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FUNCTIONAL SERVICING REPORT

AT

0th Killaly Street West,
Port Colborne, ON

PREPARED FOR:

1000046816 ONTARIO LIMITED.

Feb 01, 2024

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1. INTRODUCTION

King EPCM (the Engineer) was retained by 1000046816 Ontario Limited. (the Client) to carry out civil engineering designs for a proposed residential sub-division at 0th Killaly Street West, City of Port Colborne, Regional Municipality of Niagara, Ontario (the Site).

The purpose of this report is to review the functional servicing requirements of the proposed residential sub-division. This report details King EPCM's review of existing municipal services along Killaly Street West, Elgin Street, West Side Road, and Rosemount Rd, as well as the proposed stormwater sewer designs, sanitary considerations, and other recommendations.

This report was prepared for the Client, Mapleview, for the property owners, and any related site-specific engineers, designers, and contractors. This report is considered an intellectual property of King EPCM, and third party use of this report, including reliance, in-part or full, is prohibited without written consent from King EPCM.

1.1. PROPERTY INFORMATION

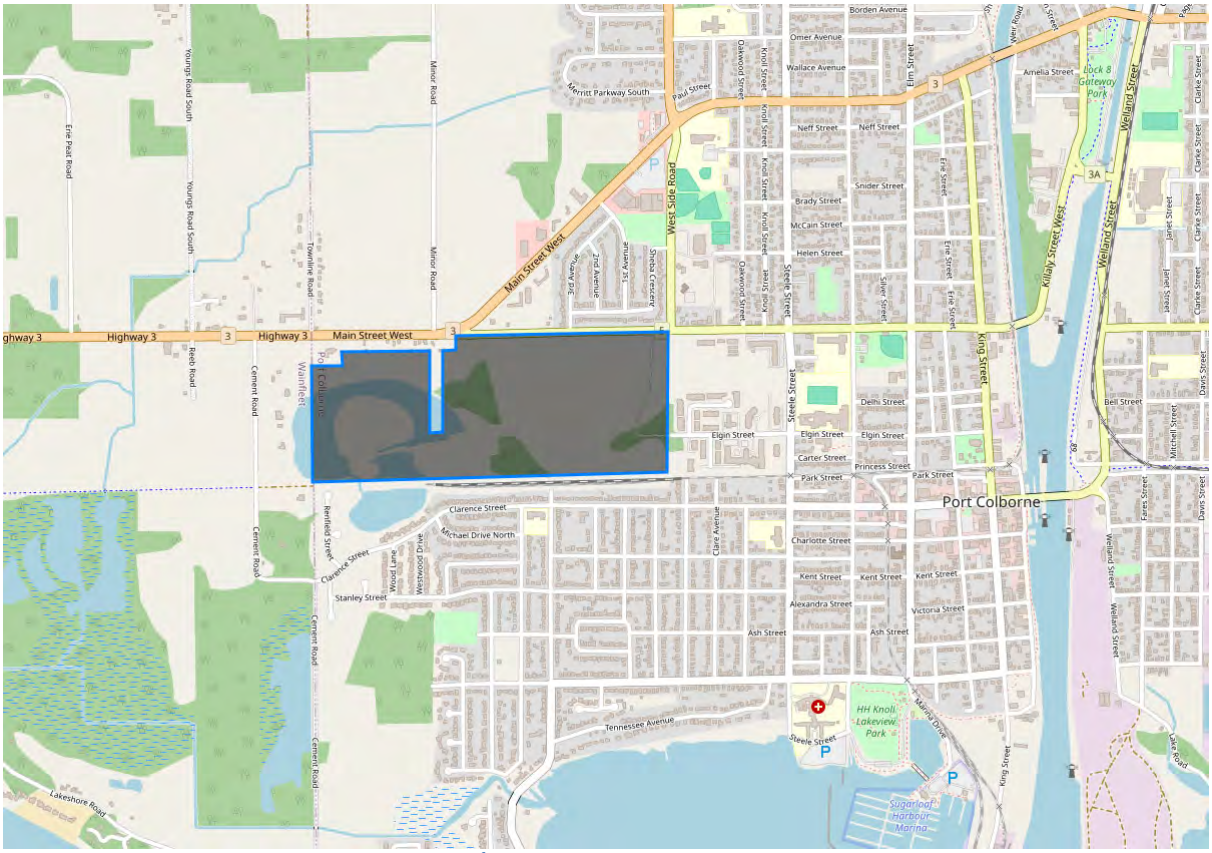

Figure 1 – 0th Killaly St West, Port Colborne, ON

The site is located at the municipal address of 0th Killaly Street West, City of Port Colborne, Regional Municipality of Niagara. Please refer to the legal survey for the exact legal description.

The Site property is considered abandoned brownfield, with the majority of the western portion of the site as an abandoned / vacant quarry pit, while the central area is a scrubby-vegetation vacant property, with exposed high-bedrock and remnants of abandoned demolished concrete structures. The northeast corner of the property is vacant with agricultural hayfields.

The Site is bound by on the north boundary by Killaly Street West, the east boundary by a proposed future extension of West Side Road (but currently vacant), and the south is bound by a commercial railway tracks owned by the City of Port Colborne.

1.2.PROPOSED DEVELOPMENTS

The purpose of this report is to provide review of existing municipal services and provide recommendations on development constraints and other design information. The project proposes a variety of types of townhouses, mid-rise mixed-use buildings, and single detached dwellings. Niagara Region recommended Persons Per Unit (PPU) for each local municipality has been pushed, based on the rates below:

Table 1 - PPU Based on Residential Type – Estimate By Niagara Region

Persons Per Unit - City of Port Colborne			
Single Detached Units	**Semi Detached Units**	**Row Units**	**Apartment Units**
2.4	2.2	2.2	1.6

Table 2 - Employment Densities - Estimate by Niagara Region Development Charges Background Study

Employment Densities (Sq. ft per Employee)		
Commercial	**Industrial**	**Institutional**
500	1200	680

Below is a detailed breakdown of each type of units:

Table 3 - Proposed Development Units and Populations

	Unit of Measurement	Population Per Unit	Total Population Est.
Single Family Dwelling	96 Units	2.4	230
Stacked Townhouses	228 Units	2.2	502
Regular Townhouses	383 Units	2.2	843
Back-to-Back Townhouses	130 Units	2.2	286
Rear Lane Townhouses	42 Units	2.2	92
Mid-rise mixed-use (Residential portion)	1231 Units	1.6	1970
Mid-rise mixed-use (Commercial portion)	3197 m2	0.0215	69
Total			**3991**

2. WATER SUPPLY

2.1.EXISTING WATERMAIN

The potable water supply for the Site is serviced by City of Port Colborne Water Treatment Plant, located at 323 King Street, Port Colborne. It is a conventional surface water treatment plant, with Lake Erie (via the Welland Canal) as a source to the Plant. The plant has a rated capacity of 36.0 MLD. Based on the 2016 Water and Wastewater Master Servicing Plan by Niagara Region, the 5-year Peak (2011 – 2015) showed a Maximul Day Demand of 14.9MLD with a 41% utilization of total plant capacity. Water services are currently not available within the Site (due to a lack of actual buildings), but several service locations are found along the property boundaries.

1. North property boundary – Intersection of Killaly St W and 3rd Ave - Hydrant #63000105
2. Northeast corner – Intersection of Killaly St W and West Side Rd – Hydrant #63000107
3. East property boundary – Elgin Road cul-de-sac – Hydrant #63000576
4. South property boundary – past the railroad tracks – Rosemount Ave cul-de-sac (not used)

Engineering records were obtained from City of Port Colborne (see Appendix II), and multiple recent hydrant flow test was performed in the last three (3) years. The above hydrant flow test locations of #1, #2, and #3 were used for modelling purposes.

The watermain at the south property boundary (#4, Rosemount Ave) is not currently designed to be used, as servicing connection and installation remains a challenge due to cross concerns through an operating railroad yard and drainage ditch. This addition connection across the railroad yard may be futher contemplated if a future road access is developed by the City of Port Colborne.

Summary of existing watermain pressures and flows:

- Generally, static pressure is between 56 ~ 60 psi (386 ~ 413 kPa)
- There does not appear to be any static pressure potential to exceed 550kPa
- Residual pressure at full open pitot flow is between 40 – 46 psi (275 – 317 kPa)
- Residual pressure at the nearest upstream hydrant is between 32 – 37 psi
- This is generally acceptable, as minimum fire flow test requires upstream hydrant >20 psi

2.2.WATER & FIRE FLOW DEMANDS

2.2.1. DOMESTIC WATER DEMANDS

Based on the Niagara Region Water and Wastewater Master Servicing Plan, 2017, domestic water demands are designed using the rates in Table 4. These values are then combined with Table 3 - Proposed Development Units and Populations to determine to total Domestic Water Demand.

Table 4 - Domestic Water Demand Rates - Niagara Region Water and Wastewater Master Servicing Plan, 2017

Domestic Water Demands - Niagara Region 2017 WWMSP	
Residential Average Day Demand	300 L/capita/day
Employment Average Day Demand	300 L/capita/day
Residential Peak Hour Factor	4
Employment Peak Hour Factor	2

2.2.2. FIRE FLOW DEMANDS

Firefighting values are based on "2020 Water Supply for Fire Protection, A Guide to Recommended Practice" issued by the Fire Underwriters Survey (FUS) of the Insurance Bureau of Canada. When assessing "water distributions systems" for fire insurance grading purposes, FUS uses the Basic Fire Flows (BFF) to review the reliability and adequacy of the water distribution system to consistently deliver the required fire flows across the zone or community. Multiple other credits or factors may be applied on the BFF to arrive at the final RFF.

Normally, the BFF is selected to be adequate for the vast majority (90%) of risks in the area. Historically, the fifth highest Required Fire Flow (RFF) in the community or response zone was used when assessing the adequacy and reliability of public fire protection in a community or response zone. Based on the current residential sub-division proposal, the most fifth-highest RFF will be the proposed mid-rise mixed-use Building 04.

$$BFF = 220\ C\ A^{0.5}$$

RFF = Required Fire Flow in litres per minute (LPM)
C = Construction Coefficient related to the type of construction of the building
A = largest floor plate plus 25% of the floor area of the floor above and 25% of below

C = 0.6 for Type I Fire Resistive Construction
A = Buildg 04, 1820m2 + 0.25*1820m2 + 0.25*1820m2 = 2730m2 (residential floor)

BFF = 220 * 0.6 * 2730*^0.5 = 6897 LPM
BFF (rounded) = 7000 LPM

Based on the proposed mix-use Building 04, the most conservative maximum floor plate plus above and below is a residential floor (there are no basement, so commercial floor plate is not the most conservative). Table 3 of the 2020 FUS guideline recommends Occupancy and Contents Adjustment Factor of -15% for residential occupancies.

BFF * Occupancy & Contents Adjustment Factor = 7000 * (1 – 15%) = 5950LPM

Three types of sprinkler credits may be applied to reduce the RFF:

- NFPA 13 Sprinkler Standard – YES:-30%

- Standard Water Supply – YES: -10%
- Fully Supervised System – YES: -10%
- A total of -50% credit may be applied to the BFF

BFF * Automatic Sprinkler Protection = 5950 * (1 - 50% credit) = 2975 LPM

There is additional Exposure Adjustment Charge based on the proximity of the subject building to an exposed risk. In the case of the proposed sub-division, the primary risk would be fire within one mid-rise building spreading to another neighbouring mid-rise building. However, Exposure Adjustment Charge can be waived if both the subject building and the exposed building are fully protected with automatic sprinkler systems. In this case, Expore Adjustment Charge has been waived as all proposed mid-rise buildings are considered to be sprinklers.

After final rounding to the nearest 1,000 LPM, as per "2020 Water Supply for Fire Protection, A Guide to Recommended Practice", the BFF for the sub-diviison is 3000 LPM.

2.2.3. TOTAL WATER DEMAND VS EXISTING CAPACITY

Based on Table 5, the combined total water demand for the proposed sub-division will have a peak hour demand of 6,255 LPM, at a minimum pressure of 140kPa (20 psi). Additionally, these demands are primarily driven by a large potential fire among the mid-rise buildings (near Killaly Street West).

Table 5 - Summary of Total Water Demand of Sub-division

	Estimated Population (Capita)	Demand Rates (L/Capita/day)	Daily Demand (L/day)	Hourly Demand (L/min)	Peak Hour Factor (unitless)	Peak Hour Demand (L/min)
Residential	3923	300	1,176,900	817	4	3,269
Commercial (Employment)	69	300	20,700	14	2	29
Firefighting						3000
Total Demand			**1,197,600**			**6,298**

Killaly Street West has the following two hydrants which can offer the following water supply, and generally shows that there are sufficient existing water supply to meet both domestic water demand and firefighting demands.

- Hydrant #63000105 (north property boundary, intersection of Killaly St West and 3rd Ave)
  - 5227 L/min at 276kPa (expected to produce more than 6298L/min at 140kPa)
- Hydrant #63000107 (northeast corner, intersection of Killaly St West and West Side Rd)
  - 6995 L/min at 303kPa (fully satisfies requirements)

Looking at total system supply review, the potable water supply for the Site is serviced by City of Port Colborne Water Treatment Plant, located at 323 King Street, Port Colborne. It is a conventional surface water treatment plant, with Lake Erie (via the Welland Canal) as a source to the Plant. The plant has a rated capacity of 36.0 MLD. Based on the 2016 Water and Wastewater Master Servicing Plan by Niagara Region, the 5-year Peak (2011 – 2015) showed a Maximul Day Demand of 14.9MLD with a 41% utilization of total plant capacity.

When combined with Table 5 Daily Demand estimates of 1.2MLD, the proposed Site development would require an additional 1.2MLD or 3.3% of the total plant capacity, and the City of Port Colborne Water Treatment Plant would be considered as sufficient.

2.3.PROPOSED WATERMAIN

The proposed watermain servicing for the proposed residential sub-division has the following main summary and objectives:

- Watermain primary feeder shall be 300mm dia. C900, Class-235 (DR18) PVC
- Extension of West Side Road (Hydrant #63000107), south to Elgin Street cul-de-sac (Hydrant #63000576)
- Primary feeder loop, Elgin St (Hydrant #63000576) west to the centre of sub-division, then north to intersection of Killaly St W and 3rd Ave (Hydrant #63000105)
- 300mm dia. primary feeder main additionally from centre of sub-division, then west along Street M, then south along Street G, until intersection with Street D
- All other watermain secondary feeders shall be 200mm dia. Class-235 PVC, and services all sub-division internal roads or mid-rise mix-used buildings
- Lowest absolute elevation for proposed watermain is near the intersection of Killaly Street West and 3rd Street (Street N), at approx 178.00. This does not pose any static high water pressure risks at or above 550kPa.

