample was collected from the C Horizon (65 to 75 cm below ground surface) within the PSW at hand-auger location HA-1 adjacent SG-1 (Figure 2), suggesting a HSG of C/D (Table 2, Appendix C) as HSG C soils typically have between 20 and 40 percent clay and less than 50 percent sand, and HSG D typically >40% Clay (USDA, 2007).

Table 1 - Hydrologic Soil Groups (USDA, 1986)

HSG Group	Soil description
A	sand, loamy sand or sandy loam
B	silt loam or loam
C	sandy clay loam
D	clay loam, silty clay loam, sandy clay, silty clay or clay

Table 2 – Horizon C Grain-size Analyses Summary

Soil Name/Location	Gravel%	Sand%	Silt%	Clay%	Texture[1]
Niagara- Loamy Phase Soil[2]	0	3	37	60	Silty Clay
Welland Soil[2]	0	3	31	66	Silty Clay
HA-1	0	14	47	39	Silty Clay

Note: [1] - Texture as per Fetter (1994), [2] - Kingston and Presant, 1989

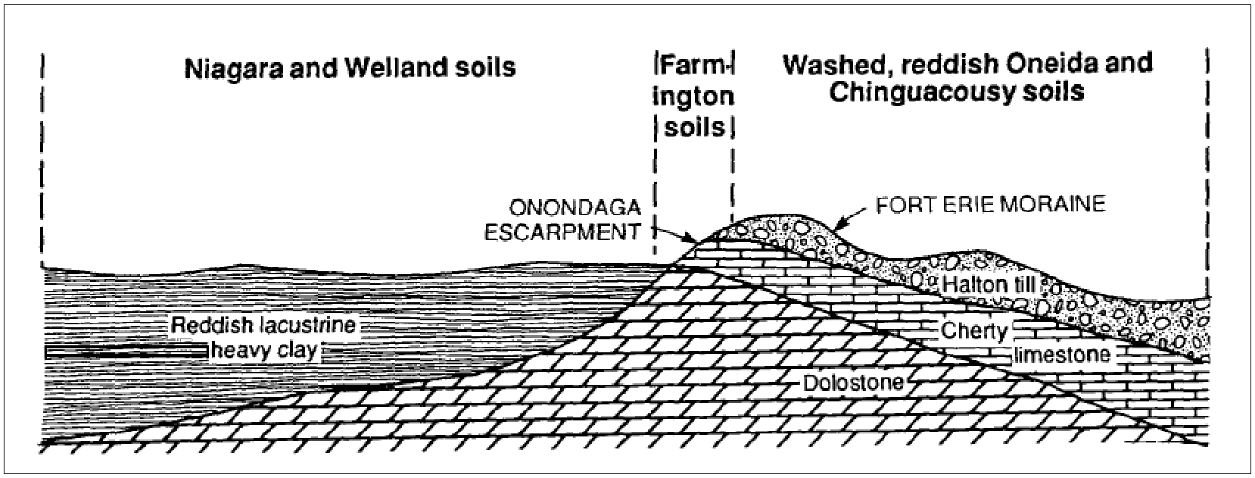

Figure 5 – Schematic landscape cross-section showing the Niagara and Welland soils (Kingston and Presant, 1989)

3.3 Surficial Geology

The Site is covered by a layer of low permeability soils (clayey silt to silty clay) (Feenstra, 1984).

The thickness of the overburden, which is primarily clay, was regionally mapped as on average 13 m across the Site (NPSPA, 2013). The extensiveness of the clay beneath the Site has been visualized in a northwest-southeast geological cross-section (Figure 6). This geological cross-section includes nearby water well records and geotechnical boreholes.

3.4 Bedrock

The Site is underlain by Guelph Formation dolostone (NPSPA, 2013).

3.5 Hydrogeologic Setting

The Site is located on the Haldimand Clay Plain, a regional aquitard (Gartner Lee Limited, 1987), consisting of a series of low permeability units including the Upper Whittlesey and Halton Aquitards (Burt, 2020). An aquitard is "*a low-permeability geologic unit that can store groundwater, but that transmits groundwater slowly*" (Niagara Peninsula Source Protection Authority, 2013).

3.5.1 Overburden Aquitard

The hydraulic conductivity of the overburden aquitard has been reported as $7x10^{-7}$ m/s, or less (GLL, 1987). The overburden geometric mean hydraulic conductivity was calculated as $1x10^{-8}$ m/s using the laboratory grain size analyses and the Excel-tool HydrogeoSieveXL (Devlin, 2015) for the wetland soils at HA-1 (Appendix C). Based on the site-specific Hydrogeological Cross Section A-A' (Figure 6), it is estimated that overburden is approximately 13 m, matching regional mapping by NPCA. The Site meets the MECP low permeability criterion for isolation of the underlying bedrock aquifer from at-surface activities as the overburden is greater than 10 m and has a hydraulic conductivity less than 10^{-7} m/s (MECP, 2008).

The limited groundwater flow in the overburden, being an aquitard, is expected to follow topography (Haitjema and Mitchell-Bruker, 2005) because the groundwater velocity is limited by the low hydraulic conductivity. Consequently, the on-site surface water flow divides are expected to also apply to shallow overburden groundwater flow.

Infiltration at the Site has been previously modelled as fairly low at less than 84 mm/year (NPCA,2009). This value is reasonable compared to published ranges for a silty clay aquitard (MECP, 1995).

3.5.2 Bedrock

The site is underlain by the Guelph formation dolostone. Regional groundwater flow mapping completed for NPCA (WHI, 2005) suggests bedrock potentiometric groundwater flow may be from about northeast to southwest across the Site, and on average from 172 to 173 m ASL. The vertical gradient is downwards between the shallow groundwater system to the contact zone aquifer (WHI, 2005). The contact-zone aquifer is described by Singer et al (2003), as '*aquifers at the bedrock surface consisting of granular sediments and fractured bedrock overlain by clay*' (NPCA and AquaResource Inc., 2010).

3.6 Wetlands

The Thompson Creek Wetland Complex PSW has a total area of 129.74 ha. There is a single wetland polygon of the PSW that is adjacent to, and partially on-site, and has an area of 8.52 ha (MNRF, 2009). Of the 8.52 ha wetland polygon, there is approximately 0.11 ha (or 1.3%) located on-site (Figure 2) (MMP, 2024) (Colville Consulting Inc., 2025). MNRF historically classified this wetland polygon as palustrine swamp, underlain by clay/loam, with a dominant species of silver maple. Palustrine wetlands are defined as having intermittent or no inflow, and either permanent or intermittent outflow (MNRF, 2014). Ecological Land Classification (ELC) mapping was completed for the wetland by Colville Consulting Inc. (2025) and classified the wetland vegetation as Red Maple Mineral Deciduous Swamp (SWD3-1). The ground surface elevation of the PSW swamp at the western portion of the site is generally at or below 180.45 m ASL (Figure 2). The wetland buffer is proposed to be a minimum of 20 m as marked by Colville Consulting Inc. and surveyed by MMP (MMP, 2024, Appendix F).

During Site visits by Terra-Dynamics staff, it was noted that along the eastern boundary of the wetland there was small slope or berm along the wetland boundary. The berm does not allow for an outflow of the wetland to the rest of the Site, and approximately denotes the edge of the woodlot limit as surveyed by MMP (2024).

3.6.1 Wetland Water Level Monitoring

A wetland staff gauge was installed within the PSW, within the Site boundary, and equipped with a water level pressure transducer datalogger measuring on 15-minute intervals and compensated using an on-site barometric datalogger. The compensated water level data is presented in Appendix B. Water level measurements were completed for one-year at SG-1 (Figure 2) from April 25th, 2024, until April 28th, 2025. Manual compensation measurements were also made during the four site visits to confirm data accuracy. Surface water levels collected at SG-1 from April 25th, 2024, to April 28th, 2025, are considered to be representative of background conditions during a period of generally above-average precipitation from early spring to mid summer of 2024 and generally below average from late summer 2024 to early spring 2025. Precipitation in April, May, June, July and December of 2024 and was 127%, 98%, 173%, 106%, and 95% at the Environment and Climate Change Canada's Welland-Pelham station (2025a) when compared to the 1991-2020 Climate normals (2025b) (Table 3). Precipitation in August, September, October, and November of 2024, and January, February, March and April of 2025 was 84%, 29%, 44%, 69%, 58%, 74%, 63% and 85% at the Environment and Climate Change Canada's Welland-Pelham station (2025a) when compared to the 1991-2020 Climate normal (2025b) (Table 3).

At SG-1, surface water levels began to decline shortly after the installation of the datalogger on April 25, 2024, with no sustained surface water (i.e. saturated soil conditions), present after May 10, 2024, until late February 2025. From May 10, 2024, until late February 2025, surface water levels only increased coinciding with precipitation events or snow melt events and then subsequently declined, provided no additional precipitation or melt occurred. For example, on June 29, 2024, a 28 mm precipitation event sustained ponded conditions for five days (Appendix B). As historical daily evaporation rates are estimated to be about 5 mm a day in June, this is in line with the observations made on-site (Schroeter & Associates, 2007) as well as an estimated 9 mm for the initial water abstraction (Section 3.7.1).

Surface water levels in the PSW swamp were sporadic as result of their dependence upon precipitation throughout the early portion of 2024 and displayed sustained conditions only after late February 2025, however, water level depths were less than 0.16 m throughout the one year monitoring period (Appendix B).

3.6.2 Wetland Hydroperiods

A hydroperiod is defined as "*the seasonal pattern of the water level of a wetland…It characterizes each type of wetland, and the constancy of its pattern from year to year ensures a reasonable stability for that wetland. It defines the rise and fall of a wetland's surface and subsurface water by integrating all of the inflows and outflows"* (Mitsch and Gosselink, 2007).

Mitsch and Gosselink (2007) report that the "hydroperiods of many bottomland hardwood forests and swamps have distinct periods of surface flooding in the winter and early spring due to snow and ice conditions followed by spring floods but otherwise have a water table that can be a meter or more below the surface" (Figure 7). This characterization is considered reasonable for the PSW swamp in comparing the surface water level monitoring at SG-1 (Appendix B) to a published hydroperiod for a Canadian swamp given the precipitations conditions mentioned on Section 3.6.1 (Figure 7). The small area of the PSW on-site receives water from precipitation and potentially runoff via the adjacent catchment area if rainfall was sufficiently greater than the initial abstraction (e.g. 9 to 20 mm, Section 3.7.1).

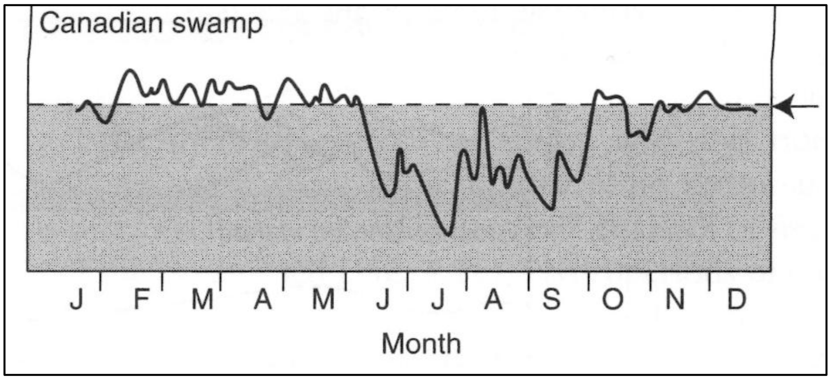

Figure 7 – Canadian Swamp Hydroperiod (Mitsch and Gosselink, 2007)
Note: arrow indicates wetland ground surface

3.6.3 Wetland Characterization

The small portion of the swamp PSW that is within the western boundary of the property can be classified as a surface water depression wetland (Figure 8) (Mitsch and Gosselink, 2007).

A surface water depression wetland is summarized as a: "*wetland…dominated by surface runoff and precipitation, with little groundwater outflow due to a layer or low-permeability soils*…". Low permeability soils have been noted beneath the Site (Section 3.5.1) and the wetland reasonably fit this description.

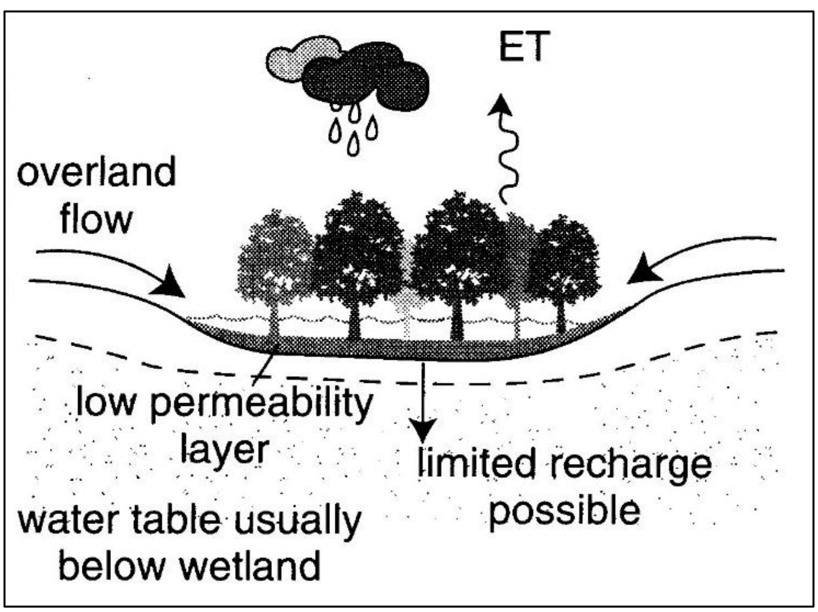

Figure 8 - Surface water depression and surface water slope wetlands (Mitsch and Gosselink, 2007)

3.6.4 Soil Water Holding Capacity

The swamp wetland can be assigned a soil water holding capacity (SWHC) of between 350 (HSG D) or 400 (HSG C) mm based upon a dual soil classification of Hydrologic Soil Group (HSG) D/C (Section 3.2) (AquaResource Inc. and NPCA, 2009).

3.6.5 Wetland Surface Water Catchments

Analysis of the Site topographic survey was used to complete a terrain analysis. The terrain analysis concluded that the upgradient catchment for the on-site PSW is 0.24 ha, with a downgradient receiving catchment of 0.25 ha within the PSW (Figure 4). The modelled overland surface water flow catchment does not mean surface water flows to the wetland regularly, given the little to no slope, but that if there was a sufficient rainfall event to overcome the initial abstraction, surface water could potentially flow towards the wetland.

3.7 Pre-development Subwatershed Water Balance Modelling

NPCA previously completed pre-development water balance modelling for 1991-2005, as part of provincial water budgeting for the source water protection program (AquaResource Inc. and NPCA, 2009). This modelling was completed at 1-hour time steps with a filled-in meteorological dataset including solar radiation and a crop coefficient for improved calculation of evapotranspiration. The modelling used lumped parameter catchments incorporating data such as soils, land cover and slope.

Modelled annual and monthly water balance results were obtained for Catchment LWR_TSC_W100 (Tables 4 and 5), respectively, without decimal places (AquaResource Inc. and NPCA, 2009). Lumped parameter model inputs for this catchment included a basin slope of 2.3%, percent impervious of 5.2%, and a Soil Conservation Service (SCS) Curve Number (CN) of 82. These catchment values reasonably correspond with on-site conditions (e.g. slope and CN). The annual surplus as shown on Table 4 is precipitation minus evapotranspiration, i.e. the water available for runoff and recharge.