The watermain is generally located 1m offset from the edge of asphalt / curb, and at minimum 1.5m below grade with appropriate frost protection, or at 1.8m below grade where bedrock interference is not an issue.

An EPANET water distribution network model was completed, and found that for total demand of 6,298L/min test along the main mid-rise buildings, or along the southwest corner of the proposed sub-division, that domestic water demand and firefighting water demand can be met at critical locations.

Detail calculations & charts are found in Appendix III.

3. WASTEWATER SERVICING

3.1. EXISTING CONDITIONS

The Region of Niagara is responsible for wastewater servicing provided to the residents and businesses for the City of Port Colborne. Based on the 2016 Wasterwater Master Servicing Plan Volume IV, for Niagara Region, produced by GM BluePlan, the City of Port Colbourne is serviced by the Seaway Wastewater Treatment Plant, located at 30 Prosperity Avenue, Port Colborne.

The Seaway Wastewater Treatment Plant currently services an existing population of 16,428 and 5,667 employees (based on 2015 data), and it is a modified conventional activated sludge facility, with a current rated capacity of 19.6MLD, and a peak flow capacity of 45.4MLD.

3.2. PROPOSED WASTEWATER LOADING

The wastewater loading has been calculated using the Ministry of Environment Conservation and Parks, Dec 2022, Design Criteria for Sanitary Sewers, Storm sewers and Forcemains.

These design parameters include the following:

Domestic Flow:	q = 300 L/capita/day (the same as water demand as per Table 3)
Extraneous Flow:	I = 0.28 L/s/Ha (infiltration)
Peaking Factor:	M=1+14/(4+(P/1000)^0.5), Harmon Peaking Factor
	Min=2.0, max=3.8
	P = Estimated population (capita)
Area:	Estimated Area (Ha)
Design Flow,	Q = q x M + I * A

Based on the above criteria, Table 6 below shows the estimated Average Daily Flow (MLD) and Total Peak Flow (L/s) for the Site.

Table 6 - Wastewater Loading Summary

Land Use	Area (Ha)	Estimated Population (Capita)	Average Daily Flow (L/s)	Average Daily Flow (MLD)	Harmon Peaking Factor (unitless)	Peak Daily Flow (L/s)	Infiltration Rate (L/s)	Total Peak Flow (L/s)
Low-Rise Residential	19.9	1953	6.8	0.59	3.6	24.4	5.6	29.9
Mid-rise mixed-use (Residential portion)	7.6	1970	6.8	0.59	3.6	24.6	2.1	26.7
Mid-rise mixed-use (Commercial portion)	0	69	0.2	0.0	2	0.5	0.0	0.5
Total				**1.2**				**57.1**

3.3. CAPACITY SUMMARY

Looking at the overall Seaway Wastewater Treatment Plant capacity, the historic average flow between 2011 ~ 2015 is averaged at 12MLD, only achieving 61% utilization out of the maximum of 19.6MLD.

Based on Table 6, the average daily flow expected for the Site is calculated at 1.2MLD, and potentially contributes to 6.1% of total plant capacity. When considering the totality of the proposed Site and existing conditions, there is an expected 67% of total plant utilization at 13.2MLD out of 19.6MLD available. Therefore, the City of Port Colborne – Seaway Wastewater Treatment Plant is considered as sufficient and does not triggers further evaluation at 80% and 90% of utilization.

Due to the large area of the Site and being a historically vacant brownfield site, the Site is bordered by three separate wastewater catchments:

- Arena Catchment to the north
  - Servicing all of the proposed mid-rise residential and commercial uses
  - Requires approx 27.2L/s of Arena Sewage Pump Station capacity
  - 2017 study shows 2041 capacity at a surplus of 65.2L/s (and thus sufficient)
- Elm Street Catchment to the east
  - Servicing approx 25% of the proposed low-rise residential
  - Requires approx 7.5L/s of Elm Sewage Pump Station capacity
  - 2017 study shows 2041 capacity at a surplus of 529L/s (and thus sufficient)
- Rosemount North Catchment to the south
  - Servicing approx 75% of the proposed low-rise residential
  - Requires approx 22.4L/s of Rosemount North Sewage Pump Station capacity
  - 2017 study shows existing peak wet weather flow of 73.8 L/s versus a pump capacity of 95.0L/s
  - When combined the proposed additional load, there will 96.2L/s loading versus a pump capacity of 95.0L/s
- Further studies and detailed review is required for the Rosemount North Sewage Catchment, specifically if the City of Port Colbourne implemented any wet weather infiltration reduction programs, as per the recommendations in the 2017 report

Additional details are found in Appendix IV.

4. STORMWATER MANAGEMENT

The Site was considered as the industrial land use historically throughout the years until the factory was demolished. The Site is currently vacant. The site property is considered rectangular in shape, measures approximately 139 acres (563,000 m2) and is situated at the south of Highway 3 and Killaly Street west, east of Cement Road, west of Akimbo Rd., north of Gord Harry Conservation Trail, Port Colborne, Ontario. The Site was on the industrial land use, with residential properties to the north, east and south, and a quarry pond to the west followed by the agricultural area. The previous concrete factory area was located southeast of the Site.

This Site was originally used to mine the limestone bedrock, which was converted into cement, and shipped by the rail along the southern property boundary to construct the Welland Canal.
The north portion of the property is currently flat agricultural hayfield, with a small stand of trees at the northwest corner. The east property boundary was along Akimbo Rd. and abutted Elgin Street, and there were currently two parks with manicured grass lawn and a pedestrian trail entering into the property. The south property boundary included a drainage channel running from southeast to southwest, and discharged into the Quarry Ponds. A railway line for parking & temporary storage purposes was on the south side of the drainage channel. The west property boundary was surrounded by Quarry pond as well as the island within the pond.

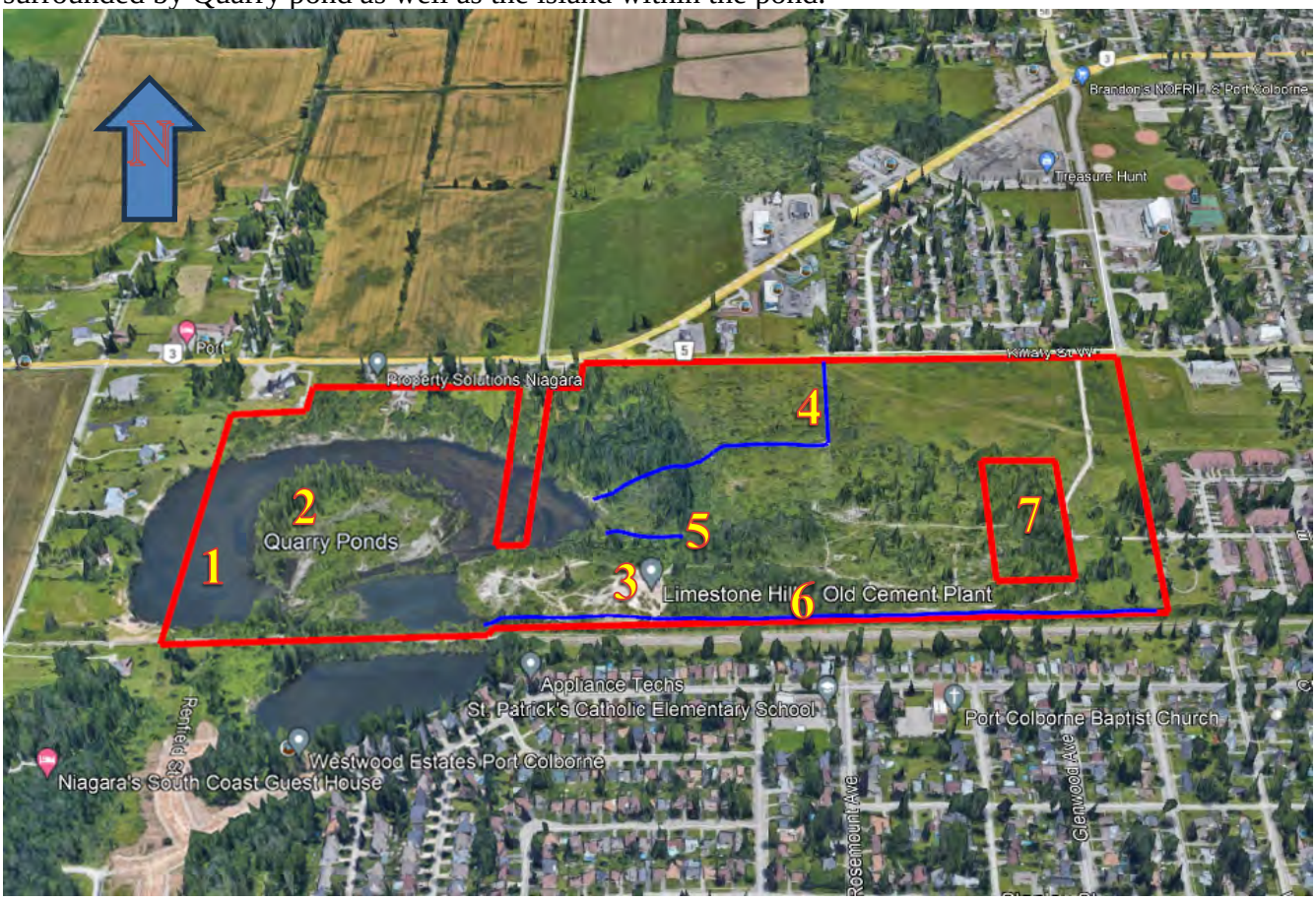

Figure 2 - Existing Site Location

In the above figure, the existing property is displayed which is:
#1: Quarry Pond (Area = 76,060 m^2)
#2: Wetland (Area = 31,237 m^2) – although the exact conformity to OWES is debated
#3: Limestone Stockpile (Area or TIMP = 11,805 m^2)
#4-6: Waterways (streams)

and the existing landscaped pervious areas which are located within the site boundary:
Parkland (Area= 359,917 m^2)
Grass (Area= 70,453 m^2)

and there is a Significant Woodland/Woodlot within the site boundary, in the eastern portion.

#7: Woodlot (Area= 22,047 m^2)

4.1.PRE-DEVELOPMENT CONDITIONS

Prior to development, the property is considered near-vacant with Total Impervious Surface Area of less than 16% (~9 ha) near the southwest boundary (old cement plant footprint) and in the west portion of the site (Quarry Pond), with grasses & trees for the remaining 84%. The ground surface is relatively flat and level (grading between 1 – 2% west and southwest) with minor undulations, with eroded beck / gravel primary soil allowing for relatively high infiltration rates.

Table 7 - Historical IDF Table, Port Colborne, 6136606

	Return Interval (years)					
Duration	2	5	10	25	50	100
5 min	92.80	116.30	131.80	151.50	166.00	180.50
10 min	64.50	83.60	96.20	112.20	124.10	135.80
15 min	52.10	69.10	80.30	94.50	105.10	115.50
30 min	35.70	48.90	57.60	68.70	76.90	85.00
1 hr	22.90	31.60	37.40	44.70	50.20	55.50
2 hr	13.80	18.60	21.70	25.70	28.60	31.60
4 hr	8.33	11.35	13.26	15.77	17.60	19.47
6 hr	5.80	8.10	9.50	11.40	12.80	14.20
12 hr	3.50	4.90	5.90	7.10	7.90	8.80
24 hr	2.00	2.80	3.30	3.90	4.40	4.80

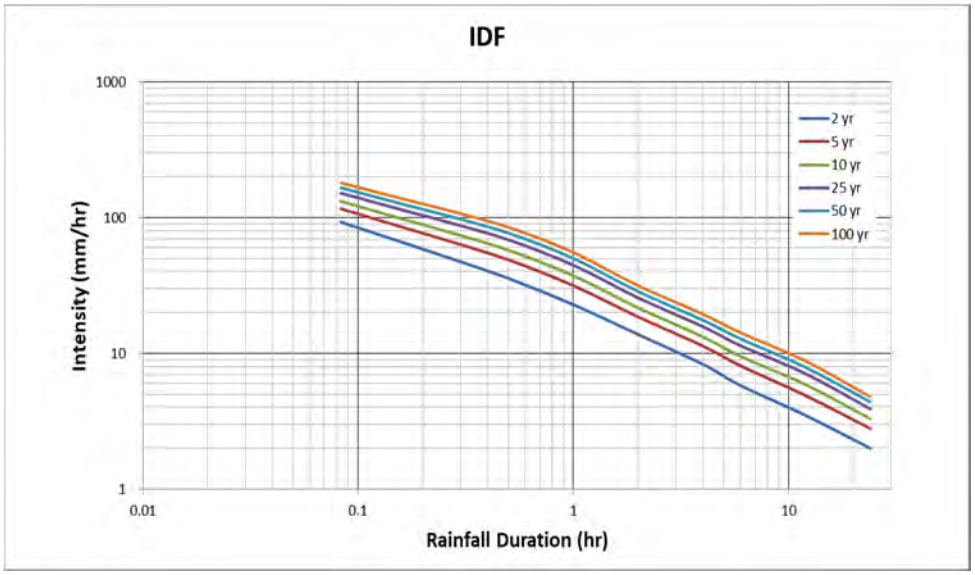

Figure 3 - Intensity-Frequency-Duration (IDF) Curves, Port Colborne, 6136606

- Pre-development 1 in 2 year, 1 in 5 year, 1 in 10 year, 1 in 25 year, 1 in 50 year and the 1 in 100 year design storm events, peak flow conditions are calculated as follows:
- Peak flow rate Modified Rational Formula: Qp = (0.001/3600) * A * C * Ca * i

    - A = Developed area in m^2 = 302,283.2 m^2**
    - C = runoff coefficient = 0.35 (Clay, parkland & grass, 3.4% TIMP, flat, MTO 1997 design chart 1.07 for rural & urban and Table 4.1, Niagara Region SWM Guidelines)

** Note: The Engineer unselected conservatively the effect of Key Natural Heritage and/or Hydrologic Features (KNHHF) in runoff coefficient estimation. This portion is located outside the development area plan and has the same effect on the runoff captured in pre- and post-development scenarios. In other words, the difference in runoff captured by this portion will be zero in both cases.

    - Ca = Antecedent Precipitation Factor = 1.0 for 2, 5 and 10 year, 1.10 for 25 year, 1.20 for 50 year, and 1.25 for 100 year.
    - i = average rainfall intensity in mm/hour (4, 12 & 24 hour IDF for Port Colborne Table 5 above)
    - Detailed calculations are contained within attached Excel Spreadsheet.

- Time of Concentration:

    - Airport Method if $C < 0.4$, $\boldsymbol{T_c = \frac{3.26 * (1.1 - C) * L^{0.5}}{S_w^{0.33}}}$

      Where:
      T_c= time of concentration (min)
      L = catchment length, (m)
      S_w = catchment slope (%)

C = runoff coefficient (-)

For Developed area: C = 0.35, *L* = 782m, S_w = *0.67%*
For EXT1: minimum T_c = 10min
For EXT3: C = 0.25, *L* = 355m, S_w = *0.5%*

- Bransby Williams Method if *C* > 0.4, $\boldsymbol{T_c = \frac{0.057 * L}{S_w^{0.2} * A^{0.1}}}$

  Where:
  T_c= time of concentration (min)
  L = catchment length, (m)
  S_w = catchment slope (%)
  A = catchment area (ha)

For EXT2: C = 0.60, *L* = 770m, A = 21.2 ha, S_w = *0.5%*

- When the time of concentration is calculated as less than 10 minutes, an assumed time of concentration for those catchments is 10 minutes.

- It should be noted that exterior catchments (Pond, Wetland, Parkland, and Woodland) will remain the same in pre- and post-development conditions, and they do not contribute drainage to the proposed storm sewer system, except the Woodland which will be directed into the surrounding streets and conveyed to the southern ditch/swale through storm sewer pipes.

Table 8 - Flow Rate Calculations using Modified Rational Method (Pre-Development Scenario)

Parameter	Catchment	Area (ha)	Runoff Coefficient (-)	Time of Concentration (min)	Design Storm					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Total Runoff (Qp) in cms (Intensity in mm/hr)	Developed area	30.2	0.35	78.2	0.66 (22.4)	0.77 (26.2)	0.85 (29.1)	1.07 (33.3)	1.30 (37.1)	1.48 (40.4)
	EXT1	2.2	0.20	10	0.09 (77.2)	0.11 (90.6)	0.12 (101.3)	0.16 (118.5)	0.19 (130.2)	0.22 (143.0)
	EXT2	21.2	0.60	37.1	1.32 (37.4)	1.54 (43.5)	1.71 (48.2)	2.15 (55.3)	2.59 (61.1)	2.95 (66.6)
	EXT3	0.52	0.25	65.6	0.01 (25.4)	0.01 (29.6)	0.01 (32.9)	0.01 (37.7)	0.02 (41.8)	0.02 (45.5)

4.2.POST-DEVELOPMENT CONDITIONS

The Client has proposed to construct a variety of types of townhouses, mid-rise mixed-use buildings, single detached dwellings, along with parking lots, sidewalks, and driveways on the property while retaining the existing natural heritage (woodlands, parklands, wetlands, and pond) outside of the developed area. Based on the low groundwater level observed during borehole drilling, monitoring wells in the last year, and high infiltration sandy clay layer existed in the site to a considerable depth, below a thin layer of upper clay layer mixed with sand and pebbles or stone chips, the Engineer proposes that rooftop downspouts along with parking lots and roads runoffs to be captured into storm sewers through catchbasins and then directed to the existing Quarry pond through box culvert (Catchment # 100 & EXT2) or swale (Catchment # 200, 400, 500, 600, EXT1, EXT3) or directly (Catchment # 300). Storm sewers shall be designed to drain all lands based on the Rational Method 5-year storm events. It is evident that precipitation influences the groundwater level but there was no significant relationship between the precipitation and the groundwater level inside the Site.

The results indicated that there is no significant relationship between the precipitation and the groundwater level inside the Site. For example, no water was observed in boreholes on 8th June after heavy rains on June 6-8, after rainfall termination, while the groundwater rose to a depth of 36-51 cm below ground, only in BH205, near the eastern shore of the Quarry Pond, in the third and fourth events with total rainfall of less than 2 mm before measurement. In other words, heavy rainfalls in several consecutive days in June did not have any effect on the groundwater level inside the Site, and minor changes in the only mentioned borehole in July and August are only related to recharging from the pond.

It is recommended that separate Oil/Grit Separators (OGS) units be installed in each outfall to treat the pollutant-generating areas, such as the roadways, driveways, parking spaces, etc.

Below is a summary of the proposed site conditions:

- Total site surface area (developed area) = 302,283.2 m^2
- Total pervious surface area (Parkland, Grass and landscapes) = 110,546.7 m^2 (36.6%)
- Total impervious surface area (TIMP) = 191,736.5 m^2 (63.4%)
    - 51,761.2 m^2– new buildings
    - 78,616.8 m^2– new driveways (municipal roadway)
    - 26,228.6 m^2– new parking lots
    - 18,352.5 m^2– new sidewalks
    - 33,554.8 m^2– new single family
- Rooftop downspouts, parking lot, driveway and interior road runoffs are captured by catchbasins.
- A box culvert in the northern portion of the site to collect the runoff from EXT2 and Catchment 100.
- Grass Swales along both sides of the property boundaries in the north and south.
- Post-development peak flow conditions are calculated as follows:
- Peak flow rate Modified Rational Formula: Qp = (1/360) * A * C * Ca * i

- A = area in m^2 = 30.3 ha

- C = runoff coefficient = 0.7 for developed area (Sandy clay or Clay & 63.4% TIMP, MTO 1997 design chart and Table 4.1, Niagara Region SWM Guidelines 1.07 for rural & urban), See Appendix IX for details runoff coefficient calculations for each catchment.

  - Ca = Antecedent Precipitation Factor = 1.0 for 2, 5 and 10 years, 1.10 for 25 years, 1.20 for 50 years, and 1.25 for 100 years.
  - i = average rainfall intensity in mm/hour (IDF for Port Colborne, Table 4 above)
  - See the post-development catchment area in Appendix VIII.

- Time of Concentration:
  - Airport Method:

For INT1: C = 0.25, *L* = 65.5m, S_w = *0.5%*
For INT2: C = 0.25, *L* = 137.6m, S_w = *0.5%*
For EXT1: minimum T_c = 10min

  - Bransby Williams Method if $C > 0.4$, $\boldsymbol{T_c = \frac{0.057 * L}{S_w^{0.2} * A^{0.1}}}$

For EXT2: C = 0.60, *L* = 770m, A = 21.2 ha, S_w = *0.5%*

  - The minimum time of concentration per city standards is 10 minutes.

- See Table 9: Post-development peak flows for the 1:2-year through 1:100-year design storms based on the Rational Method. The Modified Rational Method calculations are included in Appendix X for reference.

- See Table 10: To compare the Pre-development versus the Post-development peak flows for the 1:2-year through 1:100-year design storms based on the city's Rational for each catchment.

Table 9 - Flow Rate Calculations using Modified Rational Method (Post-Development Scenario)

Parameter	Catchment	Area (ha)	Runoff Coefficient (-)	Time of Concentration (min)	Design Storm					
					2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Total Runoff (Qp) in cms (Intensity in mm/hr)	100	9.17	0.81	14.9	1.31 (63.8)	1.53 (74.5)	1.70 (83.0)	2.17 (96.1)	2.60 (105.7)	2.97 (115.7)
	200	7.06	0.69	13.9	0.90 (66.1)	1.05 (77.3)	1.17 (86.1)	1.5 (99.9)	1.79 (109.8)	2.04 (120.3)
	300	1.29	0.67	15.0	0.15 (63.6)	0.18 (74.4)	0.20 (82.8)	0.25 (95.9)	0.30 (105.5)	0.35 (115.4)
	400	4.0	0.67	13.6	0.50 (66.9)	0.58 (78.3)	0.65 (87.3)	0.83 (101.3)	1.0 (111.4)	1.14 (122.0)
	500	3.72	0.74	14.3	0.50 (65.1)	0.58 (76.2)	0.65 (84.8)	0.83 (98.3)	0.99 (108.1)	1.13 (118.4)
	600	2.90	0.66	14.9	0.34 (63.9)	0.40 (74.7)	0.44 (83.2)	0.56 (96.4)	0.67 (106.0)	0.77 (116.0)
	INT1	0.58	0.25	28.2	0.02 (44.5)	0.02 (51.8)	0.02 (57.5)	0.03 (65.9)	0.03 (72.8)	0.04 (79.4)
	INT2	1.52	0.25	40.9	0.04 (35.1)	0.04 (40.9)	0.05 (45.3)	0.06 (51.9)	0.07 (57.4)	0.08 (62.5)
	EXT1	2.2	0.20	10	0.09 (77.2)	0.11 (90.6)	0.12 (101.3)	0.16 (118.5)	0.19 (130.2)	0.22 (143.0)
	EXT2	21.2	0.60	37.1	1.32 (37.4)	1.54 (43.5)	1.71 (48.2)	2.15 (55.3)	2.59 (61.1)	2.95 (66.6)
	EXT3	0.52	0.95	13.8	0.09 (66.3)	0.11 (77.5)	0.12 (86.3)	0.15 (100.2)	0.18 (110.2)	0.21 (120.7)

Table 10 - Comparison of Peak Flows for Pre and Post Development Based on Modified Rational Method

Parameters	Catchment	Design Storm					
		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Post-Development Peak Flows (cms) (Allowable Peak Flows = Pre-Development Peak Flows in cms)*	100	1.31 (0.2)	1.53 (0.23)	1.70 (0.26)	2.17 (0.33)	2.60 (0.39)	2.97 (0.45)
	200	0.90 (0.15)	1.05 (0.18)	1.17 (0.20)	1.5 (0.25)	1.79 (0.30)	2.04 (0.35)
	300	0.15 (0.03)	0.18 (0.03)	0.20 (0.04)	0.25 (0.05)	0.30 (0.06)	0.35 (0.06)
	400	0.50 (0.09)	0.58 (0.10)	0.65 (0.11)	0.83 (0.14)	1.0 (0.17)	1.14 (0.20)
	500	0.50 (0.08)	0.58 (0.09)	0.65 (0.10)	0.83 (0.13)	0.99 (0.16)	1.13 (0.18)
	600	0.34 (0.06)	0.40 (0.07)	0.44 (0.08)	0.56 (0.10)	0.67 (0.12)	0.77 (0.14)
	INT1	0.02 (0.01)	0.02 (0.01)	0.02 (0.02)	0.03 (0.02)	0.03 (0.02)	0.04 (0.03)
	INT2	0.04 (0.03)	0.04 (0.04)	0.05 (0.04)	0.06 (0.05)	0.07 (0.07)	0.08 (0.07)
	EXT1	0.09 (0.09)	0.11 (0.11)	0.12 (0.12)	0.16 (0.16)	0.19 (0.19)	0.22 (0.22)
	EXT2	1.32 (1.32)	1.54 (1.54)	1.71 (1.71)	2.15 (2.15)	2.59 (2.59)	2.95 (2.95)
	EXT3	0.09 (0.01)	0.11 (0.01)	0.12 (0.01)	0.15 (0.01)	0.18 (0.02)	0.21 (0.02)

Note: (*1.32*) denotes pre-development peak flow.

* Allowable Peak Flow = Pre-dev. Peak Flow – Uncontrolled Post-dev. Peak Flow (The allowable release rate will be set to the pre-development flow as there is no Uncontrolled Post-dev. Peak Flow in this project)

The existing property is currently vacant (brownfield) and is not serviced by any storm sewer or stormwater management facilities, except a Quarry Pond located within the site boundary in the southwest with a total area of 7.6ha. Since the total post-development peak flows from the site exceed the pre-development levels due to TIMP increases, quantity controls are technically required, but fully satisfied with the Quarry Pond to act as a traditional stormwater management pond.

Based on the detailed Modified Rational Method calculations in the SWM Report, Appendix X, it is concluded that the proposed development will result in an increase in surface runoff to the Quarry Pond of 3538 m^3 from the proposed development during the worst-case scenario, i.e., 100-year storm event. When compared to the storage capacity of the pond with a total surface of 7.6 ha, this will result in an increase in water level of 4.7 mm over existing conditions. This represents a limited impact on the pond.

Due to the high infiltration rate along with low groundwater table in this site, the proposed stormwater facility consists of a buried storm sewer system along with separate outlet structures for each catchment outfall. Outlets will be discharged into the Quarry Pond finally, through a box culvert or swale which will be established towards the existing pond on the site property to the west/south.

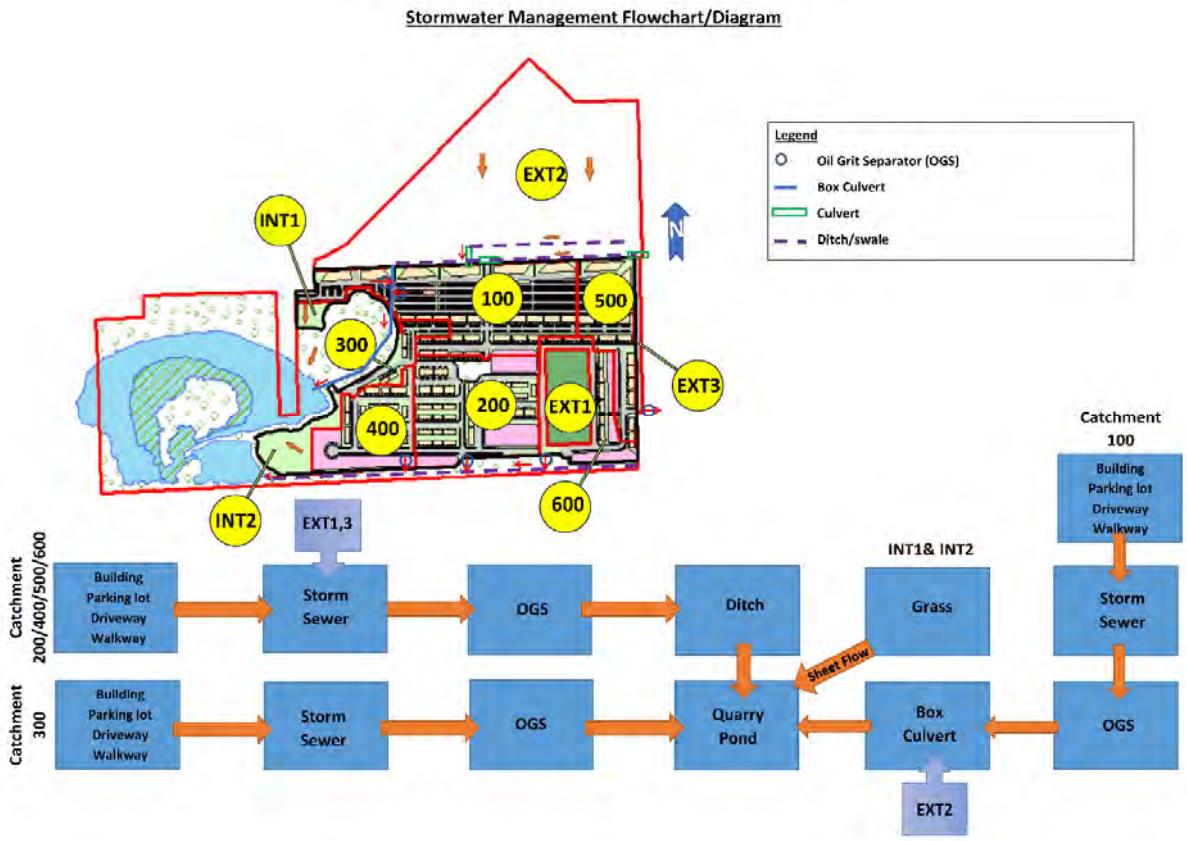

Figure 4 - Stormwater Management Flowchart / Diagram

5. STORM DRAINAGE

5.1. MINOR SYSTEM DESIGN

As per the Niagara Region Stormwater Management Guidelines, Dec 2022, storm sewers are designed for the minor system design of 5-year return period. Rainfall intensity and IDF curves are found based on Table 7 and **Error! Reference source not found.**.