Table 4 - Water Balance 15-year (1991-2005) Averages

Catchment	Precipitation	Actual Evapotranspiration	Annual Surplus	Infiltration*	Recharge	Runoff
	(mm/year)					
LWR_TSC_W100	881	572	309	78	39	229

Notes: * - Infiltration is interflow plus recharge

Table 5 - Monthly Runoff (Catchment LWR_TSC_W100)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Runoff (mm)	27	24	43	41	25	9	5	3	5	7	20	22

3.7.1 Initial Abstraction for the Site

The previously calculated Curve Number (CN) values for Site are (a) 85 for most of Site and (b) 72 for wetland area (AquaResource Inc. and NPCA, 2009). Based upon CN numbers of 85 and 72, assuming antecedent moisture condition (AMC) II, the initial basin abstraction values would be 9 and 20 mm using the Soil Conservation Service (SCS) curve number (CN) procedure for the Site and the Wetland area, respectively. This is based upon equation 1 (AquaResource Inc. and NPCA, 2009):

$$I=0.2*((25400/[CN])-254) \qquad \text{[Equation 1]}$$

where I=initial abstraction (mm) and CN=Sub-basin curve number.

> *Abstraction: that part of precipitation that does not become direct runoff (e.g. interception, evaporation, transpiration, depression storage, infiltration)* (AGI, 1974)
>
> *Rainfall abstraction refers to the component of rainfall that does not contribute to surface runoff; it usually comprises interception, depression storage and infiltration…In some applications, infiltration and depression storage are not explicitly computed but are lumped, as for example in the SCS* (Soil Conservation Service) *curve number method* (Watt, 1989)

Given that the SCS CN procedure lumps infiltration and depression storage (Watt, 1989), depression storage should also be defined, it is:

> "*water that is temporarily ponded in surface depressions and gradually depleted by evaporation or infiltration"* (Watt, 1989)

Amounts of depression storage that can occur in agricultural watersheds, expressed as an equivalent depth, are shown in Table 6. From a review of site conditions, it appears appropriate the Site best qualifies as "fair" in field surface drainage quality based current pre-development conditions. The calculation of an initial abstraction of between 9 mm before runoff occurring at the Site appears reasonable.

Table 6 - General guidelines for estimating field surface depressional storage (Watt, 1989)

Field Surface Drainage Quality	**Field Description**	**Depressional Storage (mm)**
Good	Surface relatively smooth and on grade so that water does not remain ponded in field after heavy rainfall. No potholes, adequate outlets.	1-5
Fair	Some shallow depressions; water remains in few shallow pools after heavy rainfall. Micro-storage caused by disking or cultivation may cause surface drainage to be only fair even when field surface is on grade.	6-15
Poor	Many depressions or potholes of varying depth. Widespread ponding of water after heavy rainfall, or inadequate surface outlets such as berms around field ditches.	16-25 or greater

4.0 Wetland Water Balance Assessment

A monthly wetland water balance assessment was completed for the wetland located on-site along the western boundary and adjacent to the Site, as informed by the Conservation Authority Guidelines for Development Applications (2013) and TRCA's guidance for water balances (2012).

It is noted that the MECP (2003) water balance approach is typically concerned with the evaluation of post-development to prevent (i) increased runoff, and/or (ii) reduction in groundwater recharge. However, given the current wetland characterization, any on-site water surplus contribution, with respect to the wetlands, is via additional surface water flow, not groundwater. Consequently, the purpose of the wetland water balance assessment is to evaluate if runoff maintains monthly saturated conditions in the wetlands, primarily during the spring to fall period.

4.1 Monthly Water Balance Example

An example of water balance modelling from the University of Waterloo is shown below (Figure 9). Annual groundwater recharge begins in the fall following '*soil water utilization*' and '*deficit*' in the summer. Soil water utilization corresponds with evapotranspiration exceeding the precipitation supply. Annual groundwater recharge occurs during the same time period that groundwater levels rise. However, in this example it is noted that the soil water holding capacity (SWHC) modelled was only 100 mm compared to the higher SWHC 400/350 mm for the swamp wetland (Section 3.6.4).

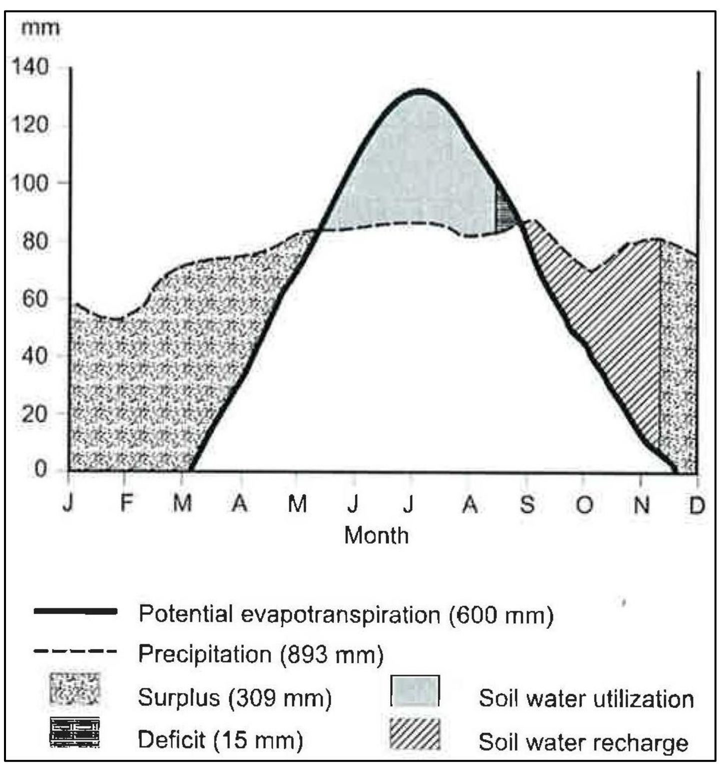

Figure 9 – Brantford Average Water Balance (Sanderson, 2004)

4.2 Wetland Monthly Water Balance

A monthly water balance for the wetland was completed using the U.S. Geological Survey (USGS) Monthly Water Balance Model (McCabe and Markstrom, 2007), which only considers direct precipitation to the wetland as a water supply. For temperature and precipitation, climate normal inputs (1991-2020) from Welland-Pelham Station ID 6139445 were used (Environment and Climate Change Canada, 2025a) as well as a review of 2024-2025 climate data from the Welland-Pelham Station ID 6139449 (Environment and Climate Change Canada, 2025b). The monthly wetland water balance modelling results (Tables 7a/7b) are summarized below in Table 8 for the average conditions (without decimal places):

1. On average potential evapotranspiration exceeded precipitation for June, July and August, i.e. soil water utilization occurred.

2. On average soil water holding capacities are less than saturated, i.e. less than 400 mm and 350 mm, for the months of June to October.

3. Soil water recharge occurred would be expected to occur in September and October during average precipitation conditions.

Table 8 – Average Monthly Wetland Water Balance (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Precipitation (mm)	82	53	70	83	81	86	84	79	96	89	84	82
Evapotranspiration (mm)	10	11	21	39	73	107	121	96	62	33	17	11
Soil Moisture (mm)	400	400	400	400	400	**374**	**333**	**311**	**341**	**392**	400	400
Soil Water [1] Deficit (mm)						**26**	**67**	**89**	**59**	**8**		

Notes: [1] Difference between the SWHC (400 mm) and the modelled soil moisture

Table 8 only displays a SWHC of 400 mm, however within Table 7a, a SWHC of 350mm is also presented. A SWHC of 350mm or 400mm showed similar overall conditions.

The monthly April 2025 to October 2025 modelling (Tables 7c/7d) reasonably matches to the surface water levels at SG-1 given above average precipitation in June and July 2024 and below average from August 2024 until April 2025 (Appendix B) (Table 3). The monthly wetland water balance modelling only included precipitation as a source of supply.

4.3 Wetland Water Balance Assessment

As introduced in Section 4.0, "*the purpose of the wetland water balance assessment …is to evaluate if runoff maintains monthly saturated conditions at the wetlands*". Assessment of this condition is a concern only on average, for the months of June through October when the monthly wetland water balance indicates less than saturated conditions may occur because direct precipitation alone was relied upon to maintain average saturated conditions.

The pre-development wetland water balance assessment includes a calculation of June to October monthly runoff areas required for the wetland to have saturated conditions (Table 9).

4.3.1 PSW Swamp

It was modelled that under pre-development conditions, upgradient on-site runoff (Figure 4) would not be expected on average to sustain saturated conditions during the June to October months at the PSW Swamp (Table 9). This is based upon an insufficient pre-development drainage area to sustain saturated conditions, as the pre-development upgradient drainage area to the wetland was modelled as 0.24 ha (Table 9, Figure 4).

Table 9 – Modelled Runoff to PSW Swamp

Month	Jun	Jul	Aug	Sep	Oct
Soil Water [1] Deficit (mm) [see Table 8]	25.7	67.1	88.8	59.4	8.5
Wetland Soil Water Depletion Volume[2] (m^3)	64.3	167.8	222.0	148.5	21.3
Modelled Runoff (mm) [see Table 5]	9.0	5.0	3.0	5.0	7.0
Pre-Development Runoff Supply (m^3)	21.6	12.0	7.2	12.0	16.8
Upgradient area [3] required to produce saturated wetland – Drainage Area (ha)	**0.71**	**3.36**	**7.40**	**2.97**	**0.30**

Notes: [1] Difference between the SWHC (400 mm) and the modelled soil moisture
[2] Deficit depth multiplied by the area of PSW Swamp receiving runoff (0.25 ha)
[3] Volume of soil water deficit (m^3) divided by monthly modelled runoff (mm) converted to hectares – bolded values indicate upgradient drainage area sufficient for saturated conditions

The Site Plan (Jansen Consulting, 2025) (Appendix F) includes development within approximately 26% (or 0.061 ha) of the PSW runoff catchment, while maintaining a 20 m buffer from the wetland. It is modelled that pre-development runoff is insufficient to maintain saturated conditions during June to October on average (Table 9). Consequently, no additional buffer area is required. However, if desired, the addition of clean roof runoff may provide additional supply during periods of below average precipitation if deemed suitable for the vegetation by Colville Consulting Inc.

4.4 Wetland Risk Evaluation

4.4.1 Magnitude of Hydrological Change

TRCA's wetland risk evaluation (2017) decision tree (Figure 10) includes four key hydrological change criteria:

1) Impervious cover in catchment;
2) Change in catchment size;
3) Dewatering; and
4) Impact to recharge areas.

(1) The change in area of on-site impervious cover for the proposed development within the existing wetland catchment is 26% assuming that the proposed parking lot is 100% impervious.

(2) The post-development surface water catchment for the wetland is calculated to be changed 26%, as the pre-development catchment is 0.24 ha, and the change in area (not including runoff from residential lots) is 0.061 ha. This includes the proposed 20 m buffer from the wetland.

(3) Construction dewatering is not expected to affect wetlands due to the low permeability of the soils on-site (Section 3.5.1). The aquitard underlying the Site is of sufficiently low permeability that overburden dewatering is likely not feasible and/or necessary (Preene, 2020).

(4) No impacts to wetland recharge areas are predicted as TRCA (2017) defines this as "*replacement of existing soils with significantly less permeable materials*" and the on-site soils are already of low permeability. In addition, there are no locally significant recharge areas to be impacted as these are defined by TRCA (2017) as "*highly porous sedimentary deposits or otherwise having high hydraulic conductivity*".

"*The highest magnitude category with one or more criteria satisfied determines the potential magnitude of change*" with the magnitude thresholds of less than 10% change as low, 10-25% medium and greater than 25% high (TRCA, 2017). Consequently, a medium hydrologic risk is assigned to the 0.11 ha wetland, however as discussed in Section 4.3, negative hydrologic impacts are not predicted as the Site drainage is not modelled to sustain saturated conditions at the wetland on average between June to October.

4.4.2 Sensitivity of the Wetlands

The risk assignment (Figure 10) is to consider the type of wetlands and their hydrological sensitivity (TRCA, 2017). MNRF (2009) identified the PSW swamp as Red Maple Mineral Deciduous Swamp SWD3-1 which is reported to have medium hydrological sensitivity (TRCA, 2017) (Colville Consulting, 2025).

4.4.3 Risk Assignment

As per Figure 10, a medium risk is assigned based upon (i) a medium magnitude of hydrological change, and (ii) a medium wetland sensitivity. The TRCA recommended study, modelling and mitigation requirements are:

(i) Monitoring as required as outlined in the Wetland Water Balance Protocol (TRCA, 2016).
- Pre-development monitoring took place from April 18, 2024, until April 28, 2025, to inform the conceptual model and impact assessment for the Site.

(ii) Approved continuous hydrogeological model is required with output at daily aggregated to weekly resolution
- Existing modelling (completed at 1-hour time steps) completed by NPCA was utilized for this report (AquaResource Inc. and NPCA, 2009) as part of a monthly analysis.

(iii) Design of a mitigation plan to maintain the wetland water balance.
- The Wetland Water Balance Assessment has identified no need for additional mitigation given the Site does not on average sustain saturated conditions at the wetland during June to October.

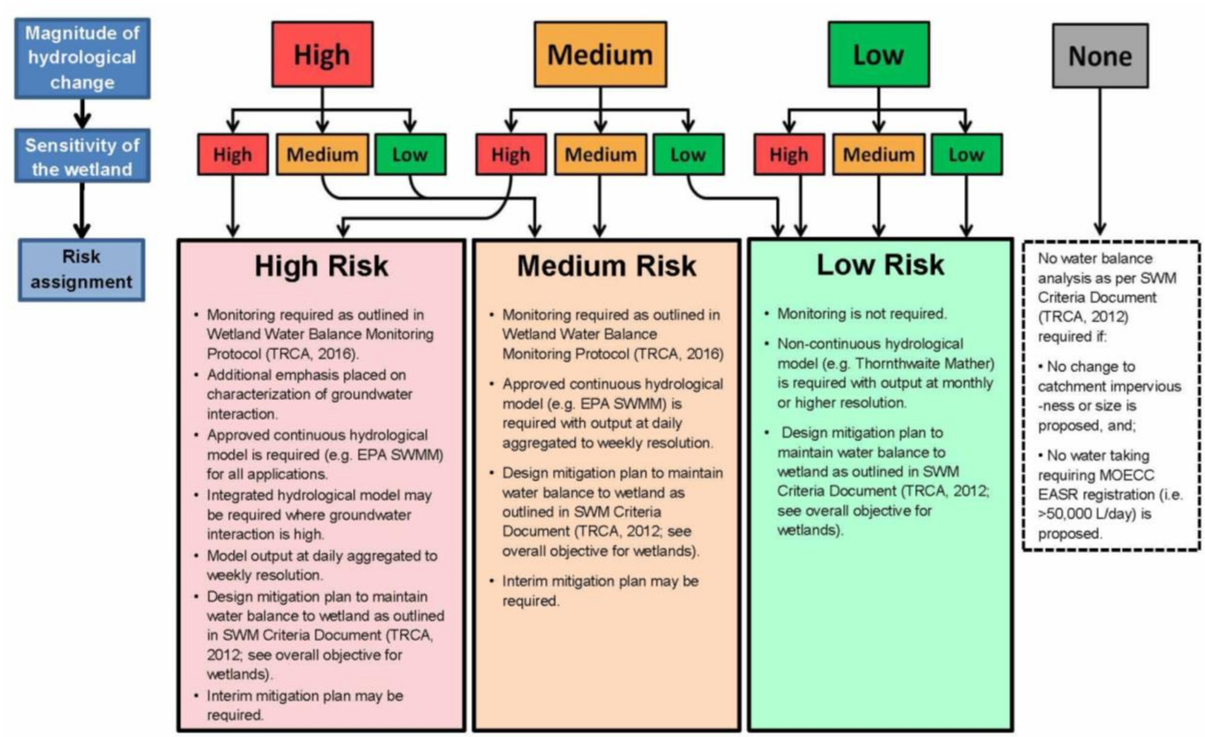

Figure 10 - Wetland Risk Evaluation Decision Tree (TRCA, 2017)

5.0 Conclusions and Recommendations

The following conclusions are provided:

1. The Site is 0.81 hectares and within the Site the MNRF have mapped Provincial Significant Wetland (PSW) swamp associated with Thompson Creek Wetland Complex.