Based on topographic survey, the existing site conditions (as well as the overall local-regional flow) consists of sheet flow southwest, towards the quarry pond. The proposed minor system design consists of multiple catchment areas, and generally falls within the main outlets:

- Northwest corner of Site; overland flow re-alignment outlet
- West-central of the Site; discharging into the local quarry pond via escarpment cliff
- South property boundary; south drainage channel into the quarry pond
    a. Sub-catchment – along east property boundary; proposed West Side Rd extension and existing storm sewer from Elgin St cul-de-sac
    b. Sub-catchment – central and south areas of the Site drains directly into the drainage ditch via direct storm sewer connection

5.2. MAJOR SYSTEM DESIGN

Major system events are generally considered any event greater than 1:5 year storm. These are evaluated for overland flow. In general overland routes on the western section of the site (between Quarry pond and developed area) which are undisturbed are expected to follow the pre-grading. The southwest portion being a locally elevated region, and flowing northwest towards Quarry Pond.

There are no major differences between pre-development and post-development overland routes, with a general flow direction to the west Quarry pond, or south into the drainage ditch, then west again into the pond.

Several major structures have been designed to accommodate major 1:100 year storm events, including:

- The northwest corner ditch re-alignment along Killaly Street West
- The box-culvert as part of the ditch re-alignment process

6. GRADING

Based on the topographic survey of the Site, the property contains a variety of slopes, with the north and eastern sections of the site as generally flat at 0.5% – 2% grade, while the central, south, and west portions of the site as fully disturbed with varying levels of old foundations, exposed bedrock, constructed drainage ditches, and other hilly topography.

Based on the Environmental Site Assessment Phase II Report completed by King EPCM, there is a large potential area of contamination and exceedance of metals. These areas corresponds to the historic brownfield locations of the quarry factory that made Portland cement powder, as well as the aerial discharge of exhaust fumes, coal dust, and general metallic dusts.

These proposed areas will need to be lightly stripped (approx 0.3m for initial discussion purposes, and then backfilled with off-site materials. These remediation efforts are generally considered as part of Niagara Region Brownfield Remediation projects. Additionally, bedrock is found at varying depths, with the top weathered surface bedrock anywhere between 0m and 0.6m below grade. Weathered bedrock can still be excavated / reasonably chipped with a hydraulic hammer, with feasible excavation / removal down to approx 1.0 ~ 1.5m below grade before tool refusal.

Exact depth of reasonable excavation is currently set at a conservative depth of 0 ~ 0.6m below grade.

In general, soil and granular material will need to be brought onto site (with some possibility of on-site reuse of existing quarry materials), for road bases, as well as soil fill and soil cover for sufficient frost protection of pipes and municipal services.

7. VEHICLE AND PEDESTRIAN ACCESS

Vehicle access into the proposed residential sub-division can be separated into three major routes:

1. 3rd Avenue extension past Killaly Street West, currently called Street N
2. West Side Road extension past Killay Street West (this is legally owned by the City of Port Colborne, and developed / constructed by the Client, on behalf of the City)
3. Elgin Road extension of an existing cul-de-sac, and intersecting with proposed Street B

Several major design criteria was considered with the above proposal, specifically:

- All road access to the proposed mid-rises along Killaly Street West shall be from the rear-lot internal roads (no driveway access onto Killaly Street West), with exception to the above description of the intersection of Killaly Street West and 3rd Avenue.
- Block 35 is a natural heritage area with minimal development, and roads acting as a buffer between residential development and the Block
- Block 36 is a proposed park
- Rosemount Road, at the south property boundary, currently does not extend into the subject property. There has been significant pushback from the current tenant of the railroad yard south of the Site property. Since the legal owner of the railway lands is the City of Port Colborne, appropriate discussion should be had between the tenant and the City in order to come to a mutually acceptable solution (which is not on the burden of the Client).

Pedestrian access is provided along all of the proposed municipal roads with standard concrete sidewalks. Additionally, Killaly Street West is proposing to have a storm ditch re-alignment along the northwest corner of the property. Based on historic and current site survey works, there is approx 7.8m of width between existing Killaly Street W edge of asphalt and the new legal property (after road widening). This is sufficient for the proposed ditch re-alignment as well as a concrete side walk.

8. SUMMARY

In summary, the proposed residential sub-division includes multiple mid-rise mixed-use buildings, as well as a variety of townhouses and single family dwellings. Based on Niagara Region People Per Unit recommendations for City of Port Colborne, there is an estimated population of 3991 people and employment equivalents within the proposed areas.

Total water supply is generally sufficient based on the City of Port Colborne Water Treatment Plant, located at 323 King Street, Port Colborne. It is a conventional surface water treatment plant, with Lake Erie (via the Welland Canal) as a source to the Plant. The plant has a rated capacity of 36.0 MLD. Based on the 2016 Water and Wastewater Master Servicing Plan by Niagara Region, the 5-year Peak (2011 – 2015) showed a Maximul Day Demand of 14.9MLD with a 41% utilization of total plant capacity. The proposed population of 3991 people expects to add 1.2MLD, or 3.3% of the total plant capacity.

Total wastewater sewer capacity is regulated by the Seaway Wastewater Treatment Plant capacity. The average daily flow expected for the Site is calculated at 1.2MLD, and potentially contributes to 6.1% of total plant capacity. When considering the totality of the proposed Site and existing conditions, there is an expected 67% of total plant utilization at 13.2MLD out of 19.6MLD available. Localized pump-station volumes are generally acceptable, with exception to the Rosemount North SPS that requires further detailed analysis.

Stormwater runoff at the site is currently overland flow into the historic quarry pond for infiltration into bedrock and evapotranspiration. Proposed storm sewers shall manage all minor storm events up to 1:5 year events, generally discharging to either the west ditch re-alignment portion, or to the south property boundary storm ditch. Since the quarry pond does not have any outflows, TSS and phosphorus is fully captured within the quarry pond with no off-site discharge expected.

This report has been prepared for the sole use of 1000046816 Ontario Limited. or any project relevant approval authorities. King EPCM accepts no liability for claims arising from the use of this report, or from actions taken or decisions made as a result of this report, by parties other than the Client.

Tony Wang, P. Eng
Principal Engineer
King EPCM

APPENDIX I – SITE GRADING PLAN & SITE SERVICING PLAN

GENERAL NOTES:

1. THIS IS A COMBINED LEGAL SURVEY AND SITE TOPOGRAPHIC SURVEY:
   - LEGAL SURVEY IS BASED ON "BARICH GRENKIE SURVEYING LTD." ON DEC. 22, 2022
   - SPOT ELEVATIONS ABUTTING PROPERTY BOUNDARY AND ROADS ARE BASED ON "BARICH GRENKIE SURVEYING LTD." ON DEC. 20, 2022
   - ELEVATION CONTOUR LINES WITHIN PROPERTY BOUNDARY ARE BASED ON "CHAMBERS AND ASSOCIATES SURVEYING LTD." ON DEC. 20, 2010.
   - NATURAL HERITAGE CONSIDERATIONS AND WATER LEVEL ARE BASED ON "TERRASTORY ENVIRONMENTAL CONSULTING INC." ON OCT. 30, 2022
2. ALL MEASUREMENTS STATED IN METERS

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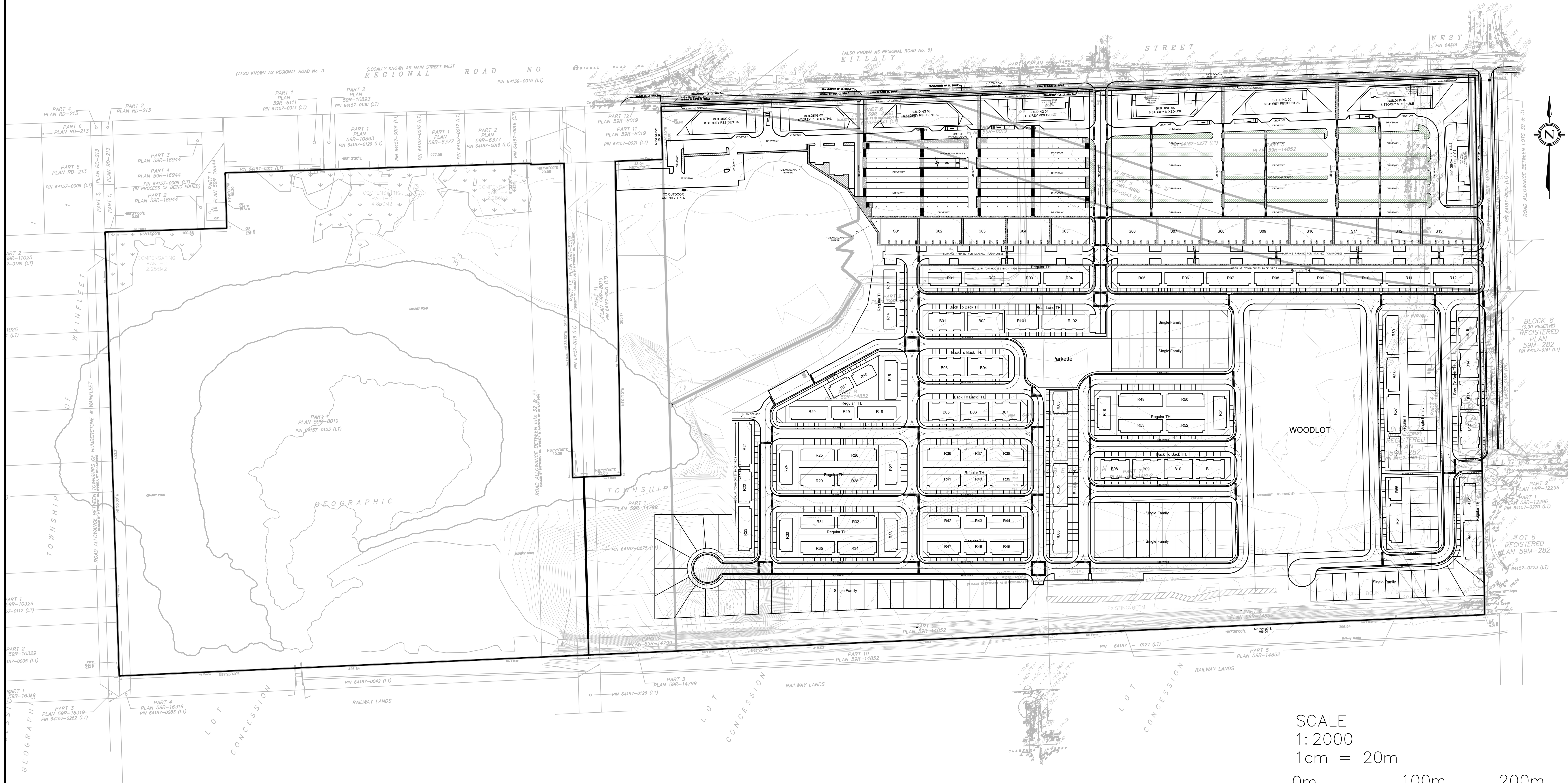

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KEY MAP
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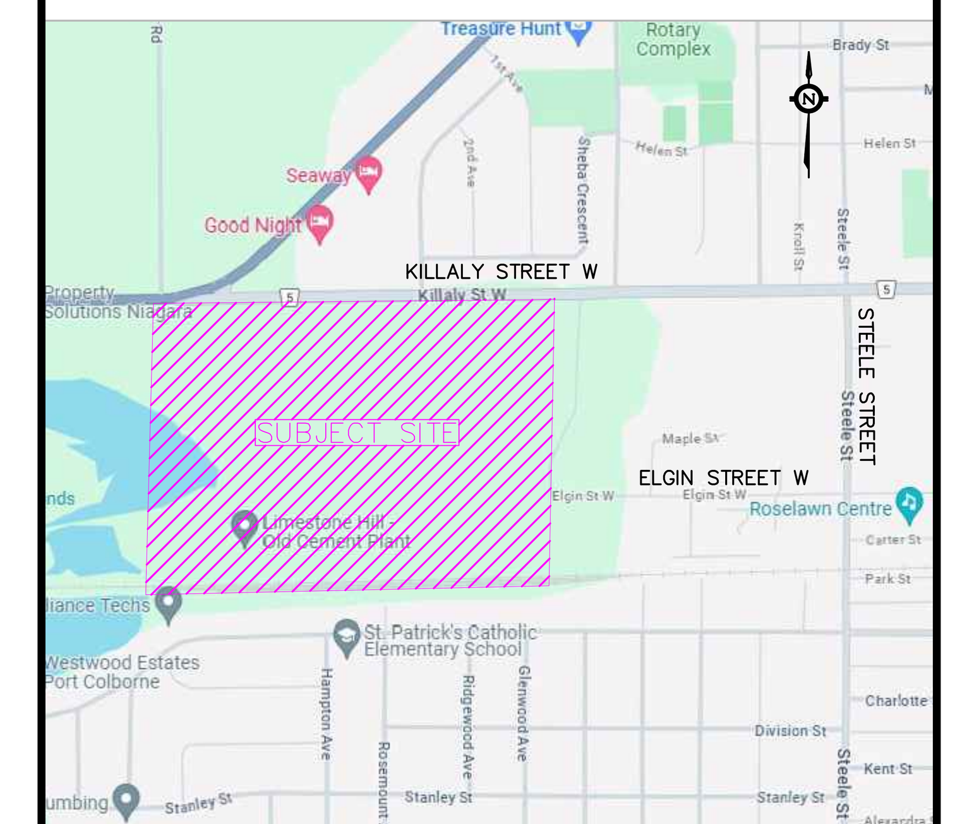

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DATE	JAN. 19, 2024

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CLIENT

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PROJECT NAME

MAPLEVIEW PORT COLBORNE HOMES DEVELOPMENT AREA

PROJECT LOCATION

PARTS OF LOT 31 & 32, CONCESSION 1, TOWNSHIP OF HUMBERSTONE, CITY OF PORT COLBORNE, KILLALY STREET WEST

PRINT TITLE

DEVELOPABLE AREA (30M OFFSET FROM WATER LEVER) & NATURAL HERITAGE CONSIDERATIONS

FILE No.

SITE PLAN

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V2	ISSUED TO CLIENT	JAN 19, 2024	K.L.	
V3	FIRST SUBMISSION	FEB 06, 2024	K.L.	

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LEGEND:

- 315.58 EXISTING ELEVATION
- 182.70 BEDROCK ELEVATION
- 182.70 PROPOSED ELEVATION
- EXISTING SURFACE FLOW ROUTE
- PROPOSED SURFACE FLOW ROUTE
- PROPOSED SANITARY MANHOLE
- PROPOSED STORM MANHOLE
- EXISTING MANHOLE
- PROPOSED HYDRANT AND VALVE
- PROPOSED GATE VALVE
- EXISTING HYDRANT
- EXISTING GATE VALVE
- BOREHOLE

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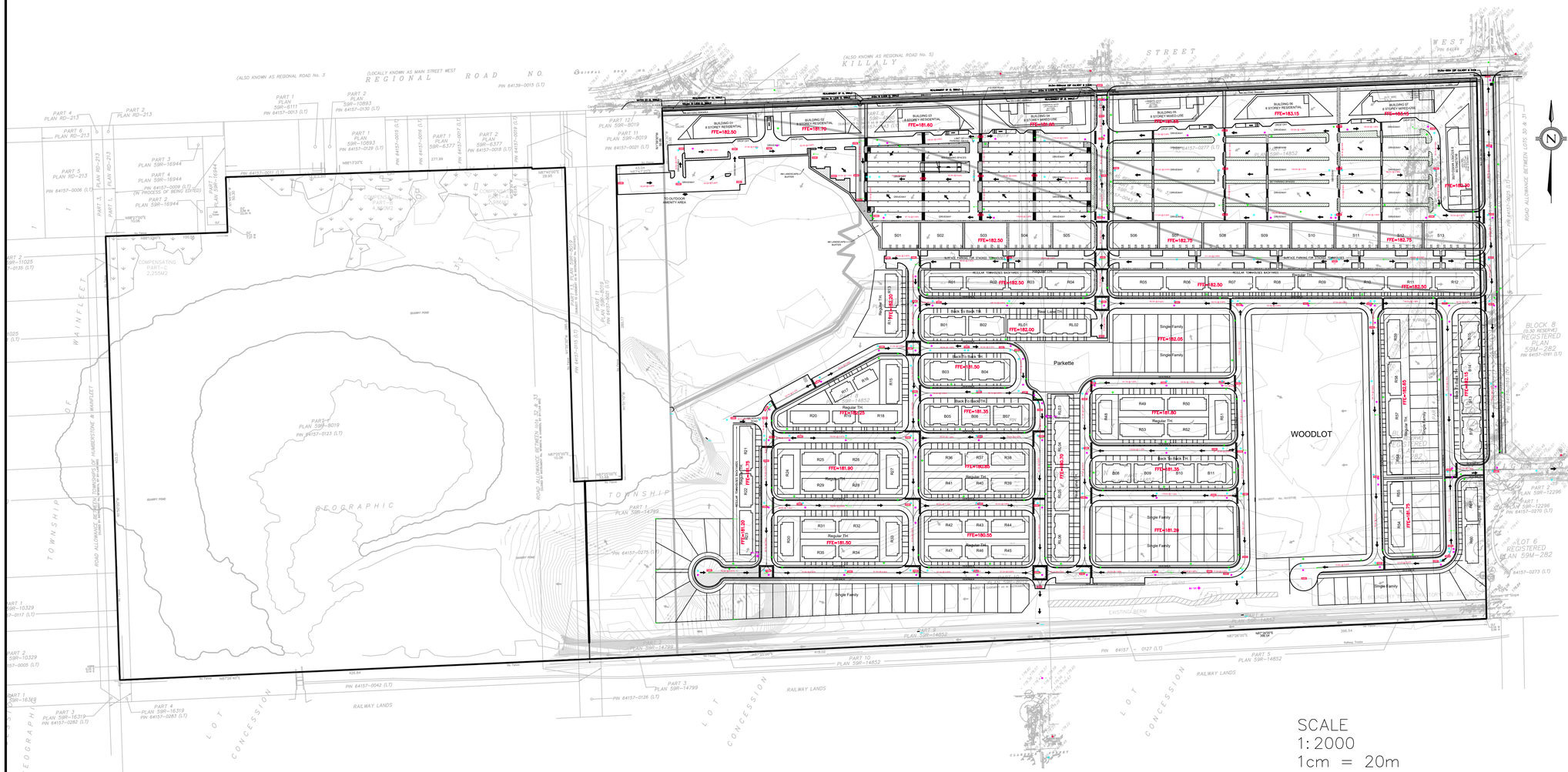

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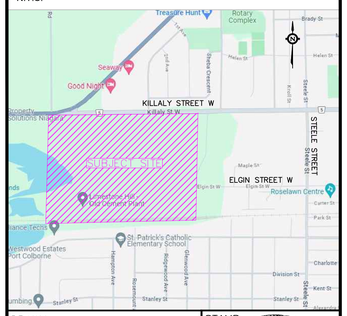
KEY MAP

N.T.S.



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DATE: JAN. 19, 2024

STAMP: LICENSED PROFESSIONAL ENGINEER, Y. T. WANG, 100228476, FEB 06, 2024, PROVINCE OF ONTARIO

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PROJECT NAME

MAPLEVIEW PORT COLBORNE HOMES DEVELOPMENT AREA

PROJECT LOCATION

PARTS OF LOT 31 & 32, CONCESSION 1, TOWNSHIP OF HUMBERSTONE, CITY OF PORT COLBORNE, KILLALY STREET WEST

PRINT TITLE

DEVELOPABLE AREA (30M OFFSET FROM WATER LEVER) & NATURAL HERITAGE CONSIDERATIONS

FILE No.

GRADING PLAN

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V2	ISSUED TO CLIENT	JAN 19, 2024	K.L.	
V3	FIRST SUBMISSION	FEB 06, 2024	K.L.	

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2. ALL MEASUREMENTS STATED IN METERS

LEGEND:

- ×315.58 EXISTING ELEVATION
- EXISTING SURFACE FLOW ROUTE
- PROPOSED SURFACE FLOW ROUTE
- PROPOSED STORM MANHOLE
- EXISTING MANHOLE
- PROPOSED STORM SEWER
- FUTURE STORM SEWER
- EXISTING STORM SEWER
- BOREHOLE

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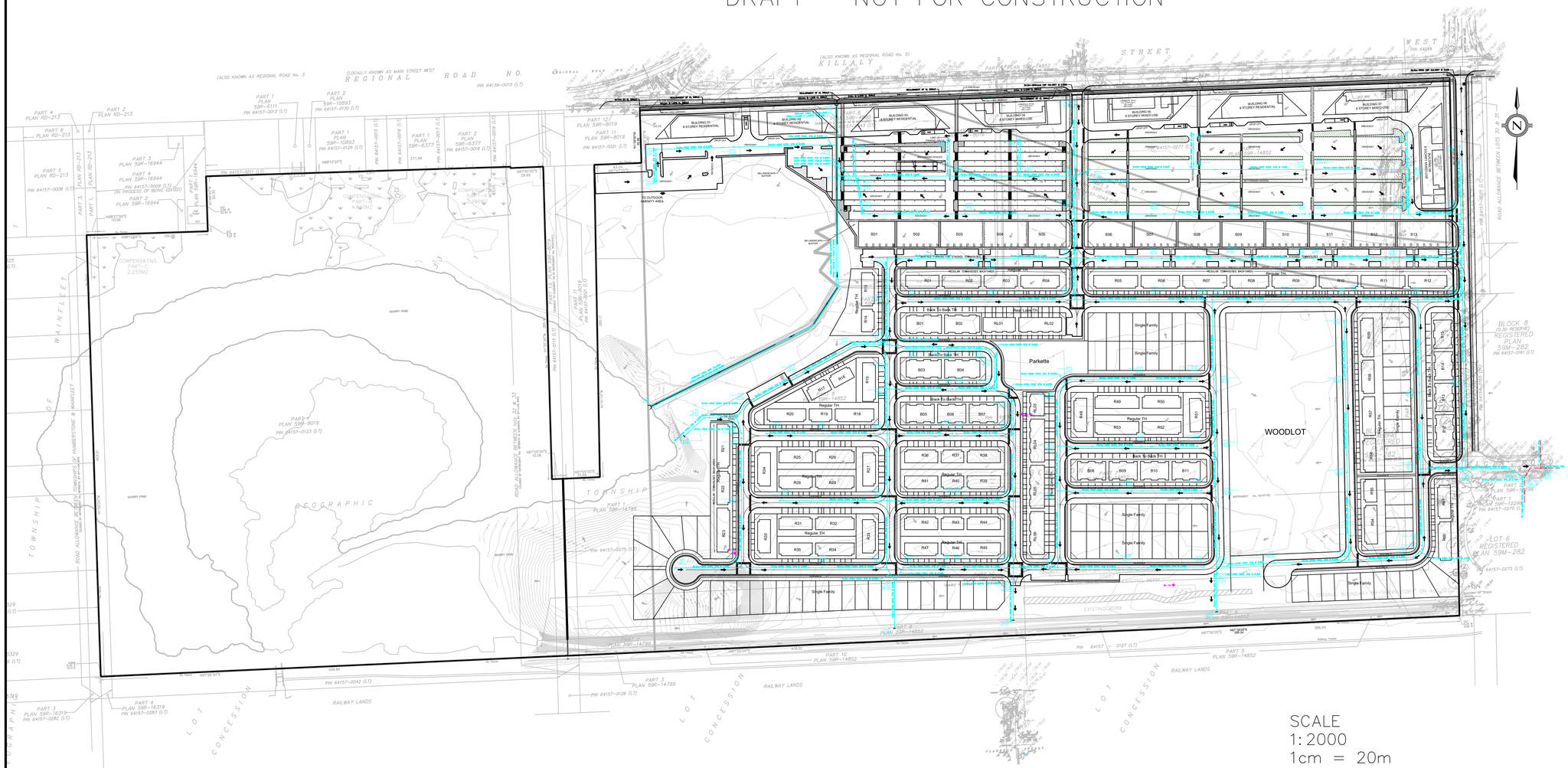

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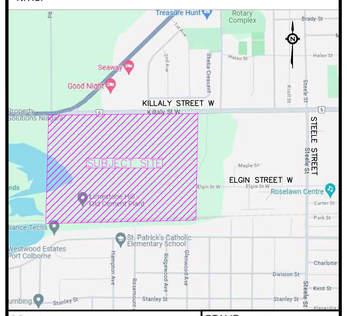

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PRINT TITLE

DEVELOPABLE AREA (30M OFFSET FROM WATER LEVER) & NATURAL HERITAGE CONSIDERATIONS

FILE No.

STORM SERVICING PLAN

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V2	ISSUED TO CLIENT	JAN 19, 2024	K.L.	
V3	FIRST SUBMISSION	FEB 06, 2024	K.L.	

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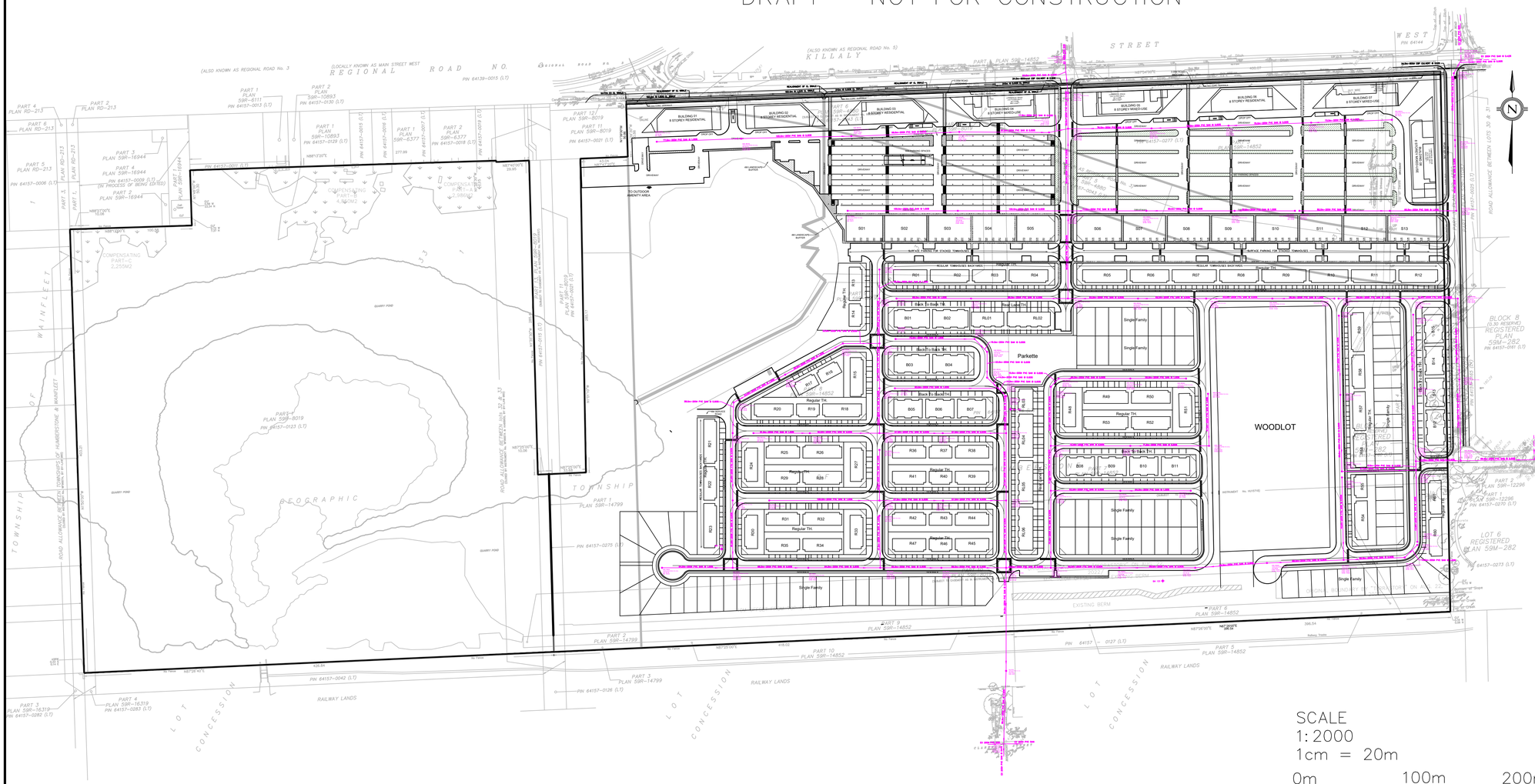
2. ALL MEASUREMENTS STATED IN METERS

LEGEND:

- PROPOSED SANITARY MANHOLE
- EXISTING MANHOLE
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- BOREHOLE

DRAFT – NOT FOR CONSTRUCTION



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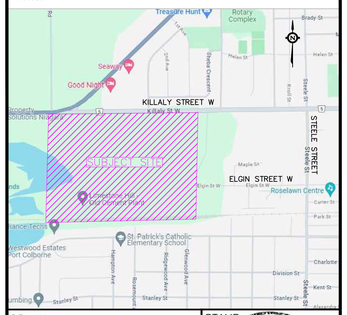

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PRINT TITLE

DEVELOPABLE AREA (30M OFFSET FROM WATER LEVER) & NATURAL HERITAGE CONSIDERATIONS

FILE No.