2. The Site is located on the Haldimand Clay Plain, a regional aquitard of silty clay/clayey silt soils.

3. The MNRF mapped wetlands are on low permeability silty clay, consisting of surface water depression wetlands.

4. Surface water conditions at the PSW swamp were monitored from April 18, 2024, until April 28, 2025.

5. A monthly water balance of average wetland conditions (before considering potential runoff to the wetland) identified potential evapotranspiration as exceeding precipitation for June, July and August, with soil water holding capacities less than saturated also in September and October.

6. Pre-development average monthly surface water balance modelling for the PSW swamp indicates upgradient lands do not sustain saturated conditions during June, July, August, September and October.

7. The TRCA wetland risk screening tool assigned a medium risk to the wetland, based upon the potential for a medium magnitude of hydrological change and medium wetland sensitivity.

8. Residential development of the Site should not negatively impact the hydrology of the wetland with implementation of the proposed 20 m buffer.

We trust this information is sufficient for your present needs. Please do not hesitate to contact us if you have any questions.

Yours truly,

TERRA-DYNAMICS INC.

PROFESSIONAL GEOSCIENTIST
BRIAR MACINTYRE
PRACTISING MEMBER
3716
ONTARIO

Briar MacIntyre, B.Sc., P.Geo.
Environmental Geologist

Jayme D. Campbell, P.Eng.
Senior Water Resource Engineer

cc: Ethan Cleugh, GSP Group
Nancy Frieday, GSP Group
Scott Nelson, S. Llewellyn and Associated Limited
Ian Barrett, Colville Consulting Inc.
Brett Espensen, Colville Consulting Inc.

<u>Attachments</u>
Figure 1 – Location of Subject Lands
Figure 2 – Site Setting
Figure 4 – Wetland Catchment
Figure 6 – Hydrogeologic Cross-Section A-A’
Table 3- Welland-Pelham Precipitation Analyses
Tables 7a/7b/7c/7d – Swamp 350/400 mm USGS Monthly Wetland Water Balances
Appendix A – Terms of Reference
Appendix B – Data Logger Water Level Monitoring
Appendix C – Soil Information and Analyses
Appendix D – Hydrogeological Cross Section Water Well and Geotechnical Logs
Appendix E – Wetland Photographs
Appendix F – Supporting Information

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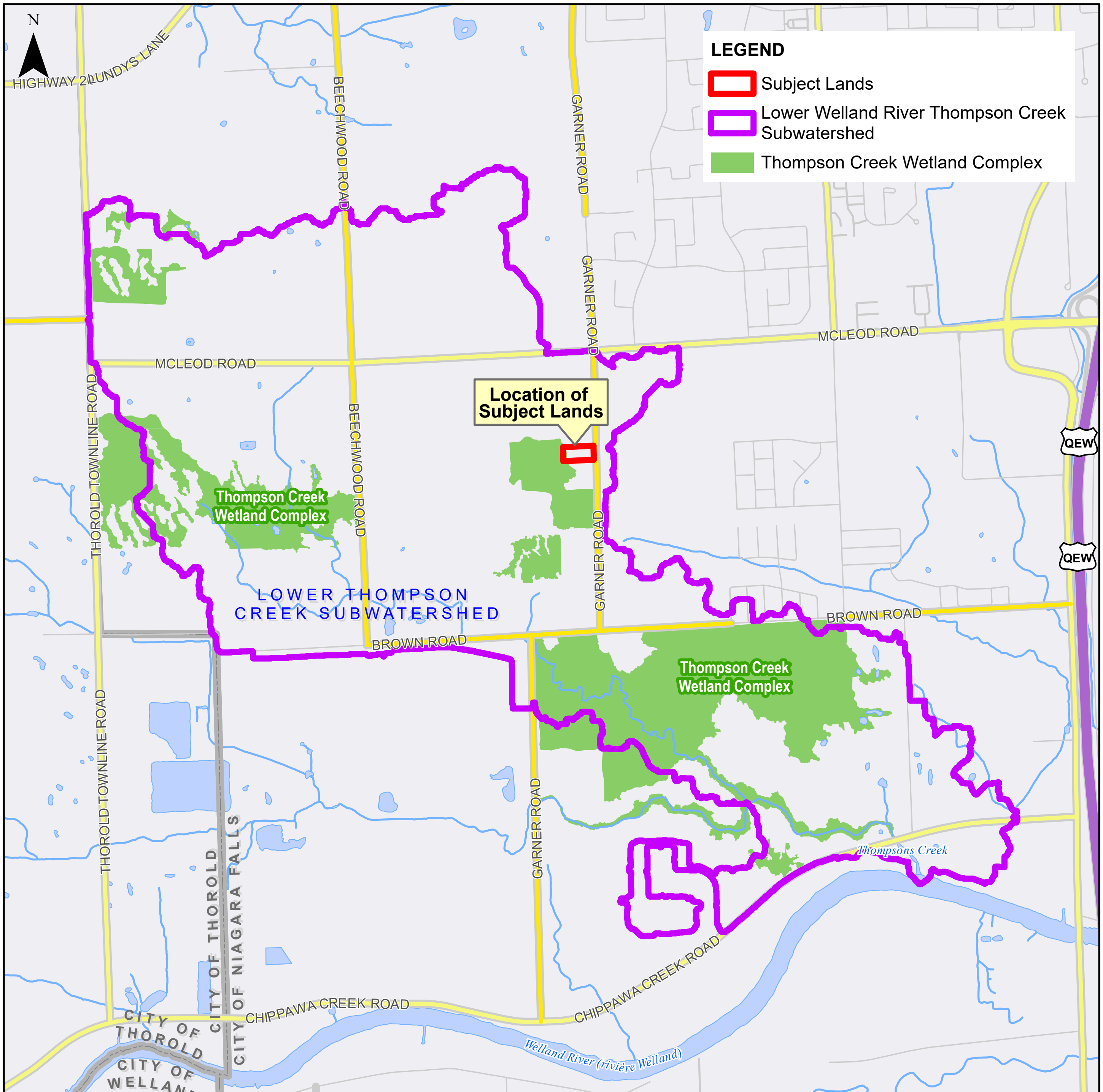
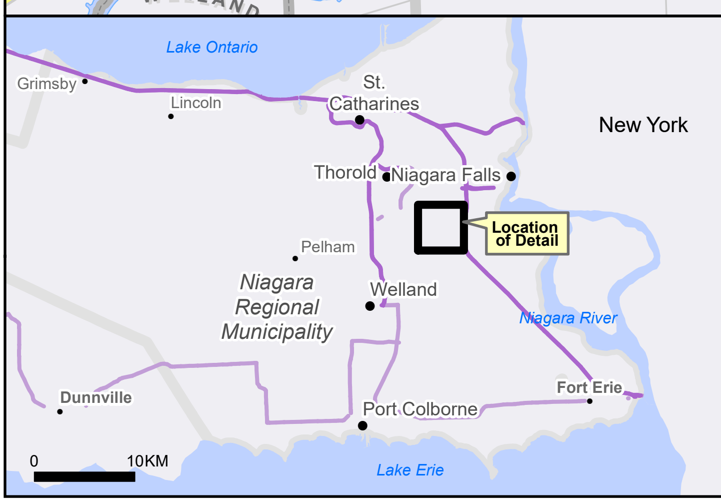




Location of Subject Lands

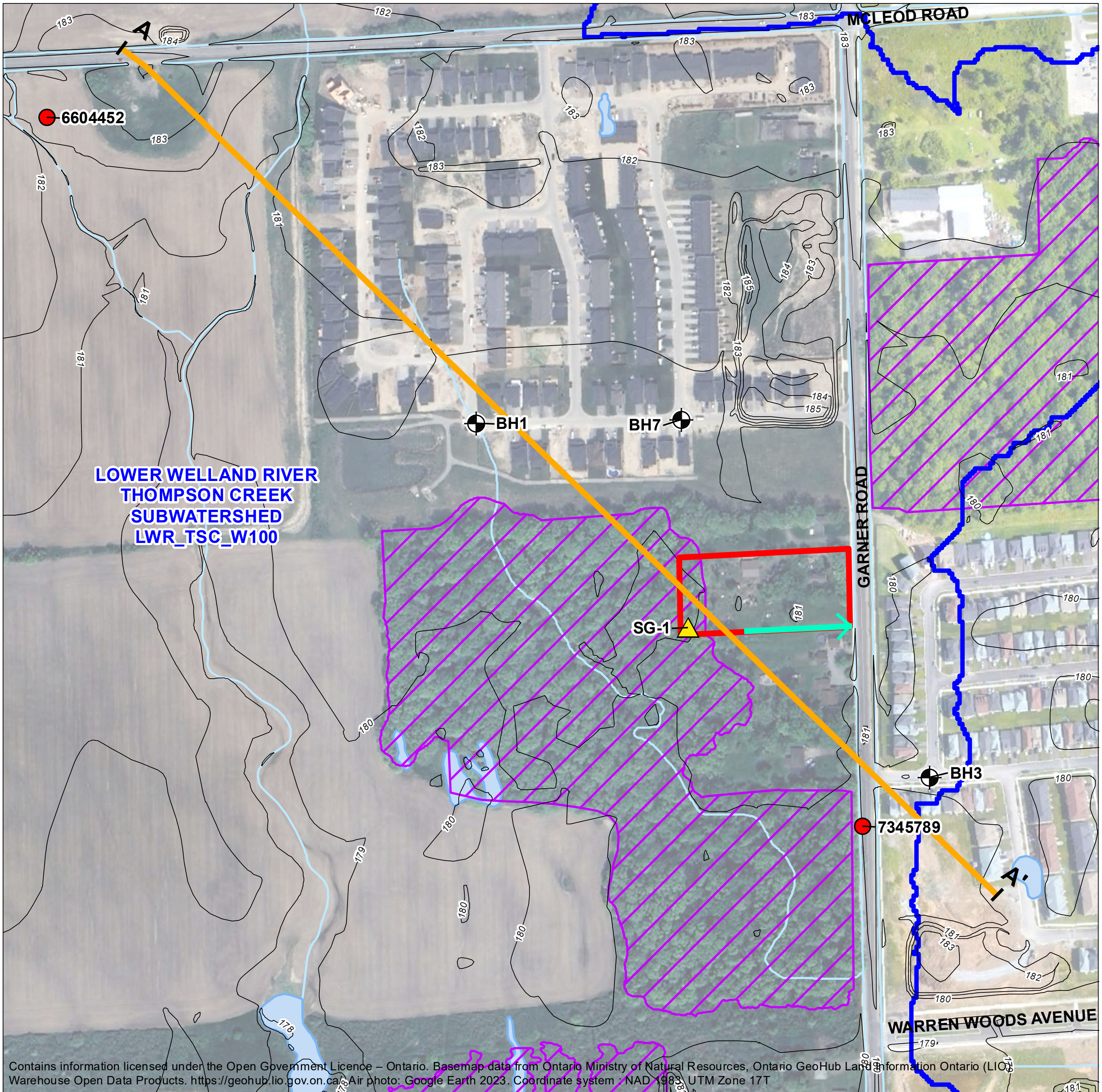
Wetland Water Balance
Madan CPA Professional Corporation
7525 Garner Road, Niagara Falls, ON

Terra-Dynamics inc.

0 0.5 KM
1:25,000

Figure 1

Path: H:\TERRA_DYNAMICS\9758 - TD 7525 Garner Rd\gis\mxd\Figure 1 Location of Subject Lands.mxd Revised: July 25, 2025



Legend

- Subject Lands
- Lower Welland River Thompson Creek Subwatershed
- Thompson Creek Wetland Complex (Colville Consulting, 2025)
- Location of Cross-section
- Waterbody (NPCA, 2017)
- Surveyed Swale and Flow Direction (MMP, 2024)
- Watercourse, Ephemeral (NPCA, 2017)
- Ground Surface Contour (NPCA)
- Water Well (MECP)
- Geotech Record (City of Niagara Falls 2020)
- Staff Gauge

Site Setting

Wetland Water Balance
Madan CPA Professional Corporation
7525 Garner Road, Niagara Falls, ON

Terra-Dynamics inc.

0 100 Meters
1:4,500

N

Figure 2

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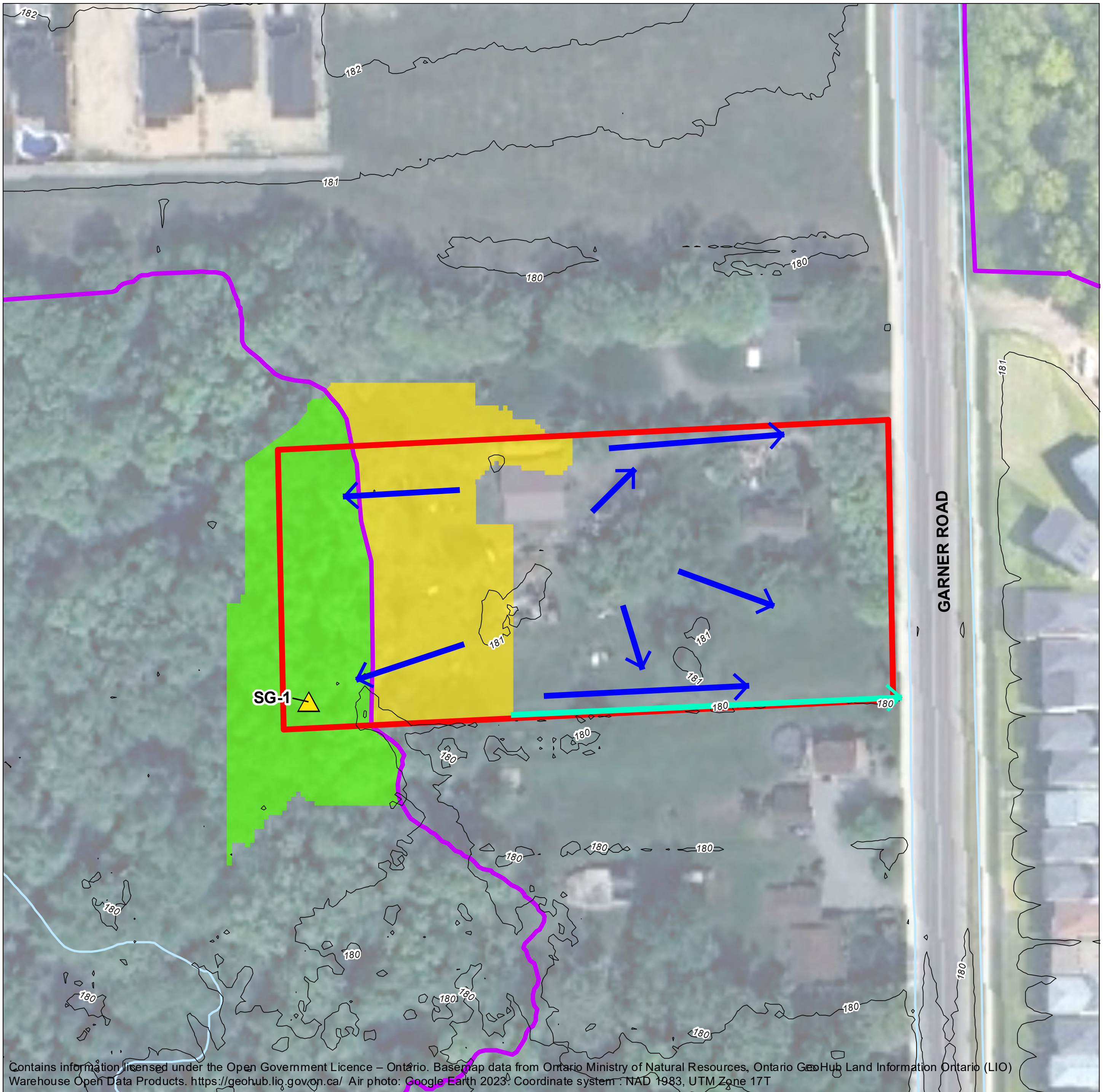

Legend

- Subject Lands
- Thompson Creek Wetland Complex (Colville Consulting, 2025)
- Waterbody (NPCA)
- Watercourse, Ephemeral (NPCA, 2017)
- Topographic Contour (1m) (MMP, 2024)
- Broad Overland Flow Direction
- Surveyed Swale and Flow Direction (MMP, 2024)
- Upgradient Catchment (0.24 ha)
- Downgradient Catchment (0.25 ha)
- Staff Gauge

Wetland Catchment

Wetland Water Balance
Madan CPA Professional Corporation
7525 Garner Road, Niagara Falls, ON

Terra-Dynamics inc.