SANITARY SERVICING PLAN

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2. ALL MEASUREMENTS STATED IN METERS

LEGEND:

- PROPOSED HYDRANT AND VALVE
- PROPOSED GATE VALVE
- EXISTING HYDRANT
- EXISTING GATE VALVE
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- BOREHOLE

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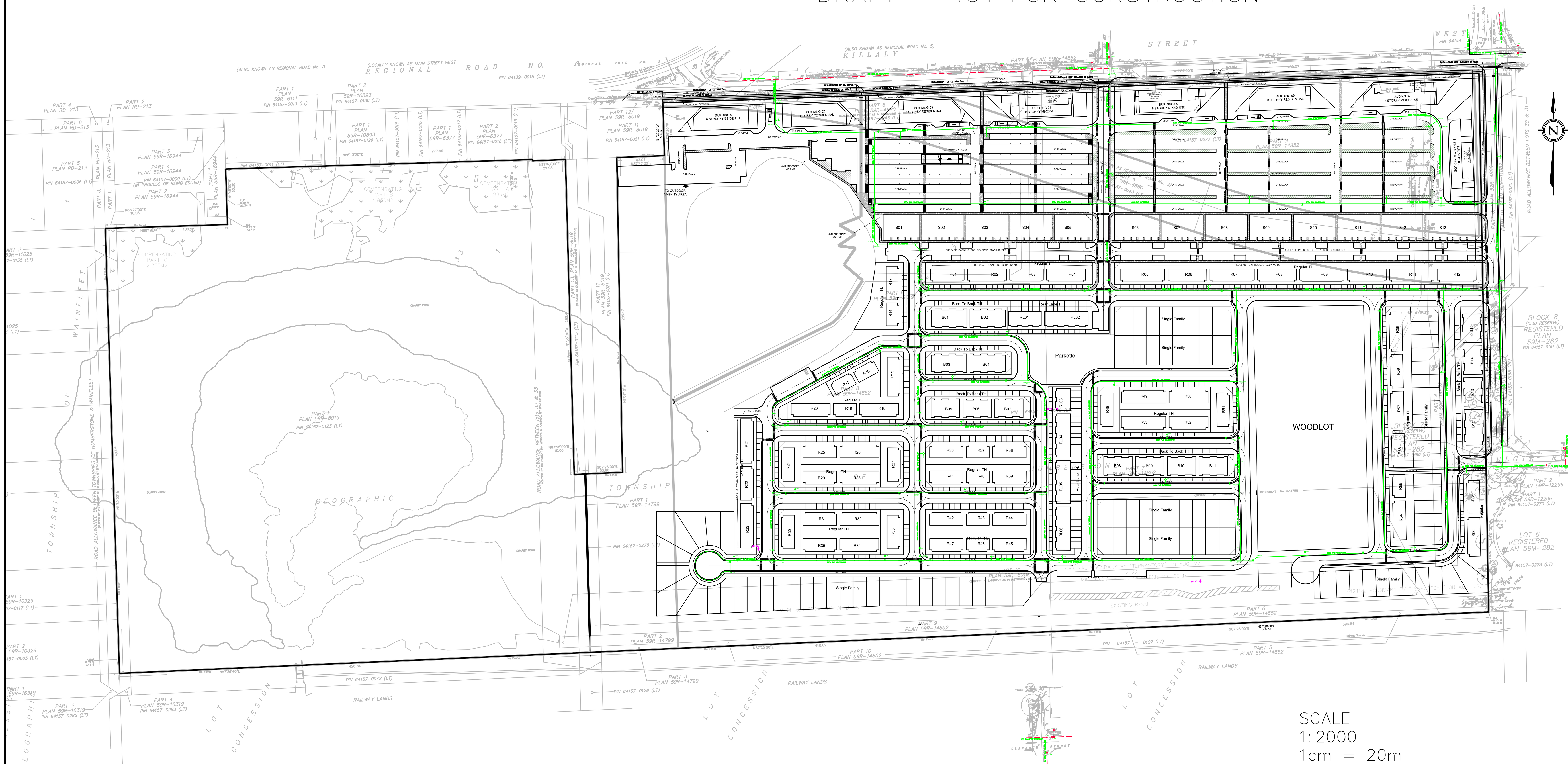

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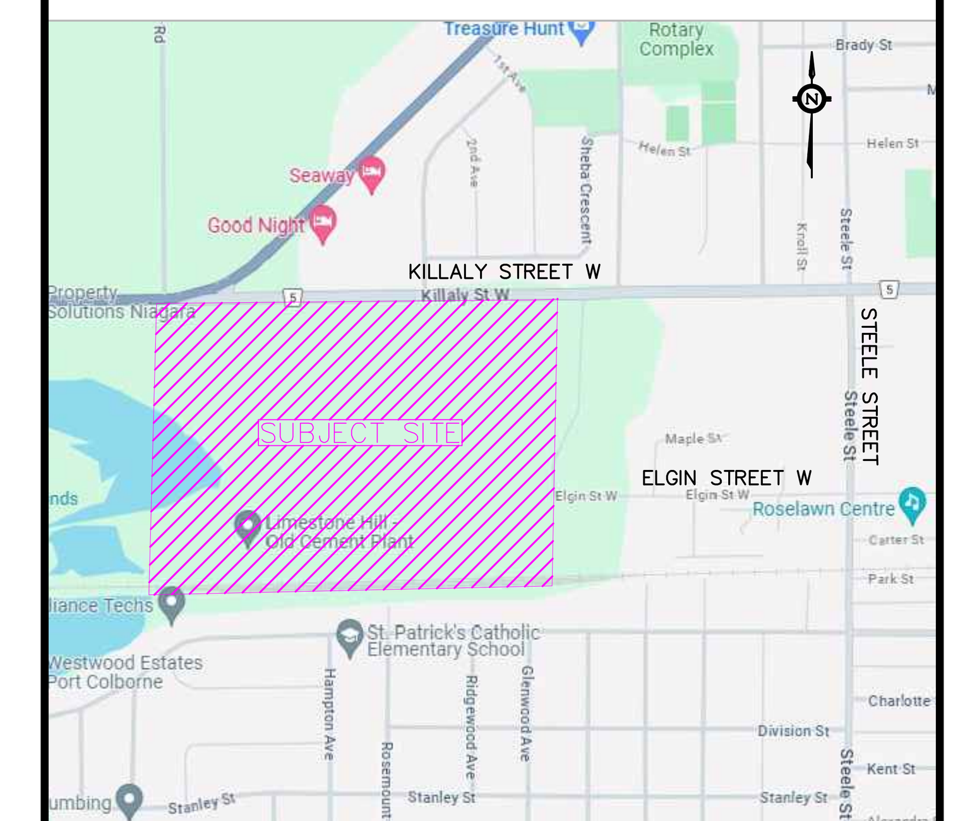

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MAPLEVIEW PORT COLBORNE HOMES DEVELOPMENT AREA

PROJECT LOCATION
PARTS OF LOT 31 & 32, CONCESSION 1, TOWNSHIP OF HUMBERSTONE, CITY OF PORT COLBORNE, KILLALY STREET WEST

PRINT TITLE
DEVELOPABLE AREA (30M OFFSET FROM WATER LEVER) & NATURAL HERITAGE CONSIDERATIONS

FILE No.
WATERMAIN PLAN

No.	ISSUED FOR:	DATE	DRAW BY	CHECK
V2	ISSUED TO CLIENT	JAN 19, 2024	K.L.	
V3	FIRST SUBMISSION	FEB 06, 2024	K.L.	

APPENDIX II – HISTORIC WATER SUPPLY SYSTEM ENGINEERING RECORDS & HYDRANT TEST RECORDS


Minor Road
Main Street West
63000176
63000175
63000329
63000330
63000203
63000198
63000031
63000028
63000106
63000328
63000104
63000105
63000107
63000108
63000344
63000110
63000349
63000350
63000178
63000647
63000606
63000586
Killaly Street West
Sheba Crescent
3rd Avenue
2nd Avenue
1st Avenue
Sheba Crescent
West Side Road
Oakwood Street
Knoll Street
Steele Street
Brock Street
63000574
63000578
63000577
63000576
63000607
63000579
63000608
63000609
63000610
63000603
Carter Street
63000575
Portal Drive
Elgin Street
Maple Street
63000267
63000016
63000596
Tugboat Lane
63000130
63000131
63000080
63000132
63000265
63000097
63000096
63000087
63000086
63000084
63000085
63000094
63000095
63000653
63000598
Clarence Street
Hampton Avenue
Rosemount Avenue
Glenwood Avenue
Homewood Avenue
Linwood Avenue
Clare Avenue
Forest Avenue
Lockmaster Laneway
Charlotte Street
Michael Drive North

Maintenance Date	May/30/2020 16	Maintenance Time	01:21 PM
Hydrant GIS Id	63000105		
Inspected By	Bruce Vandelaar		
Street Name	KILLALY STREET WEST	Zone Id	2
Fire Deparment Id	PC711	Area Number	6
		Owner Type	Municipal
Make	CENTRY	Manufactured By	Clow Canada
Model		Manufacture Dare	
Barrrel Type	Compression	Main Valve Size	4 1/2"
Exact Location:	IN FRONT OF # 1 THIRD AVENUE		
General Comments			
Attachments			

If pressure drop between static pressure and residual pressure is less than 10 psi when flowing one hydrant, open up an additional flow hydrant and record full open pitot pressure.

HYDROSTATIC TEST CONT'D	PRESSURES	COMMENTS
Hydrant Pressure		
STATIC PRESSURE:	60	
RESIDUAL PRESSURE	40	
Flow Hydrant 1		
HYDRANT ID	0328	
FULL OPEN PITOT PRESSURE HYDRANT 1	32	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	0.54	
DURATION FLUSHED (MINUTES)	1	
WATER USED HYDRANT 1 m3	3.59	
Flow Hydrant 2		
HYDRANT ID		
FULL OPEN PITOT PRESSURE HYDRANT 2	0	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	0.00	
DURATION FLUSHED (MINUTES)	0	
WATER USED HYDRANT 2 m3	0.00	
WATER USED FOR FLOW TESTING: (m3)	3.59	
FIRE FLOWS: U.S. GPM	Current Fire Flow (167.79) **1381**	
COLOUR:	Colour Green	

Min >	Max <	Hydrant Colour
0	499	Red
500	999	Orange
1000	1499	Green
1500		Blue

General Comments	

Maintenance Date	July/04/2020	Maintenance Time	02:10 PM
Hydrant GIS Id	63000107		
Inspected By	Steven Hill		
Street Name	KILLALY STREET WEST	Zone Id	2
Fire Deparment Id		Area Number	4
		Owner Type	Municipal
Make		Manufactured By	
Model		Manufacture Dare	
Barrrel Type		Main Valve Size	
Exact Location:	IN FRONT OF #327 KILLALY STREET WEST		
General Comments			
Attachments			

If pressure drop between static pressure and residual pressure is less than 10 psi when flowing one hydrant, open up an additional flow hydrant and record full open pitot pressure.

HYDROSTATIC TEST CONT'D	PRESSURES	COMMENTS
Hydrant Pressure		
STATIC PRESSURE:	56	
RESIDUAL PRESSURE	44	
Flow Hydrant 1		
HYDRANT ID		
FULL OPEN PITOT PRESSURE HYDRANT 1	37	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	0.68	
DURATION FLUSHED (MINUTES)	3	
WATER USED HYDRANT 1 m3	11.59	
Flow Hydrant 2		
HYDRANT ID		
FULL OPEN PITOT PRESSURE HYDRANT 2	0	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	0.00	
DURATION FLUSHED (MINUTES)	0	
WATER USED HYDRANT 2 m3	0.00	
WATER USED FOR FLOW TESTING: (m3)	11.59	
FIRE FLOWS: U.S. GPM	Current Fire Flow (167.79) **1848**	
COLOUR:	Colour Blue	