0 25 Meters
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Figure 4

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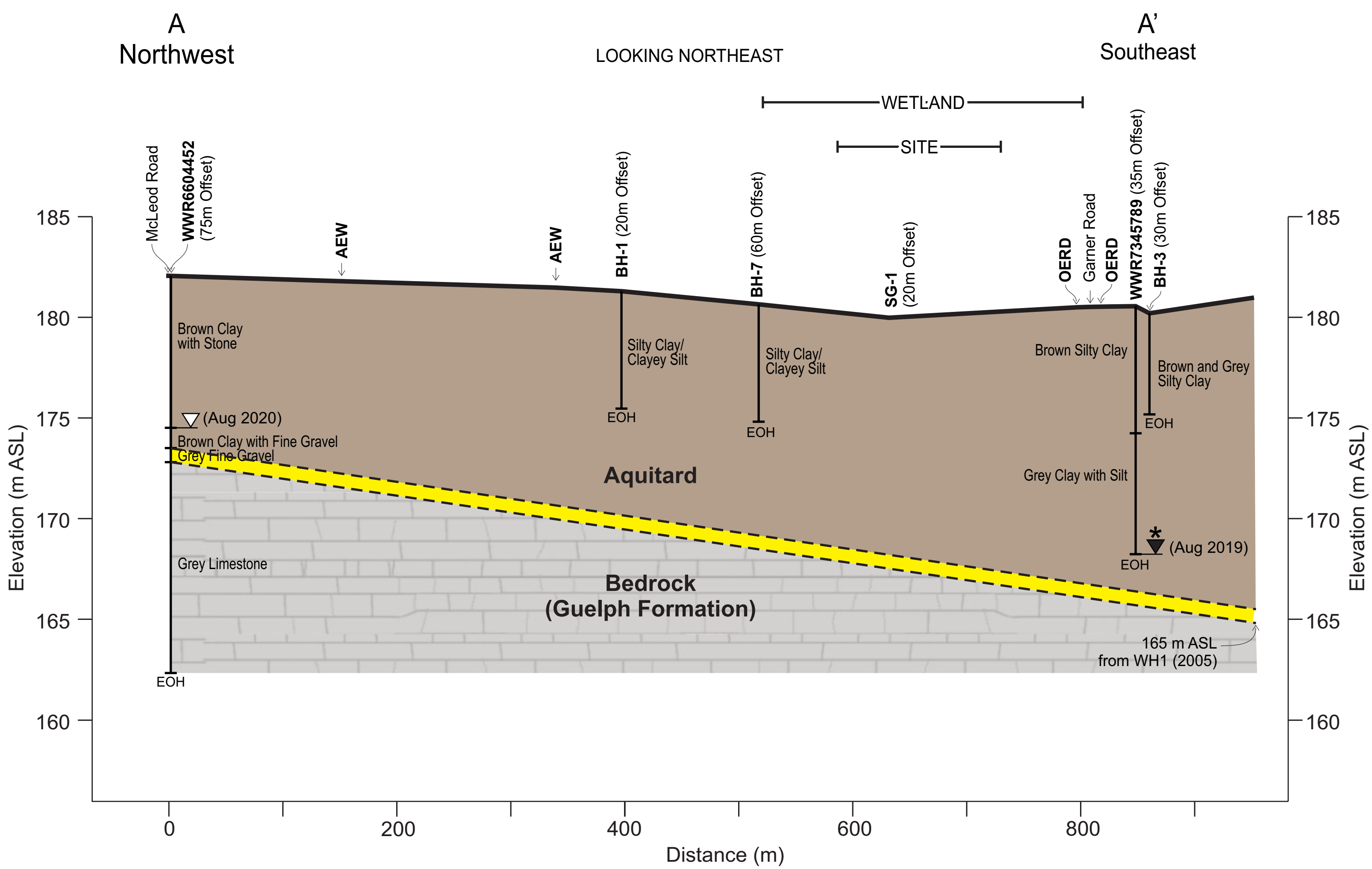


▽ Potentiometric Surface

▼ Water Encountered

EOH End of Hole

AEW Agricultural Ephemeral Watercourse

OERD Open Ephemeral Roadside Ditch

Aquitard

Bedrock

Fine Grey Gravel

Hydrogeologic Cross-section A-A'

Wetland Water Balance
Madan CPA Professional Corporation
7525 Garner Road, Niagara Falls, ON

Terra-Dynamics inc.

Figure 6

H:\TERRA_DYNAMICS\9758 - TD 7525 Garner Rd\corel\Figure 6 Hydrogeologic Cross-section A-A'.cdr Revised: July 25, 2025

Table 3
Welland-Pelham Precipitation Analyses

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Sum
Average* Precipitation (mm)	81.6	52.8	70.3	83.1	81.0	85.7	84.0	78.7	96.0	88.5	83.7	81.6	967
2024 Welland-Pelham	130	20.3	43.5	105.2	79.3	148.3	89.3	66	27.7	39.2	57.6	77.8	884
1-month Average +/-	159%	38%	62%	127%	98%	173%	106%	84%	29%	44%	69%	95%	91%
3-Month Average +/-			95%	82%	97%	133%	126%	122%	71%	50%	46%	69%	
2025 Welland-Pelham	27.4	54.5	47.2	72.8									
1-month Average +/-	34%	103%	67%	88%									
3-Month Average +/-	58%	74%	63%	85%									

Grey shading - monthly value between 95-105%, Blue shading >105%, Orange < 95%

Note: * denotes Climate Normals from Welland-Pelham ClimateStation ID 6139445 (1991-2020)

TABLE 7a
Swamp 350 mm USGS Monthly Water Balance (Average Conditions, HSG D)

Date	P	PET	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal	Comments
January	81.6	9.8	48	350	9.8	0	29.4	48	47.8	Surplus
February	52.8	11.3	38.9	350	11.3	0	30.7	38.9	43.7	Surplus
March	70.3	21.3	68.2	350	21.3	0	8.7	68.2	58.2	Surplus
April	83.1	39.1	48.5	350	39.1	0	0	48.5	56.1	Surplus
May	81	72.9	4	350	72.9	0	0	4	32	Surplus
June	85.7	107.2	-25.7	324.3	107.2	0	0	0	18.3	Soil Water Utilization
July	84	124	-44.2	283.3	120.8	3.3	0	0	11.2	Soil Water Utilization
August	78.7	100.9	-26.1	262.2	95.9	5	0	0	7.4	Soil Water Utilization
September	96	61.8	29.4	291.6	61.8	0	0	0	6.5	Soil Water Recharge
October	88.5	33.2	50.8	342.5	33.2	0	0	0	5.3	Soil Water Recharge
November	83.7	17.1	62.4	350	17.1	0	0	54.9	32.1	Surplus
December	81.6	11.2	60.2	350	11.2	0	7.4	60.2	46.9	Surplus
Sum	967				601.6				365.5	

TABLE 7b

Swamp 400 mm USGS Monthly Water Balance (Average Conditions, HSG C)

Date	P	PET	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal	Comments
========	========	========	========	========	========	========	========	========	========	
January	81.6	9.8	48	400	9.8	0	29.4	48	47.7	Surplus
February	52.8	11.3	38.9	400	11.3	0	30.7	38.9	43.6	Surplus
March	70.3	21.3	68.2	400	21.3	0	8.7	68.2	58.1	Surplus
April	83.1	39.1	48.5	400	39.1	0	0	48.5	56.1	Surplus
May	81	72.9	4	400	72.9	0	0	4	32	Surplus
June	85.7	107.2	-25.7	374.3	107.2	0	0	0	18.3	Soil Water Utilization
July	84	124	-44.2	332.9	121.2	2.8	0	0	11.2	Soil Water Utilization
August	78.7	100.9	-26.1	311.2	96.5	4.4	0	0	7.4	Soil Water Utilization
September	96	61.8	29.4	340.6	61.8	0	0	0	6.5	Soil Water Recharge
October	88.5	33.2	50.8	391.5	33.2	0	0	0	5.3	Soil Water Recharge
November	83.7	17.1	62.4	400	17.1	0	0	53.9	31.6	Surplus
December	81.6	11.2	60.2	400	11.2	0	7.4	60.2	46.6	Surplus
Sum	967				602.6				364.4	

TABLE 7c

Swamp 350 mm USGS Monthly Water Balance (2024-2025, HSG D)

Date	P	PET	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal	Comments
January-2024	130.0	11.4	81.4	350.0	11.4	0.0	33.1	81.4	70.8	Surplus
February-2024	20.3	14.7	15.2	350.0	14.7	0.0	22.7	15.2	41.8	Surplus
March-2024	43.5	26.3	26.4	350.0	26.3	0.0	11.3	26.4	35.8	Surplus
April-2024	105.2	44.3	61.3	350.0	44.3	0.0	5.7	61.3	52.8	Surplus
May-2024	79.3	84.6	-3.6	346.4	84.6	0.0	0.0	0.0	27.7	Soil Water Utilization
June-2024	148.3	111.9	29.0	350.0	111.9	0.0	0.0	25.3	32.0	Surplus
July-2024	89.3	124.8	-40.0	310.0	124.8	0.0	0.0	0.0	16.7	Soil Water Utilization
August-2024	66.0	97.8	-35.1	279.0	93.8	4.0	0.0	0.0	9.4	Soil Water Utilization
September-2024	27.7	68.2	-41.9	245.6	59.7	8.5	0.0	0.0	4.5	Soil Water Utilization
October-2024	39.2	34.3	3.0	248.6	34.3	0.0	0.0	0.0	3.5	Soil Water Recharge
November-2024	57.6	19.2	35.5	284.0	19.2	0.0	0.0	0.0	3.6	Soil Water Recharge
December-2024	77.8	11.6	50.8	334.8	11.6	0.0	12.6	0.0	3.3	Soil Water Recharge
January-2025	27.4	9.0	5.3	340.1	9.0	0.0	25.1	0.0	0.7	Soil Water Recharge
February-2025	54.5	10.7	21.7	350.0	10.7	0.0	46.2	11.8	7.1	Surplus
March-2025	47.2	24.9	43.1	350.0	24.9	0.0	23.1	43.1	26.9	Surplus
April-2025	72.8	39.6	41.1	350.0	39.6	0.0	11.5	41.1	36.5	Surplus

TABLE 7d
Swamp 400 mm USGS Monthly Water Balance (2024-2025, HSG C)

Date	P	PET	P-PET	Soil Moisture	AET	PET-AET	Snow Storage	Surplus	ROtotal	Comments
========	========	========	========	========	========	========	========	========	========	
January-2024	130.0	11.4	81.4	400.0	11.4	0.0	33.1	81.4	70.8	Surplus
February-2024	20.3	14.7	15.2	400.0	14.7	0.0	22.7	15.2	41.8	Surplus
March-2024	43.5	26.3	26.4	400.0	26.3	0.0	11.3	26.4	35.8	Surplus
April-2024	105.2	44.3	61.3	400.0	44.3	0.0	5.7	61.3	52.8	Surplus
May-2024	79.3	84.6	-3.6	396.4	84.6	0.0	0.0	0.0	27.7	Soil Water Utilization
June-2024	148.3	111.9	29.0	400.0	111.9	0.0	0.0	25.3	32.0	Surplus
July-2024	89.3	124.8	-40.0	360.0	124.8	0.0	0.0	0.0	16.7	Soil Water Utilization
August-2024	66.0	97.8	-35.1	328.5	94.3	3.5	0.0	0.0	9.4	Soil Water Utilization
September-2024	27.7	68.2	-41.9	294.1	60.7	7.5	0.0	0.0	4.5	Soil Water Utilization
October-2024	39.2	34.3	3.0	297.0	34.3	0.0	0.0	0.0	3.5	Soil Water Recharge
November-2024	57.6	19.2	35.5	332.5	19.2	0.0	0.0	0.0	3.6	Soil Water Recharge
December-2024	77.8	11.6	50.8	383.3	11.6	0.0	12.6	0.0	3.3	Soil Water Recharge
January-2025	27.4	9.0	5.3	388.6	9.0	0.0	25.1	0.0	0.7	Soil Water Recharge
February-2025	54.5	10.7	21.7	400.0	10.7	0.0	46.2	10.3	6.3	Surplus
March-2025	47.2	24.9	43.1	400.0	24.9	0.0	23.1	43.1	26.5	Surplus
April-2025	72.8	39.6	41.1	400.0	39.6	0.0	11.5	41.1	36.3	Surplus

Appendix A:

Terms of Reference

TDC Terra-Dynamics Consulting Inc.
432 Niagara Street, Unit 2 St. Catharines, ON L2M 4W3

April 10, 2024

Niagara Region
c/o Adam Boudens, Senior Environmental Planner/Ecologist
Growth Strategy and Economic Development
Sir Isaac Brock Way, P.O. Box 1042
Thorold, ON L2V 4T7

Niagara Peninsula Conservation Authority
c/o Taran Lennard, Watershed Planner II
250 Thorold Road West, 3rd Floor
Welland, ON L3C 3W2

Re: Proposed Wetland Water Balance, Terms of Reference, 7525 Garner Road, Niagara Falls, ON

1.0 Introduction and Background Information

Terra-Dynamics Consulting Inc. respectfully submits this proposed Terms of Reference to complete a wetland water balance for development of 7525 Garner Road, in the City of Niagara Falls (the Site). The Site is 0.81 hectares and includes 0.10 hectares of the Provincially Significant Thompson Creek Wetland Complex (or 12% of the Site) (Figure 1).

The Wetland Water Balance will be completed to complement the Site's Environmental Impact Statement, to confirm that the proposed wetland buffer widths will be sufficient to ensure that the hydrologic function of the wetlands will not be negatively impacted. The wetland water balance will also address:

1. Ensuring no negative impacts to the natural heritage system;
2. Informing stormwater management design at the Site in such a manner that pre-development water balance conditions are maintained at the wetland; and
3. PSW Wetlands be conserved, with the successful matching of pre and post development water balances.

This scope of work is based upon our experience in the Niagara Peninsula with the physical environment. Our current understanding of study requirements are detailed below per topic after a review of available background information.

2.0 Scope of Work

2.1 Site and Wetland Characterization

The Site and wetland will be characterized including a description of the surface water, geologic and hydrogeologic setting in text, maps and a hydrogeologic cross-section. This characterization will include consideration of topographic contours, watercourse mapping, ecological land classifications, soils information, surface geology, and nearby geotechnical boreholes.

One wetland water level staff gauge is proposed to be installed within the on-site portion of the wetland. This wetland staff gauge will be installed with a water level datalogger to collect water levels for one year at 15-minute intervals, and corrected using a barometric datalogger (also installed on-Site). During installation of the staff gauge within the wetland, a soil sample will be collected for laboratory grain-size analyses to calculate the shallow soil hydraulic conductivity.

2.2 Wetland Water Balance Modelling

A wetland water balance model will be completed using the United States Geological Survey (USGS) Thornthwaite Monthly Water Balance (McCabe and Markstrom, 2007) using both (a) climate normals and (b) Environment Canada weather data for the time of the wetland surface water level monitoring. The model provides a monthly water balance, as this is commonly sufficient detail for assessing wetland hydrologic function during summer months on low permeability soils as regionally mapped at the Site.

The wetland water balance assessment will also consider average monthly long-term water balance modelling completed for NPCA (AquaResource Inc. and Niagara Peninsula Conservation Authority (NPCA), 2009). The modelling was completed at an hourly interval over a fifteen-year period (1991-2005) providing baseline pre-development water balance values exceeding the minimum requirements for a “low risk” water balance (Figure 2).

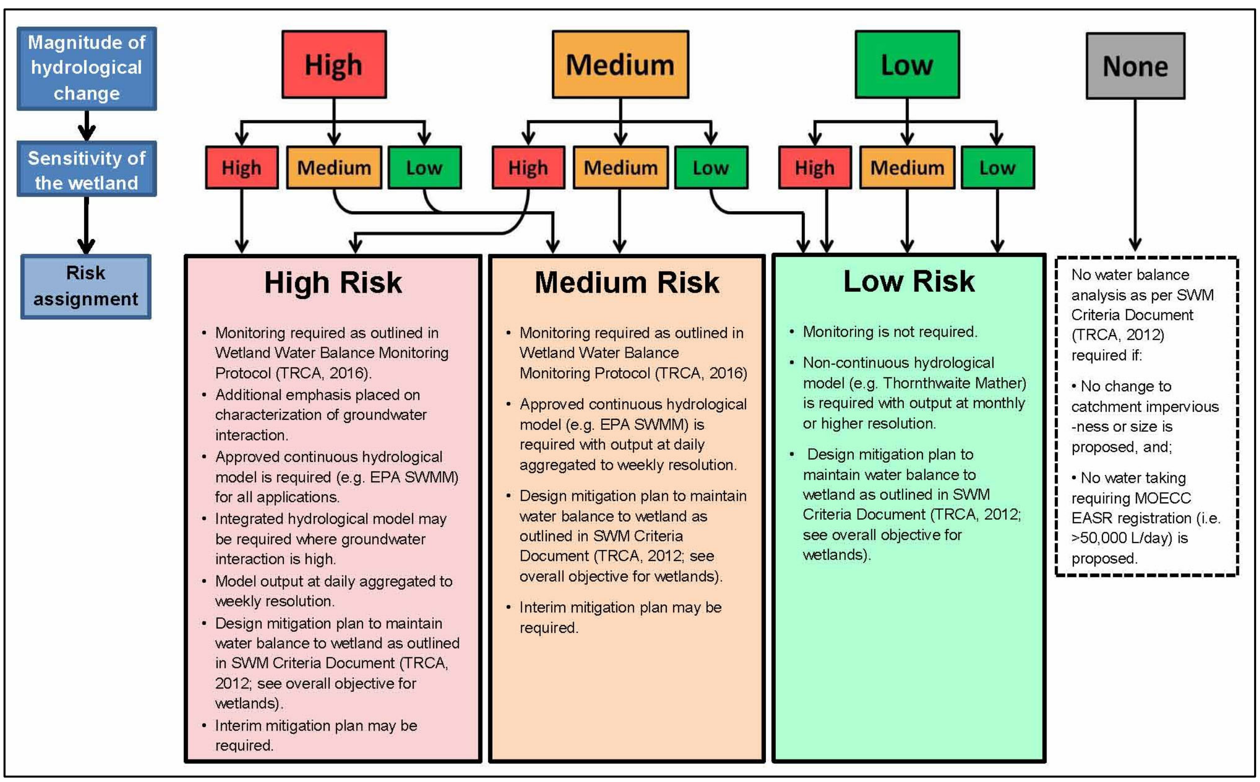


Figure 2 – Wetland Risk Evaluation Decision Tree (TRCA, 2017)

2.3 Wetland Risk Evaluation and Mitigation

A wetland risk evaluation will be completed as per the Toronto Region Conservation Authority (TRCA) protocol. An analysis will be completed of the post-development water balance considering the proposed wetland buffers, the proposed storm drainage plan and recommendations provided for the Stormwater Management Plan to improve post-development water management completing the water balance requirement for a "mitigation plan" (Figure 2, TRCA, 2017). It is expected that a mitigation plan can be developed to avoid any requirements for new continuous water balance monitoring or modelling.

We trust this information is sufficient for your present needs. Thank you for the opportunity to submit this proposed Terms of Reference. Please do not hesitate to contact us if you have any questions.

Yours truly,

TERRA-DYNAMICS CONSULTING INC.

Jayme D. Campbell, P. Eng.
Senior Water Resources Engineer

cc. Ian Barrett, Senior Biologist/Senior Manager, Colville Consulting
Nancy Frieday, Senior Planner, GSP Group

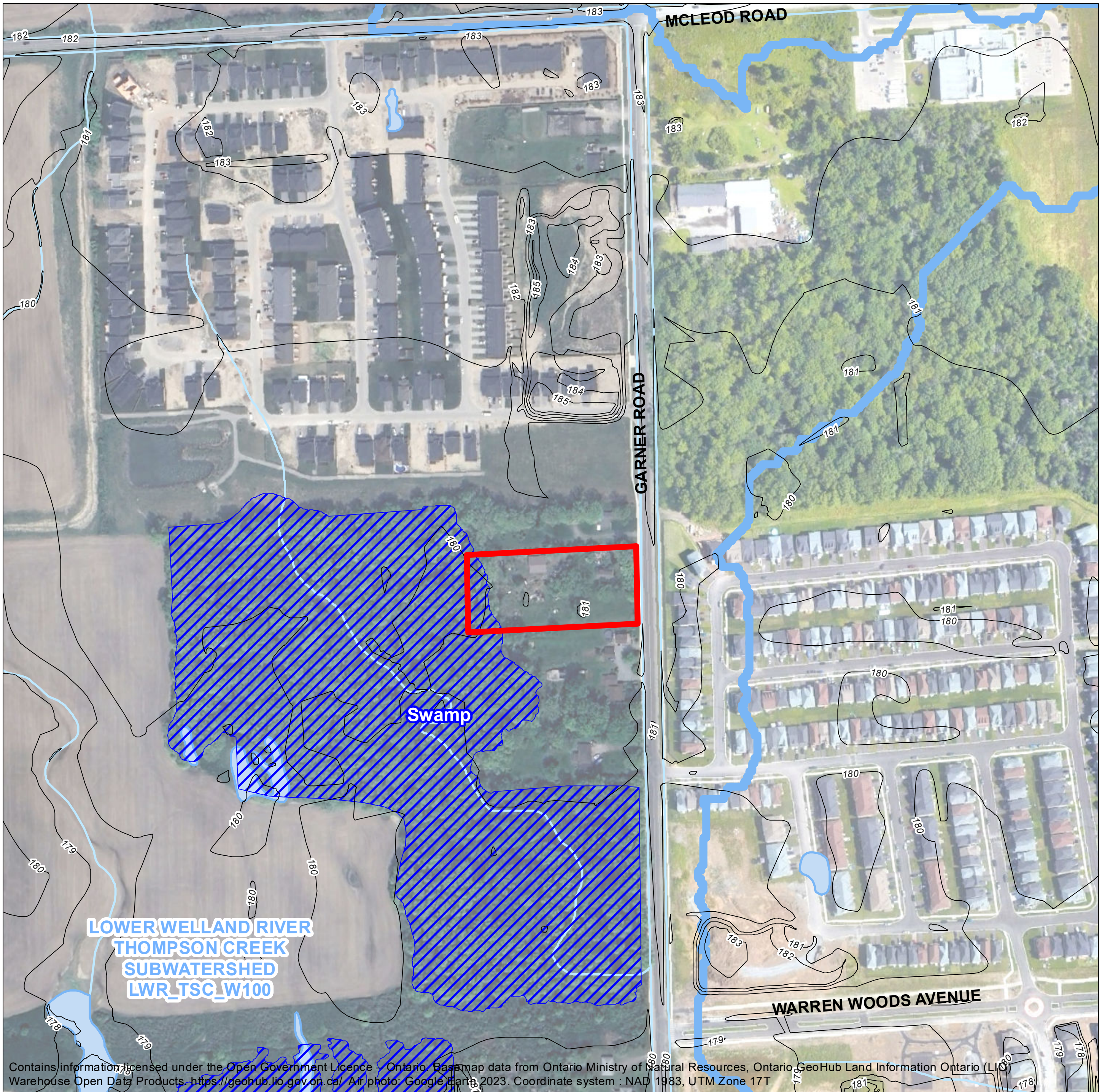
Attachments
Figure 1 – Site Details

3.0 References

AquaResource Inc. and Niagara Peninsula Conservation Authority (NPCA), 2009. Water Availability Study for the South Niagara Falls and Lower Welland River Watershed Plan Areas, Niagara Peninsula Source Protection Area.

McCabe, G.J., and Markstrom, S.L., 2007. A monthly water-balance model driven by a graphical user interface. U.S. Geological Survey Open-File report 2007-1008, 6p.

Toronto and Region Conservation Authority (TRCA), 2017. Wetland Water Balance Risk Evaluation.



Legend

- Subject Lands
- Lower Welland River Thompson Creek Subwatershed
- Thompson Creek Wetland Complex (MNRF)
- Waterbody (NPCA)
- Watercourse, Ephemeral (NPCA)
- Ground Surface Contour (NPCA)

Site Map

Wetland Water Balance
Madan-Arianna Developments
7525 Garner Road, Niagara Falls, ON

TDC Terra-Dynamics Consulting Inc.

0 100 Meters
1:4,500

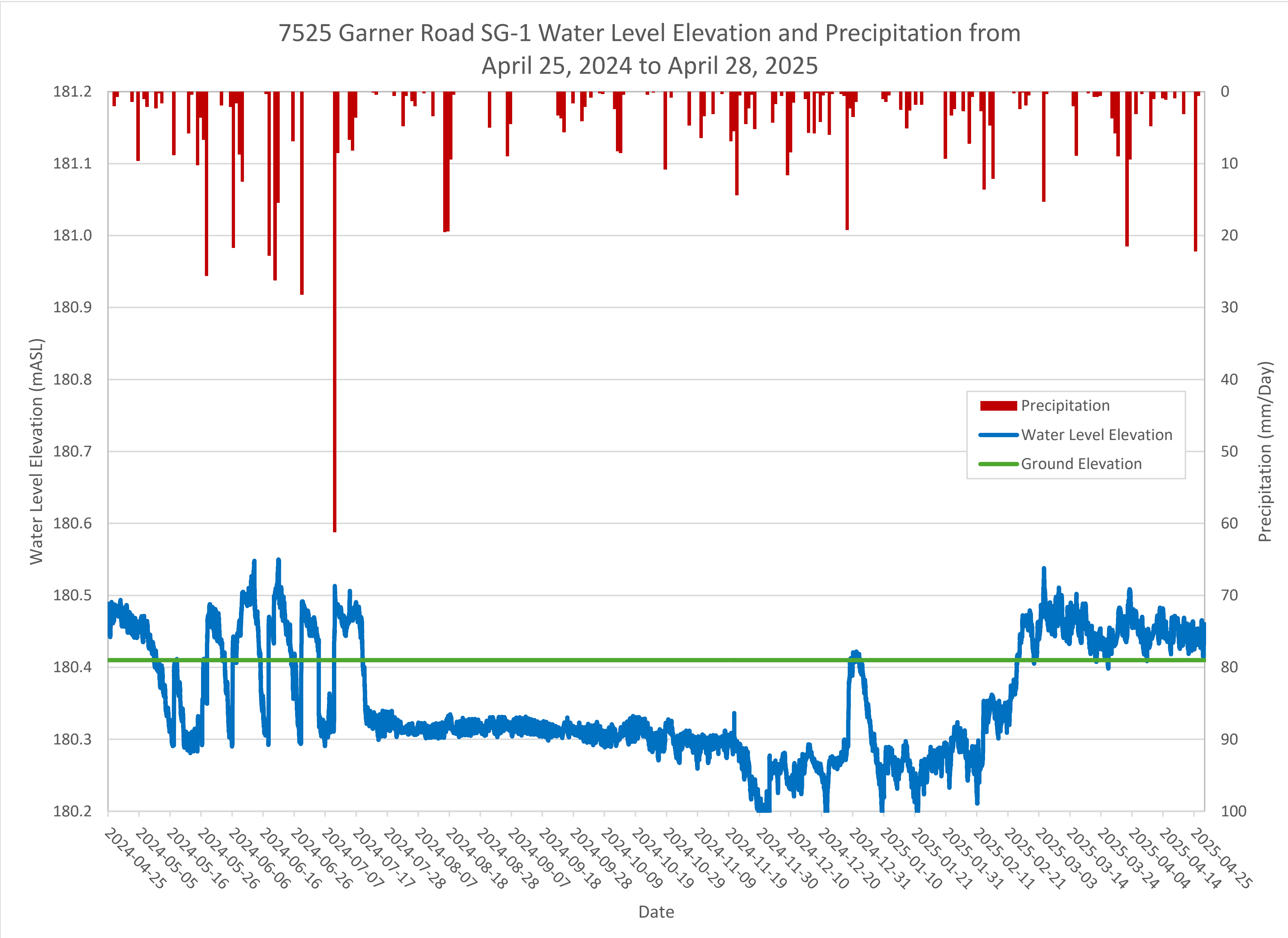
N

Figure 1

Path: H:\TERRA_DYNAMICS\9758 - TD 7525 Garner Rd\gis\mxd\Figure 1 Site Map.mxd Revised: April 9, 2024

Appendix B:

Data Logger Water Level Monitoring

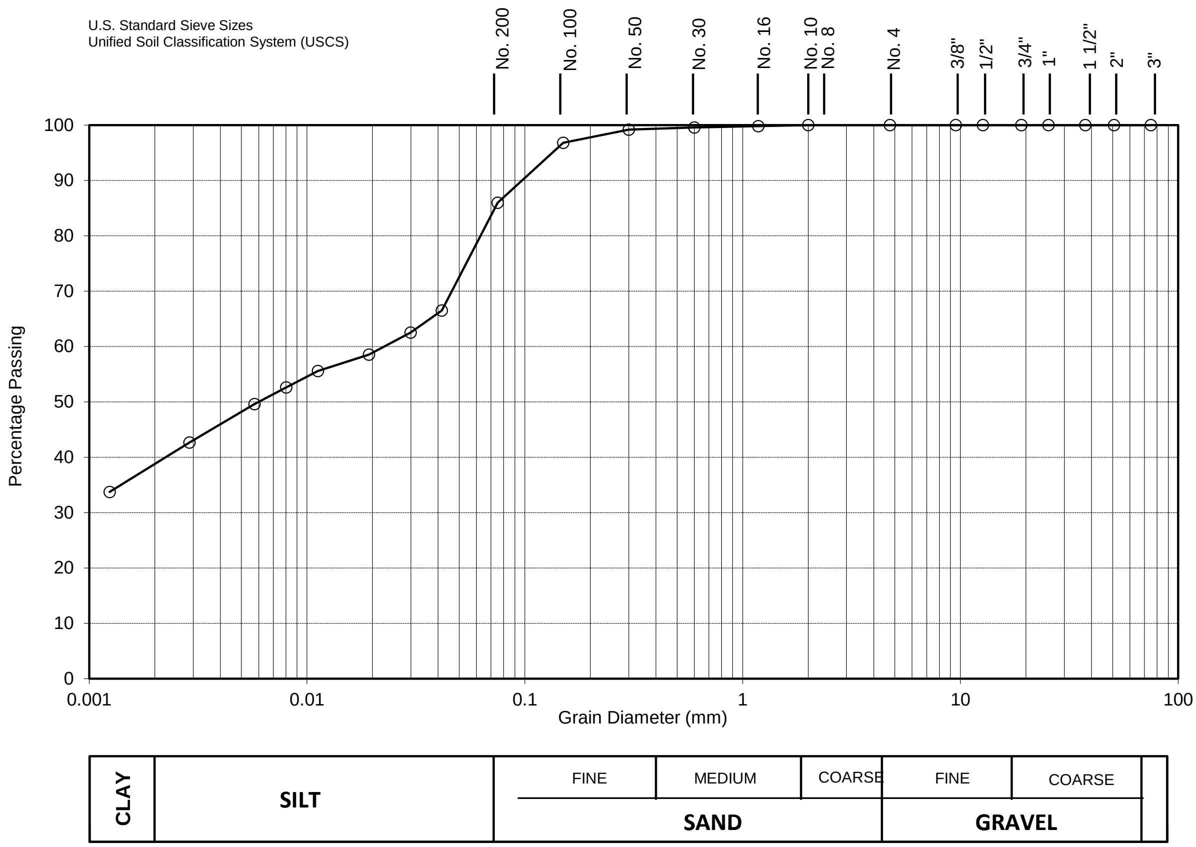


Terra-Dynamics Inc.

Appendix C:

Soil Information and Analyses

Mechanical & Hydrometer Analyses



Lab No.:	24-163	Notes: Date sample taken: April 25, 2024. Depth: 65 cm -75 cm			
Borehole No.:					
Sample No.:	HA-1				
CLAY [%]:	39	Soil Description: **Brown Silt and Clay w/ some Sand**			
SILT [%]:	47	**M.L. - Inorganic silts and very fine sands to C.L. - Inorganic clays of low to medium plasticity**			
SAND [%]:	14				
GRAVEL [%]:	0	Estimated Infiltration Rate [mm/hr] :	< 5	Estimated Permeability, k [cm/s]	10^{-8}
D_{10} (Effective Diam. in mm):	0.0002	Coefficient of Uniformity C_U:	110.0	Coefficient of Curvature C_C:	0.2

SOIL-MAT ENGINEERS & CONSULTANTS LTD.

Madan Site

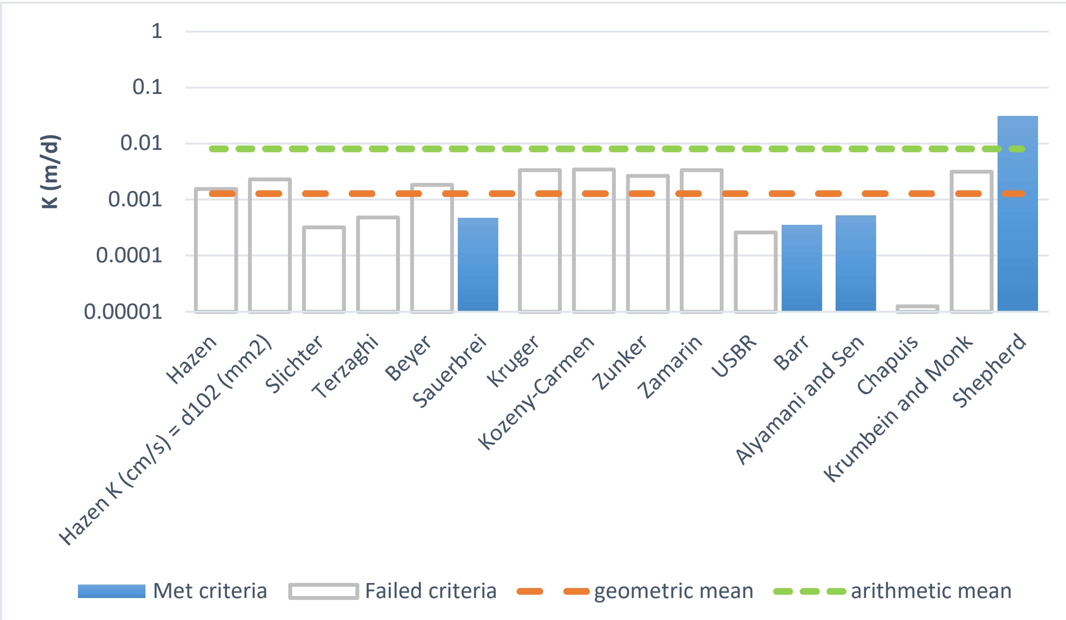
April 2024	**Grain Size Analysis No. 1**	**Project No.: SM 230001-T**

K from Grain Size Analysis Report | Date: 08-Aug-24

Sample Name: HA-1 (65-75cm) - 7525 Garner Road, Niagara Falls ON

Mass Sample (g): 100 | T (oC) 20

Poorly sorted clay with fines



Estimation of Hydraulic Conductivity	cm/s	m/s	m/d	de
Hazen	2.E-06	2.E-08	0.00	
Hazen K (cm/s) = d_{10} (mm)	3.E-06	3.E-08	0.00	
Slichter	4.E-07	4.E-09	0.00	
Terzaghi	6.E-07	6.E-09	0.00	
Beyer	2.E-06	2.E-08	0.00	
Sauerbrei	5.E-07	5.E-09	0.00	
Kruger	4.E-06	4.E-08	0.00	
Kozeny-Carmen	4.E-06	4.E-08	0.00	
Zunker	3.E-06	3.E-08	0.00	
Zamarin	4.E-06	4.E-08	0.00	
USBR	3.E-07	3.E-09	0.00	
Barr	4.E-07	4.E-09	0.00	
Alyamani and Sen	6.E-07	6.E-09	0.00	
Chapuis	1.E-08	1.E-10	0.00	
Krumbein and Monk	4.E-06	4.E-08	0.00	
Shepherd	4.E-05	4.E-07	0.03	
geometric mean	1.E-06	1.E-08	0.00	
arithmetic mean	9.E-06	9.E-08	0.01	

7525 Garner Rd- Madan OMFRA Soil Map

Legend

- Assessment Parcel
- Soil Name Label
- Soil Code
- Soil Symbol
- Hydrologic Soil Group
  - A - High
  - B - Moderate
  - C - Slow
  - D - Very Slow
- Soil Landscapes - Soil Order
- Site Boundary

This map should not be relied on as a precise indicator of routes or locations, nor as a guide to navigation. The Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA) shall not be liable in any way for the use or any information on this map. of, or reliance upon, this map.

Map Created: 9/13/2024
Map Center: 43.06455 N, -79.14987 W

Appendix D:

Hydrogeological Cross Section Water Well and Geotechnical Logs

Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 | **6604452** | Municipality 66501 | Con.

WELLAND

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
[redacted]	NIAGARA FALLS		181
	Address: 9304 McLEOD RD	Date completed: 21 06 00 (day month year)	

21 | Northing | RC | Elevation | RC | Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	To
BLACK	TOPSOIL	STONE	PACKED	0	2
BROWN	CLAY	STONE	PACKED	2	25
BROWN	CLAY	FINE GRAVEL	PACKED	25	28
GREY	FINE GRAVEL		PACKED	28	30
GREY	LIMESTONE		LAYERED	30	65

31

32

41 WATER RECORD

Water found at - feet	Kind of water
63	☑ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	To
6 1/8	☑ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	1.88	0	30
6	☐ Steel ☐ Galvanized ☐ Concrete ☑ Open hole ☐ Plastic		30	65
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet

Material and type	Depth at top of screen feet

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)

71 PUMPING TEST

Pumping test method	Pumping rate	Duration of pumping
☐ Pump ☑ Bailer	21 GPM	2 Hours 30 Mins

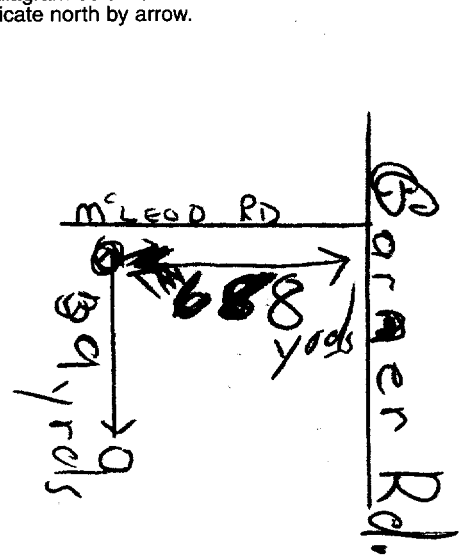
Static level	Water level end of pumping	Water levels during ☐ Pumping ☐ Recovery: 15 minutes	30 minutes	45 minutes	60 minutes
25 feet	28 feet	25 feet	25 feet	25 feet	25 feet

If flowing give rate: GPM | Pump intake set at: feet | Water at end of test: ☑ Clear ☐ Cloudy

Recommended pump type: ☐ Shallow ☑ Deep | Recommended pump setting: 55 feet | Recommended pump rate: GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



219361

FINAL STATUS OF WELL

☑ Water supply ☐ Observation well ☐ Test hole ☐ Recharge well ☐ Abandoned, insufficient supply ☐ Abandoned, poor quality ☐ Abandoned (Other) ☐ Dewatering ☐ Unfinished ☐ Replacement well

WATER USE

☑ Domestic ☐ Stock ☐ Irrigation ☐ Industrial ☐ Commercial ☐ Municipal ☐ Public supply ☐ Cooling & air conditioning ☐ Not use ☐ Other

METHOD OF CONSTRUCTION

☑ Cable tool ☐ Rotary (conventional) ☐ Rotary (reverse) ☐ Rotary (air) ☐ Air percussion ☐ Boring ☐ Diamond ☐ Jetting ☐ Driving ☐ Digging ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
KEN SCHOOLEY	4795
Address: RR#1 STEVENSVILLE	
Name of Well Technician: KEN SCHOOLEY	Well Technician's Licence No.: T-0351
Signature of Technician/Contractor: [signature]	Submission date: 21 07 00 (day mo yr)

MINISTRY USE ONLY

Data source	Contractor 4795	Date received AUG 17 2000
Date of inspection	Inspector	
Remarks		CSS.ES0

0506 (11/98) Front Form 9

2 - MINISTRY OF THE ENVIRONMENT COPY

EXP

Ontario Ministry of the Environment and Climate Change

Well Tag No. *(Place Sticker Below)* Tag#:A254965

Well Record

Regulation 903 Ontario Water Resources Act

Page 1 of 1

Measurements recorded in: ☐ Metric ☒ Imperial

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
	City of Niagara Falls	ngolic@niagarafalls.ca	

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
4310 Queen St.	Niagara Falls	ON	L2E6X5	9053562521

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
Garner Rd, north of Brown Road			

County/District/Municipality	City/Town/Village	Province	Postal Code
R.M. of Niagara	Niagara Falls	Ontario	

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 17	650777	4769571		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
Brown	Silty	Clay		0	20'
Gray	Clay	Sand Silt		20	40

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	34	Bentonite Chips	450 LB
34	40'	#3 Gravel	100 LB

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

Well production (l/min / GPM)

Disinfected? ☐ Yes ☒ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	40		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☒ Other, specify Auger

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☒ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To
2"	PVC	1/4"	0	35

Status of Well

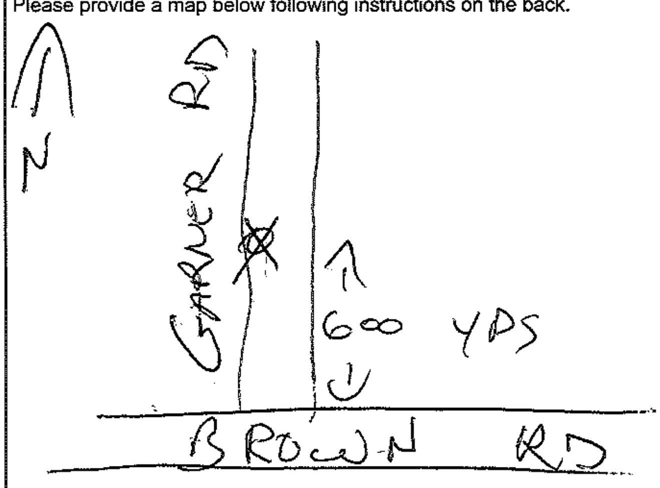
☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☒ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☐ Abandoned, other, specify ☐ Other, specify

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To
2.2	PVC	.010	35	40'

Map of Well Location

Please provide a map below following instructions on the back.