Min >	Max <	Hydrant Colour
0	499	Red
500	999	Orange
1000	1499	Green
1500		Blue

General Comments	

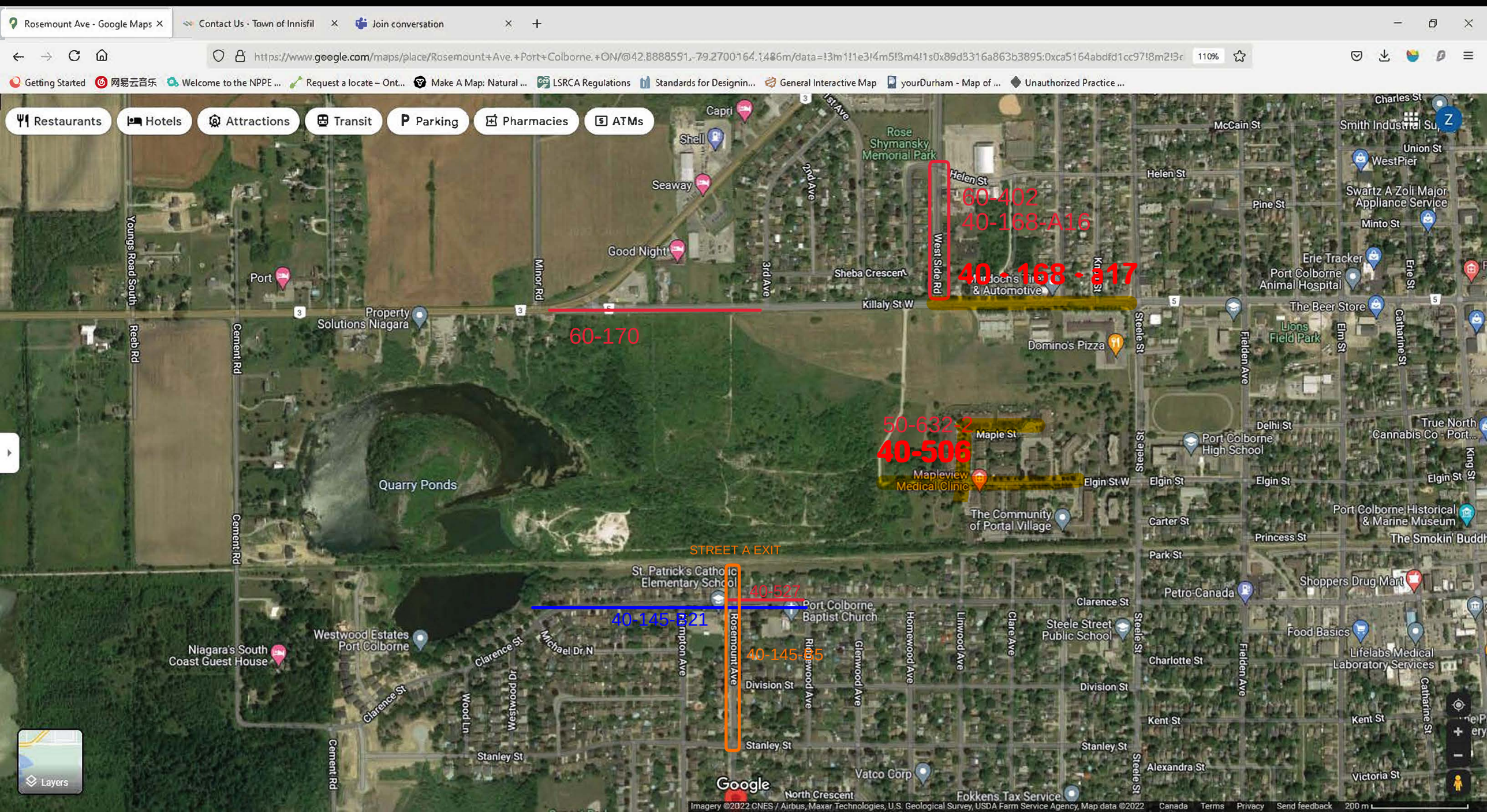
Maintenance Date	May/19/2020	Maintenance Time	09:28 AM
Hydrant GIS Id	63000576		
Inspected By	Bruce Vandelaar		
Street Name	MAPLE AVENUE	Zone Id	2
Fire Deparment Id	PC415	Area Number	4
		Owner Type	Municipal
Make	McAVITY	Manufactured By	Clow Canada
Model	M67B	Manufacture Dare	2003
Barrrel Type	Compression	Main Valve Size	5 1/4"
Exact Location:	ACROSS FROM #2 MAPLE AVE.		
General Comments			
Attachments			

If pressure drop between static pressure and residual pressure is less than 10 psi when flowing one hydrant, open up an additional flow hydrant and record full open pitot pressure.

HYDROSTATIC TEST CONT'D	PRESSURES	COMMENTS
Hydrant Pressure		
STATIC PRESSURE:	56	
RESIDUAL PRESSURE	46	
Flow Hydrant 1		
HYDRANT ID	0577	
FULL OPEN PITOT PRESSURE HYDRANT 1	35	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	1.04	
DURATION FLUSHED (MINUTES)	1	
WATER USED HYDRANT 1 m3	3.76	
Flow Hydrant 2		
HYDRANT ID		
FULL OPEN PITOT PRESSURE HYDRANT 2	0	
FREE CHLORINE RESIDUAL ONCE FLUSHING COMPLETE	0.00	
DURATION FLUSHED (MINUTES)	0	
WATER USED HYDRANT 2 m3	0.00	
WATER USED FOR FLOW TESTING: (m3)	3.76	
FIRE FLOWS: U.S. GPM	Current Fire Flow (167.79) **1984**	
COLOUR:	Colour Blue	

Min >	Max <	Hydrant Colour
0	499	Red
500	999	Orange
1000	1499	Green
1500		Blue

General Comments	


Rosemount Ave - Google Maps
Contact Us - Town of Innisfil
Join conversation
https://www.google.com/maps/place/Rosemount+Ave,+Port+Colborne,+ON/@42.8888551,-79.2700164,1486m/data=!3m1!1e3!4m5!3m4!1s0x89d3316a863b3895:0xca5164abdfd1cc97!8m2!3d
110%
Getting Started
网易云音乐
Welcome to the NPPE ...
Request a locate – Ont...
Make A Map: Natural ...
LSRCA Regulations
Standards for Designin...
General Interactive Map
yourDurham - Map of ...
Unauthorized Practice ...
Restaurants
Hotels
Attractions
Transit
Parking
Pharmacies
ATMs
60-402
40-168-A16
40 - 168 - 317
60-170
50-632-2
40-506
STREET A EXIT
40-527
40-145-B21
40-145-B5
Capri
Shell
Seaway
Good Night
Port
Property Solutions Niagara
Rose Shymansky Memorial Park
Helen St
2nd Ave
1st Ave
3rd Ave
Minor Rd
West Side Rd
Sheba Crescent
Killaly St W
Youngs Road South
Reeb Rd
Cement Rd
Quarry Ponds
Domino's Pizza
Maple St
Mapleview Medical Clinic
Elgin St W
The Community of Portal Village
St. Patrick's Catholic Elementary School
Port Colborne Baptist Church
Rosemount Ave
Westwood Estates Port Colborne
Niagara's South Coast Guest House
Clarence St
Michael Dr N
Wood Ln
Westwood Dr
Stanley St
Division St
Ridgewood Ave
Glenwood Ave
Homewood Ave
Linwood Ave
Clare Ave
Steele Street Public School
Vatco Corp
North Crescent
Fokkens Tax Service
McCain St
Smith Industrial Su...
Union St
WestPier
Swartz A Zoli Major Appliance Service
Pine St
Minto St
Erie Tracker
Port Colborne Animal Hospital
Erie St
The Beer Store
Lions Field Park
Elm St
Catharine St
Steele St
Fielden Ave
Delhi St
Port Colborne High School
Elgin St
Carter St
Princess St
Park St
Port Colborne Historical & Marine Museum
The Smokin' Buddh
Shoppers Drug Mart
Petro-Canada
Clarence St
Charlotte St
Food Basics
Lifelabs Medical Laboratory Services
Kent St
Alexandra St
Victoria St
True North Cannabis Co - Port...
King St
Layers
Google
Imagery ©2022 CNES / Airbus, Maxar Technologies, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2022
Canada
Terms
Privacy
Send feedback
200 m

APPENDIX III- WATER SERVICE PRESSURE / FLOW RATE CALCULATIONS

E. PORT COLBORNE WATER TREATMENT PLANT

E.1 Existing System Overview

The Port Colborne system services the City of Port Colborne. The system services an existing population of 16,417 and 5,655 employees.[1]

The system is supplied by the Port Colborne Water Treatment Plant, located on 32 King Street, Port Colborne. The plant is a conventional surface water treatment plant, with zebra mussel control, traveling screens, coagulation, flocculation, sedimentation, filtration, and disinfection. Lake Erie (via the Welland Canal) serves as a source to the plant. The plant has a rated capacity of 36.0 MLD (417 L/s).[2]

The system supplies local area municipalities via a water main network, pumping stations, and service reservoirs. The supply area has a single pressure zone.

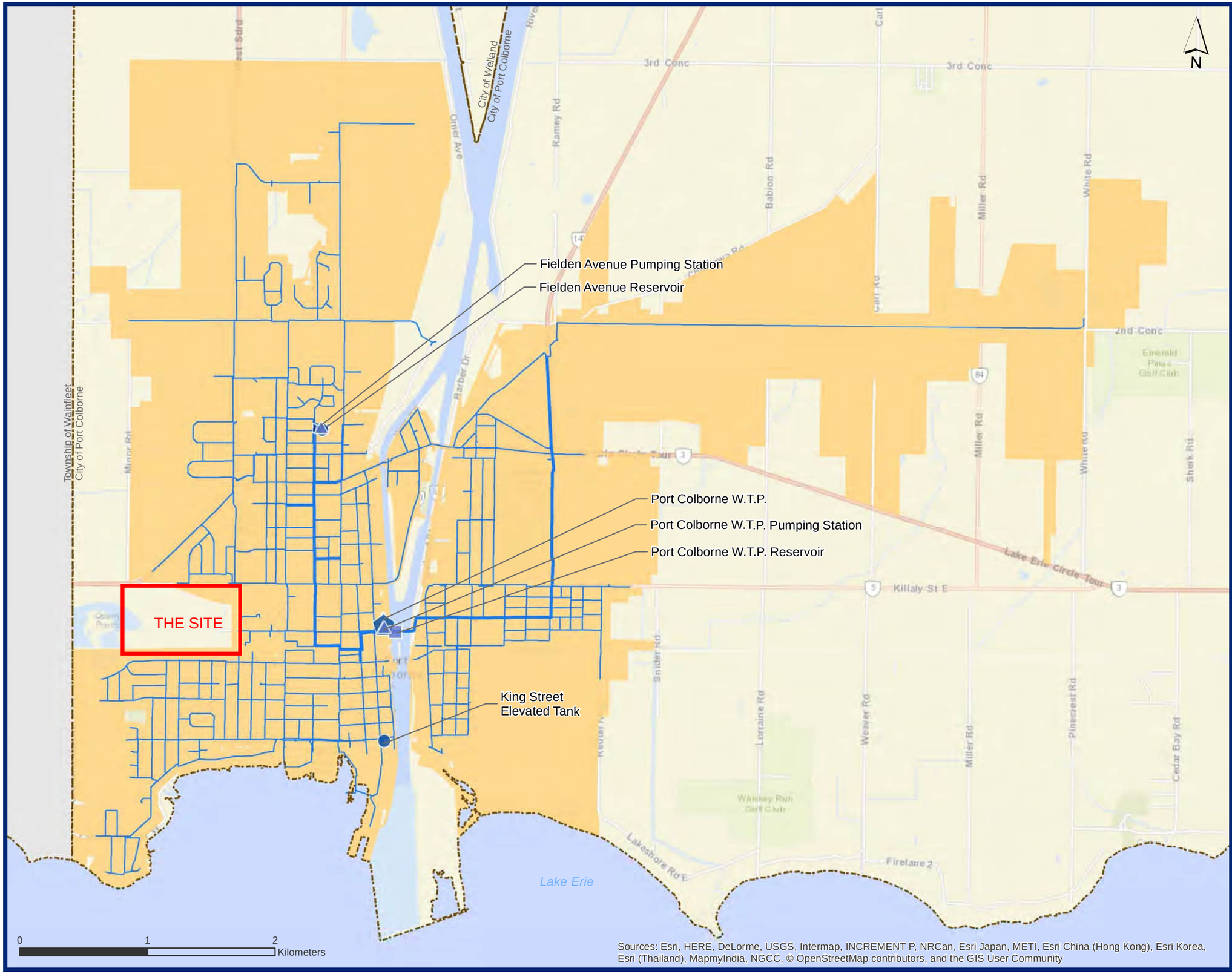
Figure 3.E.1 and Figure 3.E.2 present an overview of the water system and a water system schematic diagram, respectively.

[1] *Hemson Consulting Ltd, 2016. Niagara Region TAZ Forecasts to 2041*

[2] *Ministry of Environment Ontario, 15 August 2014. Drinking Water Works Permit. Number 007-201*

Niagara Region

2016 MASTER SERVICING PLAN



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community

Water Facilities

- Water Treatment Plant
- Reservoir
- Elevated Tank
- Standpipe
- Chlorine Facility
- Pressure Reducing Valve

Pumping Station

- Regional
- Municipal

Water Network

- Regional
- Local
- Private

Pressure Zone System*

*Pressure zone limits are shown based on property boundaries.

223

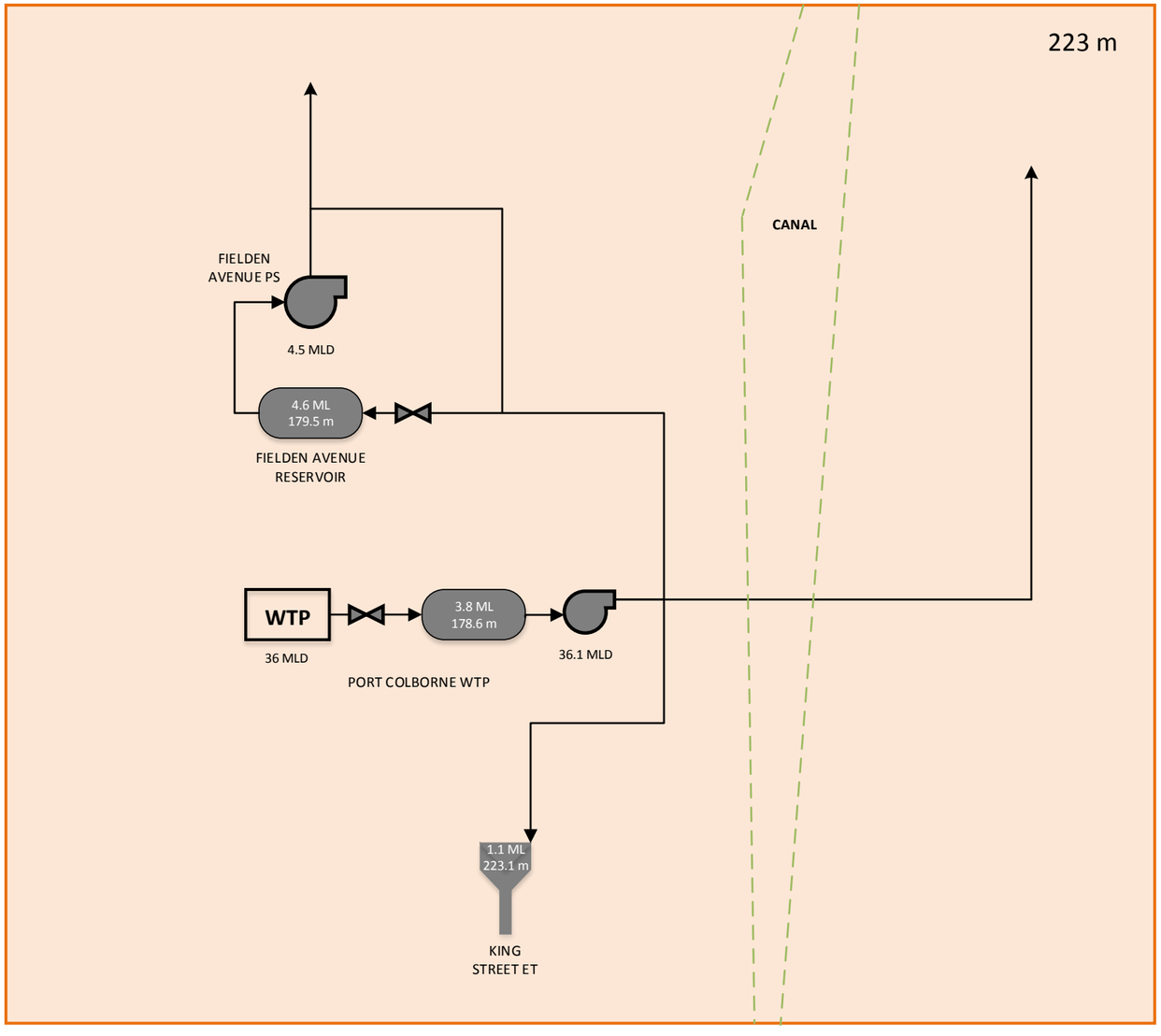
Figure 3.E.1

Existing Water System

Port Colborne WTP

BluePlan Engineering

May 2017
715023-W-2-Existing Water System (PC)
NAD 1983 UTM Zone 17N



Niagara Region

2016 Master Servicing Plan

Port Colborne WTP

EXISTING DISTRIBUTION SCHEMATIC

WTP RATED CAPACITY — Water Treatment Plant

FIRM CAPACITY — Pumping Station

Volume TWL — Reservoir

Volume TWL — Elevated Tanks

Control Valve (Only normally operated valves shown)