Comments: Well on Rd

Water Details

Water found at Depth	Kind of Water
40 (m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify
(m/ft) ☐ Gas	☐ Fresh ☐ Untested ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)
0	40	6

Well Contractor and Well Technician Information

ELITE DRILLING SERVICES
PO BOX 20062
St. Catharines, ON L2M 7W7
905 687-8691

Well Contractor's Licence No. 7484

Municipality

Address

Bus. Telephone No. (inc. area code)

Name of Well Technician (Last Name, First Name) Gow, John

Well Technician's Licence No. 2617 Signature of Technician and/or Contractor Date Submitted 20190919

Well owner's information package delivered ☐ Yes ☐ No

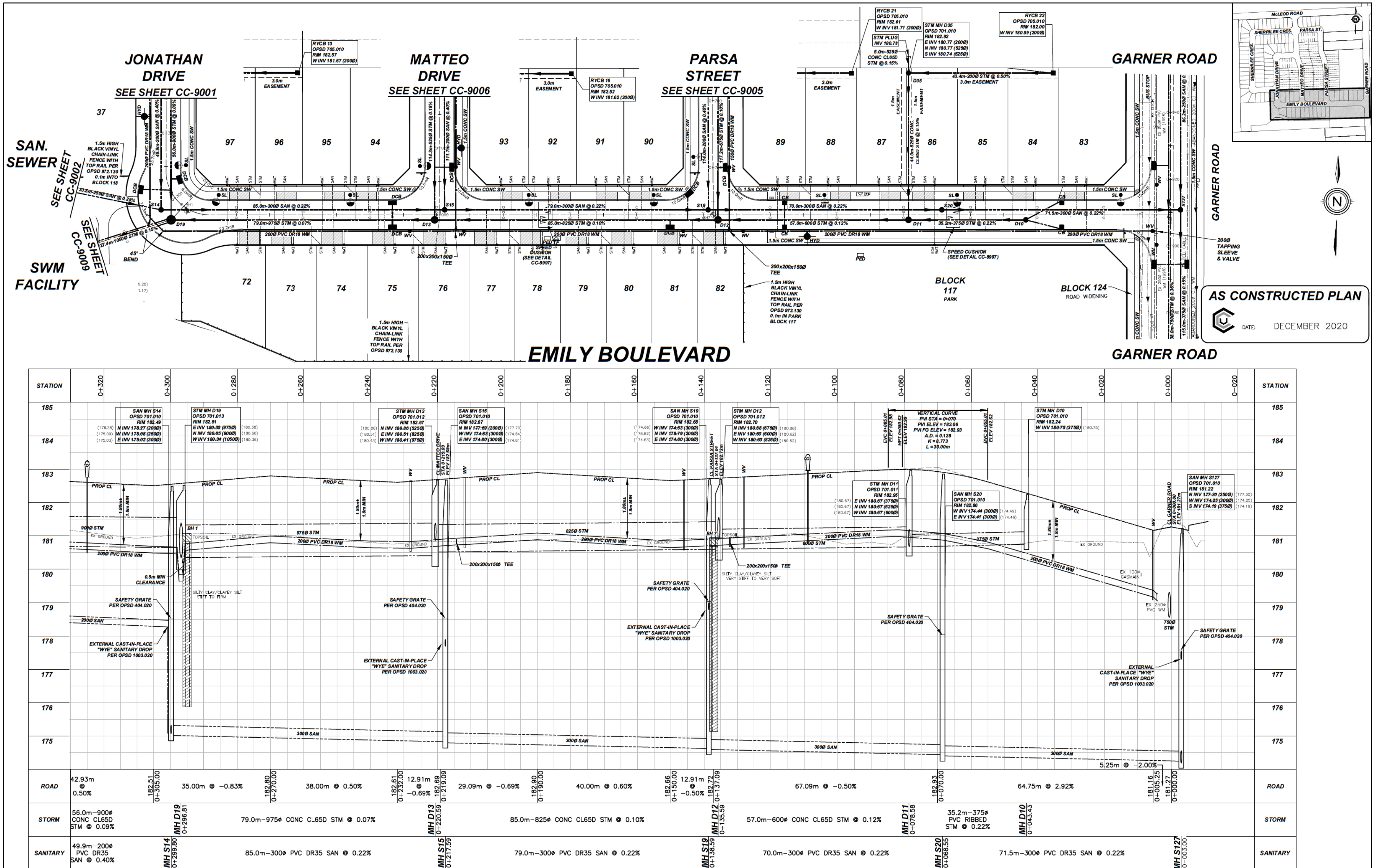
Date Package Delivered Y Y Y Y M M D D

Date Work Completed 20190802

Ministry Use Only

Audit No. Z295791

Received OCT 30 2019



#	REVISION	DATE	INIT
6	AS CONSTRUCTED	2020–12–14	K.A
5	ADJUSTED HYDRANTS AND LATERALS LOCATIONS	2020–08–21	BV
4	ISSUED FOR CONSTRUCTION	2020–06–26	BV
3	REVISED PER CITY COMMENTS (MAY 24/20)	2020–05–29	BV
2	REVISED PER MECP COMMENTS	2020–05–04	BK
1	REVISED PER CITY COMMENTS	2020–03–13	BV
0	ISSUED FOR APPROVAL	2019–10–04	BV

NOTES:

1. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
2. PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

DRAFTING KA
DESIGN MH
CHECKED BY AK
APPROVED BY AK

BENCH MARK DATUM
MONUMENT No. 90036036
IRON PIPE WITH BRASS CAP AT THE INTERSECTION OF McLEOD RD. & GARNER RD. 15.15m EAST OF C/L OF McLEOD RD., 9.7m SOUTH OF C/L OF McLEOD RD. 10cm BELOW SURFACE.
ELEVATION: 183.153m

Niagara Falls CANADA
UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS
30 Hannover Drive Unit 3
St. Catharines, Ontario
L2W 1A3
Phone: (905)688–9400
Fax: (905)688–5274

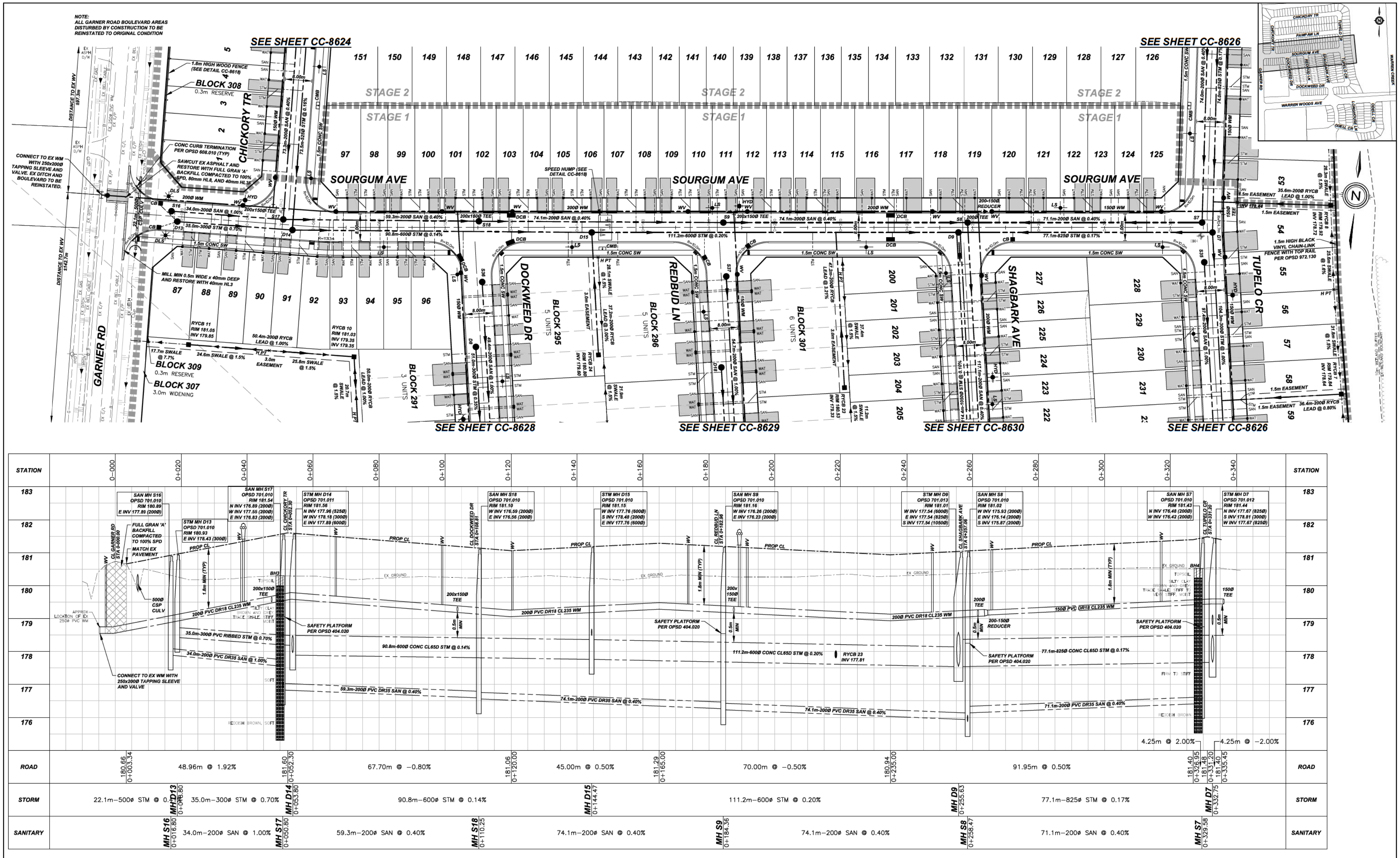
OWNER
River Realty Development (1976) Inc.
6265 MORRISON ST
NIAGARA FALLS, ON
L2E 6V2

FORESTVIEW ESTATES

EMILY BOULEVARD from GARNER ROAD to STA 0+300 AS CONSTRUCTED PLAN AND PROFILE 1

CONSULTANT FILE No. 1611
DATE 2020–12–14
PRINTED 2021–10–15
SCALE Hor : 1:500 m Ver : 1:50 m
REF No. 1611-PP1
DWG No. CC-9000
REV 6

DRAWING FILE: F:\1611\Asbuilt\1611_FORESTVIEW_ASBUILT.dwg PLOTTED: Oct 15, 2021 – 9:42am PLOTTED BY: kelvin



#	REVISION	DATE	INIT
3	ISSUED FOR CONSTRUCTION	2018−01−08	BK
2	REVISED PER CITY COMMENTS	2017−12−08	BK
1	ISSUED FOR CITY APPROVAL	2017−11−10	BK
0	ISSUED FOR MOE APPROVAL	2017−08−11	BK

NOTES:

1. THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER, AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.
2. PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.
3. ALL CONSTRUCTION MUST COMPLY WITH THE NIAGARA PENINSULA STANDARD CONTRACT DOCUMENT.

DRAFTING: BK
DESIGN: MH
CHECKED BY: AK
APPROVED BY:

LICENSED PROFESSIONAL ENGINEER
A. S. KEANE
100109861
Jan 8/18
PROVINCE OF ONTARIO

Niagara Falls CANADA

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

OWNER
1340258 ONTARIO INC
WARREN WOODS SUBDIVISION
7787 KALAR ROAD
NIAGARA FALLS, ON
L2E 6S5

WARREN WOODS - PHASE 5

SOURGUM AVE from GARNER RD to TUPELO CR

PLAN AND PROFILE 1

CONSULTANT FILE No.	0787−PH5
DATE	2018−01−08
PRINTED	2018−01−09
SCALE	Hor : 1:500 m Ver : 1:50 m
REF No.	0787-PH5-PP1
DWG No.	CC-8622
REV	3

DRAWING FILE: F:\0787\Phase 5\ENGINEERING\PRODUCTION DRAWINGS\0787PH5−SHEETS−GSP&PP.dwg PLOTTED: Jan 09, 2018 − 9:19am PLOTTED BY: BKostuk

Appendix E:

Wetland Photographs

Photograph 1: Photograph taken facing east on the property boundary displaying the staff gauge, ponded wetland area while facing towards Garner Rd. The elevated ground bordering the wetland can also be seen. Photograph taken April 25, 2024.

Photograph 2: The photograph was taken facing west displaying the staff gauge and the ponded wetland area, additional pockets of ponded water can be seen in the background. Photograph taken April 25, 2024.


Photograph 3: The photograph displays the soil from 65-75cm below ground surface that was sampled and the mottling. Photograph taken April 25, 2024.

Photograph 4: The photograph was taken facing northwest displaying the more northern portion of the wetland within the client's property boundary. Photograph taken April 25, 2024.

Photograph 5: Photograph taken facing east on the property boundary displaying the staff gauge during dry conditions, while facing towards Garner Rd. Photograph taken August 1, 2024.

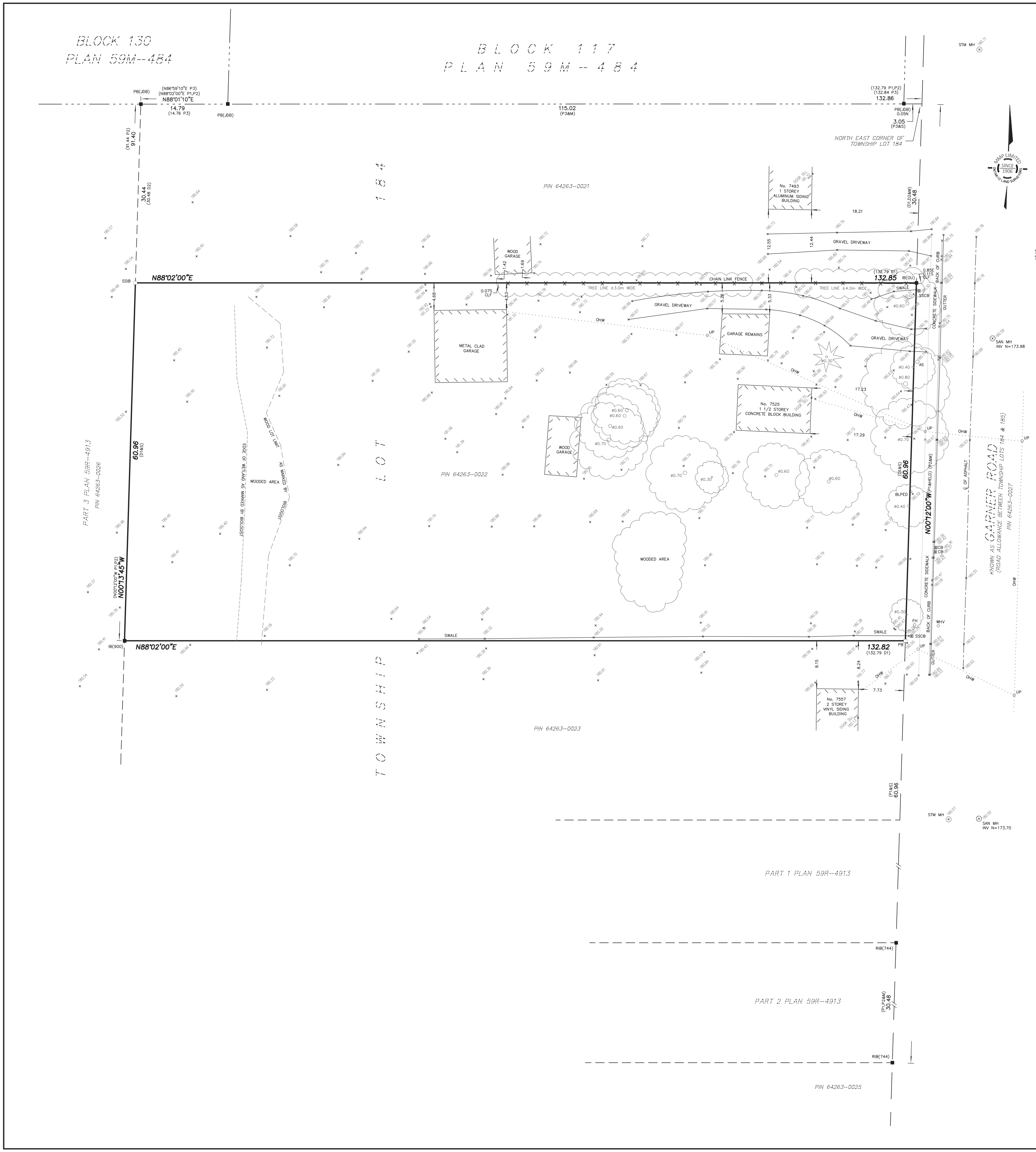
Photograph 6: Photograph taken facing south on the property boundary displaying the staff gauge during dry conditions. Photograph taken August 1, 2024.

Photograph 7: Photograph taken facing south on the property boundary displaying the staff gauge during dry conditions. Photograph taken November21, 2024.

Photograph 8: Photograph taken facing south on the property boundary displaying the staff gauge during wet conditions. Photograph taken April 28, 2025.

Appendix F:

Supporting Information



PLAN OF SURVEY SHOWING TOPOGRAPHY OF

PART OF

TOWNSHIP LOT 184

GEOGRAPHIC TOWNSHIP OF STAMFORD

NOW IN THE

CITY OF NIAGARA FALLS

SCALE 1 : 300

0 5 10 20 metres

THE INTENDED PLOT SIZE OF THIS PLAN IS 770 mm IN WIDTH BY 680 mm IN HEIGHT WHEN PLOTTED AT A SCALE OF 1:300 (INCLUDING 15mm BEYOND EACH BORDER)

MacKAY, MacKAY & PETERS LIMITED - ONTARIO LAND SURVEYORS

METRIC *DISTANCES SHOWN HEREON ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048*

ASSOCIATION OF ONTARIO LAND SURVEYORS

PLAN SUBMISSION FORM

V-67168

THIS PLAN IS NOT VALID UNLESS IT IS AN EMBOSSED ORIGINAL COPY ISSUED BY THE SURVEYOR IN ACCORDANCE WITH REGULATION 1026, SECTION 29(3)

LEGEND

■	DENOTES A SURVEY MONUMENT FOUND
□	DENOTES A SURVEY MONUMENT PLANTED
IB	DENOTES IRON BAR
SIB	DENOTES STANDARD IRON BAR
SSIB	DENOTES SHORT STANDARD IRON BAR
RIB	DENOTES ROUND IRON BAR
PB	DENOTES PLASTIC BAR
P1	DENOTES PLAN 59R-4913
P2	DENOTES PLAN 59R-3861
P3	DENOTES PLAN 59M-484
D1	DENOTES INST. No. RO662066
D2	DENOTES INST. No. AA77730
PIN	DENOTES PROPERTY IDENTIFICATION NUMBER
OU	DENOTES ORIGIN UNKNOWN
CLF	DENOTES CHAIN LINK FENCE
STM MH	DENOTES STORM MANHOLE
SAN MH	DENOTES SANITARY MANHOLE
FH	DENOTES FIRE HYDRANT
WHV	DENOTES WATER HYDRANT VALVE
CB	DENOTES CATCH BASIN
SSCB	DENOTES SEWER STORM DICB
OHW	DENOTES OVERHEAD WIRE
UP	DENOTES UTILITY POLE
AS	DENOTES ADDRESS SIGN
BLPED	DENOTES BELL PEDESTAL
℄	DENOTES CENTERLINE
(deciduous tree symbol)	DENOTES DECIDUOUS TREE SCALED TO CANOPY, TRUNK SIZE IN METRES
(coniferous tree symbol)	DENOTES CONIFEROUS TREE SCALED TO CANOPY, TRUNK SIZE IN METRES

ALL BUILDING TIES ARE TO FOUNDATION AND ARE PERPENDICULAR TO PROPERTY LINE UNLESS OTHERWISE NOTED

BENCHMARK NOTE

BENCHMARK No. 00119673582
ELEVATION = 188.710 METRES (CGVD28:78 ADJUSTMENT)

CONCRETE CYLINDER, ON EAST SIDE OF GARNER ROAD, 0.8 KILOMETRES NORTH OF MCLEOD ROAD, 8.1 METRES FROM CENTRE LINE OF GARNER ROAD, 1.1 METRES WESTERLY FROM GATE POST AT ENTRANCE TO HYDRO RIGHT-OF-WAY, 22.0 METRES SOUTHWESTERLY FROM STEEL HYDRO TOWER, TABLET IN TOP

BEARING REFERENCE

BEARINGS ARE ASTRONOMIC AND ARE REFERRED TO THE WESTERLY LIMIT OF GARNER ROAD AS SHOWN ON PLAN 59R-4913 HAVING A BEARING OF N00°12'00"W

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 16th DAY OF FEBRUARY, 2024.

FEBRUARY 26, 2024
DATE

ROY C. MAYO
ONTARIO LAND SURVEYOR
FOR MACKAY, MACKAY & PETERS LIMITED

E:\(30 & 59) Niagara\(59) South Niagara\(TWP) Stamford\LOT 184\23-276\23-276-PS.dwg

MMP
MacKay, MacKay & Peters Limited
LAND SURVEYORS & MAPPERS
SINCE 1906

3380 South Service Road
Unit 101
Burlington, ON
L7N 3J5
(905) 639-1375

halton@mmplimited.com
mmplimited.com

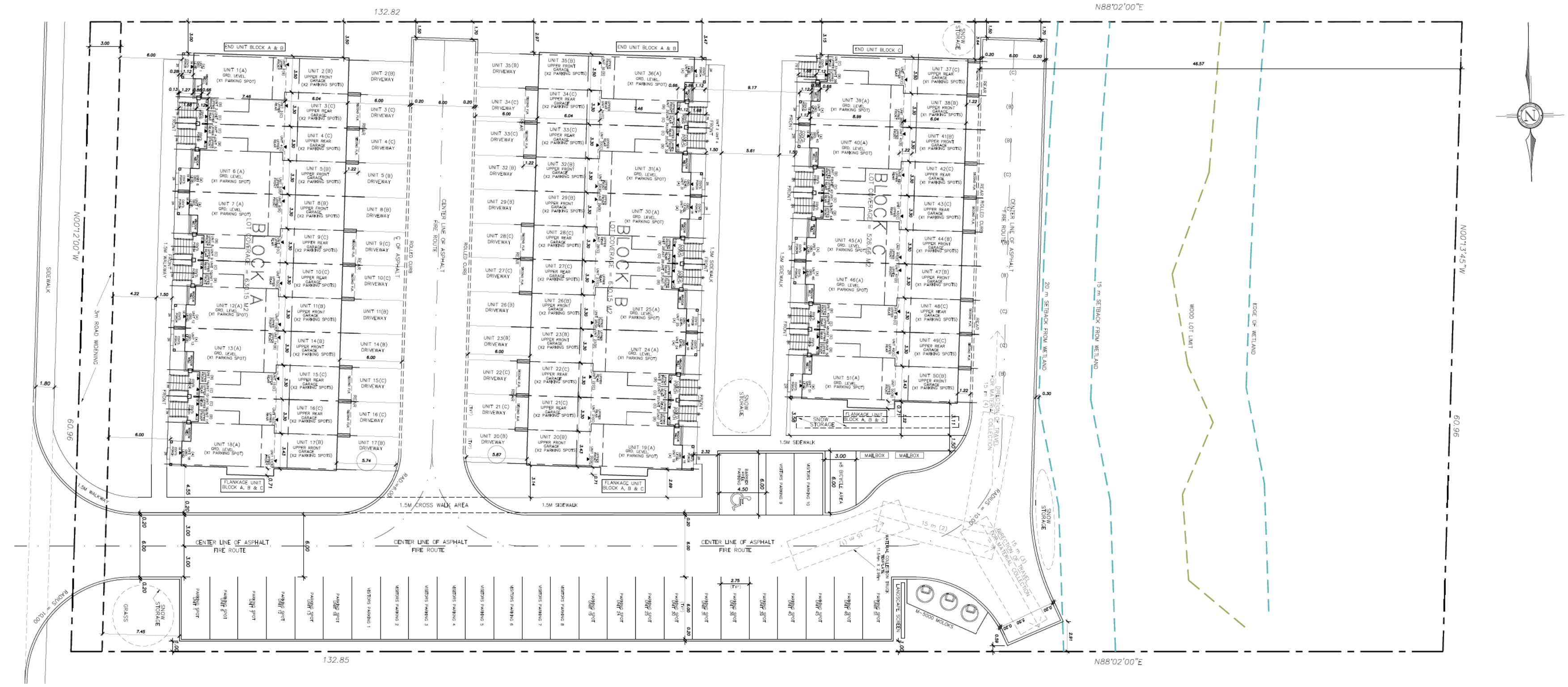
DRAWN BY:	SP
PARTY CHIEF:	CM
CHECKED BY:	(signature)
PROJECT No.:	23-276-PS

SITE PLAN OF 7525 GARNER ROAD
NIAGARA FALLS, ONTARIO

LEGEND
▶ ENTRY POINTS INTO BUILDING

LEGEND

- ☐ = BLOCK A, B, C
- ☐ = LANDSCAPING
- ☐ = PARKING (NOT INCLUDING INDOOR GARAGE PARKING)
- ☐ = PEDESTRIAN WALKWAYS
- ☐ = DRIVING AISLES



Compliance Chart for Niagara Falls Zoning By-law 79-200
7525 Garner Road

Total Lot Area = 8,092.65 m^2
Net Lot Area (Net of Road Widening, Environmental Block and Buffer) = 5,537.58 m^2
51 Stacked Townhouse Units - Density = 92.11 Units per Hectare

ZB Section	Item	Requirement	Proposed	Comply ✗ / ✓
Section 4 – General Provisions				
4.19.1 (Table 1)	Parking requirements	1.4 spaces per dwelling unit	1.68 parking spaces per unit, including 11 visitor parking spaces (13 visitor spaces required)	✓ ✗
4.27 (Table 1)	Road allowance requirements	13m minimum distance from centreline of original road allowance	3m road widening provided	✓
4.44.1	Amenity area	Minimum area of 20 m^2 per dwelling unit	28.44 m^2	✓
Section 7.11 – Residential Apartment 5B Density Zone (R5B)				
7.11.1	Permitted uses	A stacked townhouse dwelling	Stacked townhouse dwellings	✓
7.11.2 a)	Minimum lot area	133m^2 per dwelling unit	108.7 m^2 per dwelling unit (based on net lot area of 5,537.58 m^2)	✗
7.11.2 b)	Minimum lot frontage	30m	60.96m	✓
7.11.2 c)	Minimum front yard depth	7.5 m plus any applicable distance specified in section 4.27.1	7.12m	✗
7.11.2 d)	Minimum rear yard depth	10 m plus any applicable distance specified in section 4.27.1	47.79m	✓
7.11.2 e)	Minimum interior side yard width	one-half the height of the building	*TBD based on Elevations*	**TBD**
7.11.2 g)	Maximum lot coverage	30%	33.53%	✗
7.11.2 h)	Maximum height of building or structure	10m Subject to section 4.7	*TBD based on Elevations*	**TBD**
7.11.2 i)	Parking and access requirements	in accordance with section 4.19.1	See above	✓
7.11.2 l)	Minimum landscape open space	35% of the lot area	26.28%	✗
7.11.2 m)	Minimum amenity space for an apartment dwelling unit	In accordance with section 4.44	See above	✓

LOT STATISTICS

LOT AREA	8092.65 M2
LOT AREA AFTER ROAD WIDENING	7,909.80 M2
LOT AREA AFTER ROAD WIDENING AND WETLANDS	5,537.58 M2
DENSITY :	
STACKED TOWNS = 51 UNITS (X17 LOWER UNITS + X17 UPPER FRONT UNITS + X17 UPPER REAR UNITS) DENSITY BASED ON LOT AREA AFTER ROAD WIDENING	7,909.80 M2 (0.7909 Ha)
DENSITY = 64.56 UNITS / Ha	
STACKED TOWNS = 51 UNITS (X17 LOWER UNITS + X17 UPPER FRONT UNITS + X17 UPPER REAR UNITS) DENSITY BASED ON LOT AREA AFTER ROAD WIDENING AND WETLANDS	5,537.58 M2 (0.5537 Ha)
DENSITY = 92.12 UNITS / Ha	
LOT COVERAGE :	
BLOCK A	654.91 M2
BLOCK B	654.91 M2
BLOCK C	547.83 M2
TOTAL LOT COVERAGE	1,857.15 M2
LOT COVERAGE PROPOSED: LOT AREA AFTER ROAD WIDENING	(23.48%)
LOT COVERAGE PROPOSED: LOT AREA AFTER ROAD WIDENING AND WETLANDS	(33.54%)

LANDSCAPING

DEVELOPABLE AREA (PERCENTAGE OF DEVELOPABLE AREA – DOES NOT INCLUDE ROAD WIDENING AND DOES NOT INCLUDE WETLAND SETBACK AREA)	5,537.25 M2
SOFT LANDSCAPING (INCLUDING WALKWAYS – AREA PERCENTAGE BASED OF DEVELOPABLE AREA)	1,454.84 M2 (26.27%)
HARDSCAPE (ASPHALT SURFACES, PARKING AREAS, ETC. AREA PERCENTAGE BASED OF DEVELOPABLE AREA)	2,297.32 M2 (41.49%)
TOTAL AREA	5,608.98 M2
MINUS DUPLICATE AREA (BALCONY OVERLAP ON HARDSURFACE (DRIVEWAY AREA) = 71.73 M2)	−71.73 M2
TOTAL AREA	5,537.25 M2

AMENITY AREAS
(LANDSCAPED OPEN SPACES AND BALCONIES)

LANDSCAPED OPEN SPACE	1216.92 M2
FRONT & REAR BALCONIES (DOES NOT INCLUDING FRONT PORCHES)	233.60 M2
TOTAL AMENITY AREA (DIVIDED BY UNIT NUMBER)	1450.52 M2
28.44 M2 AMENITY AREA PER UNIT	

AMENITY AREAS
(LANDSCAPED OPEN SPACES, BALCONIES AND PORCHES)

LANDSCAPED OPEN SPACE	1216.92 M2
FRONT & REAR BALCONIES	233.60 M2
FRONT PORCHES & STEPS	85.60 M2
TOTAL AMENITY AREA (DIVIDED BY UNIT NUMBER)	1536.12 M2
30.12 M2 AMENITY AREA PER UNIT	

PARKING PROVIDED

X1 SPOT FOR GROUND FLOOR UNIT BLOCK A, B AND C (OUTDOOR PARKING SPOT)	X17 SPOTS
X2 SPOTS FOR UPPER FRONT UNIT BLOCK A AND B (X1 IN GARAGE & X1 IN DRIVEWAY)	X24 SPOTS
X2 SPOTS FOR UPPER REAR UNIT BLOCK A AND B (X1 IN GARAGE & X1 IN DRIVEWAY)	X24 SPOTS
X1 SPOT FOR UPPER FRONT UNIT BLOCK C (X1 IN GARAGE)	X5 SPOTS
X1 SPOT FOR UPPER REAR UNIT BLOCK C (X1 IN GARAGE)	X5 SPOTS

UNIT PARKING RATIO = X75 SPOTS FOR UNITS
= 1.47 PER UNIT AVERAGE

VISITOR PARKING = X10 SPOTS
= X1 BARRIER FREE SPOT

VISTOR PARKING RATIO = X11 PARKING SPOTS
= 0.21 PER UNIT AVERAGE

TOTAL PARKING PROVIDED
UNIT PARKING RATIO = X75 SPOTS FOR UNITS
VISTOR PARKING = X10 PARKING SPOTS
BARREIR FREE PARKING = X1 SPOT
TOTAL PARKING SPOTS = X 86
= 1.68 PER UNIT AVERAGE

METRIC DISTANCES AND/OR COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

I JEFF JANSEN DECLARE THAT I HAVE REVIEWED AND TAKE DESIGN RESONSIBILTY FOR THE DESIGN WORK ON BEHALF OF JANSEN CONSULTING UNDER DIVISION C, SUBSECTION 3.2.5 AND 3.2.4 OF THE BUILDING CODE. I AM QUALIFIED AND THE FIRM IS REGISTERED SET OUT BY THE O.B.C. QUALIFIED DESIGNER BCIN – 30272 FIRM BCIN – 110042
DATE: MAY 20 2025 SIGNATURE:

Jansen Consulting
DESIGN • CONSULTING • MANAGEMENT
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TYPE : N-035
PROJECT : 7525 GARNER ROAD
LOCATION : NIAGARA FALLS, ON

OWNERS INFORMATION :

SITE PLAN

NO.	DATE	DESCRIPTION

REVISIONS

SCALE	1:200
DATE	MAY 2025
PROJECT NO.	2024–035
DRAWN BY	AS
CHECKED BY	JJ
FILE NAME	
DRAWING NO.	S1