C — Chlorine Facility

Volume TWL — Standpipe

Trunk Watermain Network

Settlement Area Boundaries

Land and Water Features

Pressure Zone

223 m

May 2017
Figure 3.E.2
Not to Scale

BluePlan ENGINEERING

E.1.1 Facility Overview

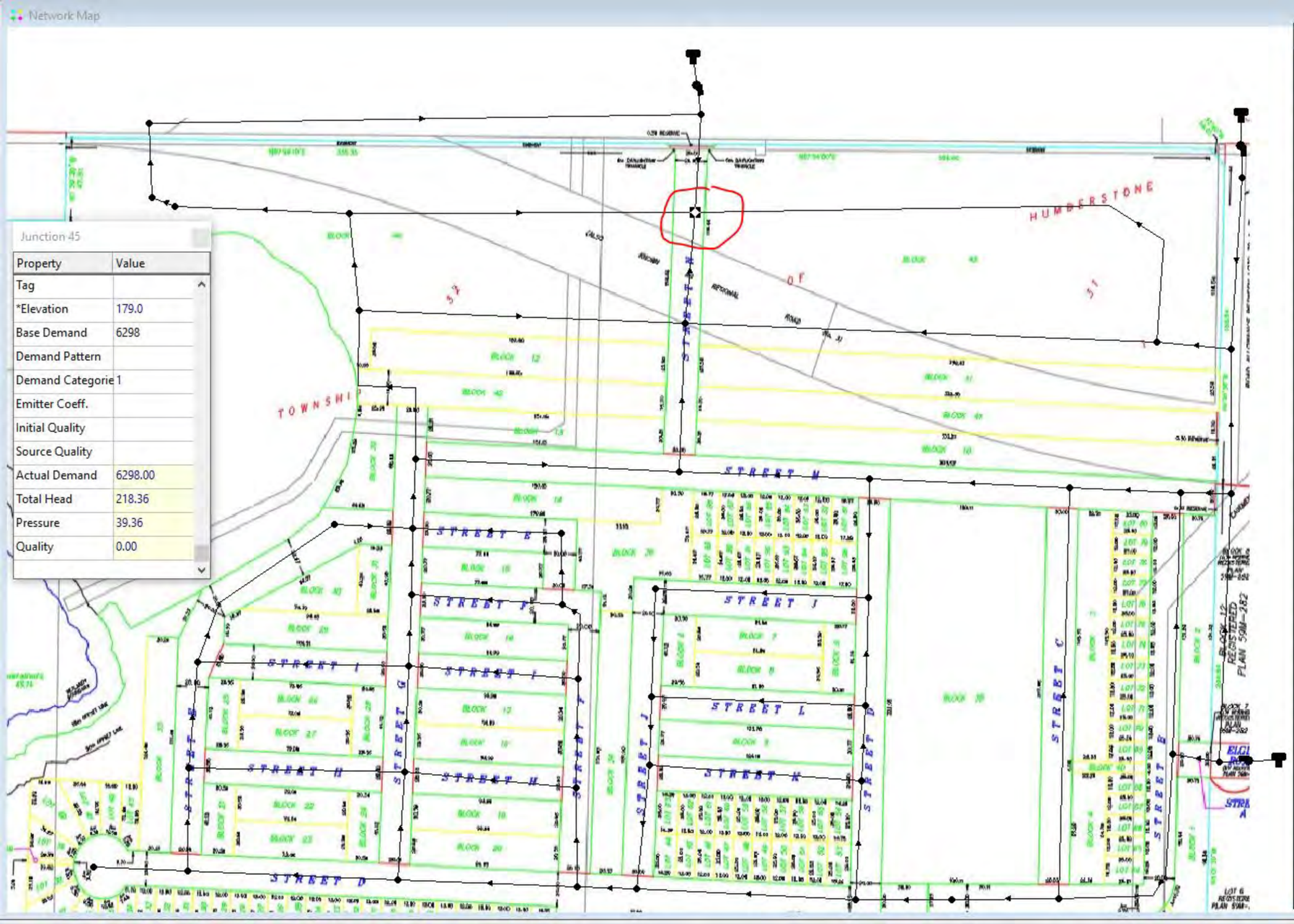
Table 3.E.1 Water Treatment Plant Overview

Plant Name	Port Colborne Water Treatment Plant[3]
Address	323 King Street, Port Colborne
Source Water	Lake Erie via Welland Canal
Rated MDD Capacity	36.0 MLD
Key Processes	• Zebra mussel control • Travelling screens • Coagulation • Flocculation • Sedimentation • Filtration • Disinfection

Table 3.E.2 Pump Stations Overview

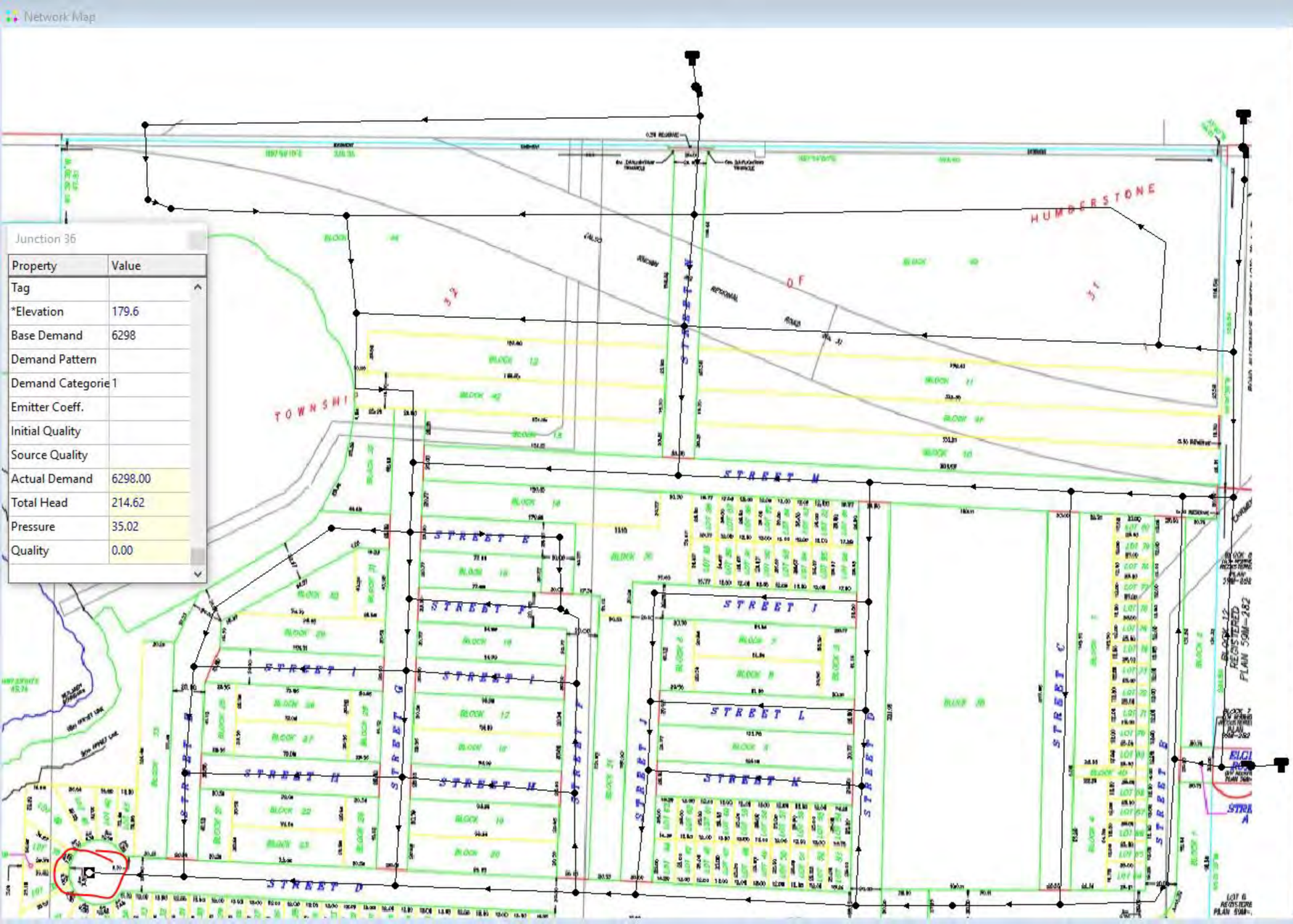
Pump Station	Location	Inlet Source (Pressure Zone)	Discharge (Pressure Zone)	Zones Supplied	Number of Pumps (Total / Firm)	Firm Capacity (MLD)	Total Dynamic Head (m)
Port Colborne Water Treatment Plant (WTP) High Lift Pumps	323 King Street, Port Colborne	WTP	223	223	5/4	36.1	48.8
Fielden Avenue Booster Pumping Station	805 Fielden Avenue, Port Colborne	223	223	223	2/1	4.5	61.0

[3] *Ministry of Environment Ontario, 15 August 2014. Drinking Water Works Permit. Number 007-201*



Network Table - Nodes

Node ID	Demand LPM	Head m	Pressure m	Quality
Junc 21	0.00	218.63	38.58	0.0
Junc 22	0.00	218.64	38.99	0.0
Junc 23	0.00	218.64	38.64	0.0
Junc 24	0.00	218.64	39.24	0.0
Junc 25	0.00	218.64	38.84	0.0
Junc 26	0.00	218.64	39.44	0.0
Junc 27	0.00	218.64	39.24	0.0
Junc 29	0.00	218.65	39.80	0.0
Junc 30	0.00	218.65	39.60	0.0
Junc 31	0.00	218.65	40.15	0.0
Junc 32	0.00	218.65	39.40	0.0
Junc 33	0.00	218.65	39.10	0.0
Junc 34	0.00	218.64	38.59	0.0
Junc 35	0.00	218.64	38.79	0.0
Junc 36	0.00	218.65	39.05	0.0
Junc 37	0.00	218.99	38.84	0.0
Junc 39	0.00	219.05	39.10	0.0
Junc 40	0.00	219.05	39.90	0.0
Junc 41	0.00	219.18	40.18	0.0
Junc 42	0.00	218.84	38.99	0.0
Junc 45	6298.00	218.36	39.36	0.0
Junc 46	0.00	218.51	39.76	0.0
Junc 48	0.00	218.51	38.81	0.0
Junc 49	0.00	218.47	39.47	0.0
Junc 50	0.00	218.47	38.77	0.0
Junc 51	0.00	218.47	38.77	0.0
Junc 52	0.00	218.46	40.06	0.0
Junc 53	0.00	218.41	40.41	0.0
Junc 54	0.00	219.11	40.61	0.0
Tank 1	-659.26	178.00	10.00	0.0
Tank 3	-3885.39	179.00	10.00	0.0
Tank 28	-1753.35	178.50	10.00	0.0



Network Table - Nodes

Node ID	Demand LPM	Head m	Pressure m	Quality
Junc 21	0.00	218.34	38.29	0.0
Junc 22	0.00	218.23	38.58	0.0
Junc 23	0.00	218.20	38.20	0.0
Junc 24	0.00	218.18	38.78	0.0
Junc 25	0.00	218.18	38.38	0.0
Junc 26	0.00	218.13	38.93	0.0
Junc 27	0.00	218.17	38.77	0.0
Junc 29	0.00	218.07	39.22	0.0
Junc 30	0.00	218.17	39.12	0.0
Junc 31	0.00	218.04	39.54	0.0
Junc 32	0.00	216.88	37.63	0.0
Junc 33	0.00	217.70	38.15	0.0
Junc 34	0.00	217.99	37.94	0.0
Junc 35	0.00	218.16	38.31	0.0
Junc 36	6298.00	214.62	35.02	0.0
Junc 37	0.00	218.92	38.77	0.0
Junc 39	0.00	219.01	39.06	0.0
Junc 40	0.00	219.01	39.86	0.0
Junc 41	0.00	219.14	40.14	0.0
Junc 42	0.00	218.87	39.02	0.0
Junc 45	0.00	218.61	39.61	0.0
Junc 46	0.00	218.60	39.85	0.0
Junc 48	0.00	218.53	38.83	0.0
Junc 49	0.00	218.56	39.56	0.0
Junc 50	0.00	218.56	38.86	0.0
Junc 51	0.00	218.56	38.86	0.0
Junc 52	0.00	218.57	40.17	0.0
Junc 53	0.00	218.63	40.63	0.0
Junc 54	0.00	219.07	40.57	0.0
Tank 1	-580.40	178.00	10.00	0.0
Tank 3	-3917.45	179.00	10.00	0.0
Tank 28	-1800.15	178.50	10.00	0.0

APPENDIX IV- WASTEWATER SERVICING RECORDS

J. SEAWAY WASTEWATER TREATMENT PLANT

J.1 Existing System Overview

The Port Colborne wastewater system services the City of Port Colborne. The system services an existing population of 16,428 and 5,667 employees.[1]

The system is serviced by the Seaway Wastewater Treatment Plant, located on 30 Prosperity Avenue, Port Colborne. The Seaway Wastewater Treatment Plant is a modified conventional activated sludge facility with a current rated capacity of 19.6 MLD, and a peak flow capacity of 45.4 MLD. [2]

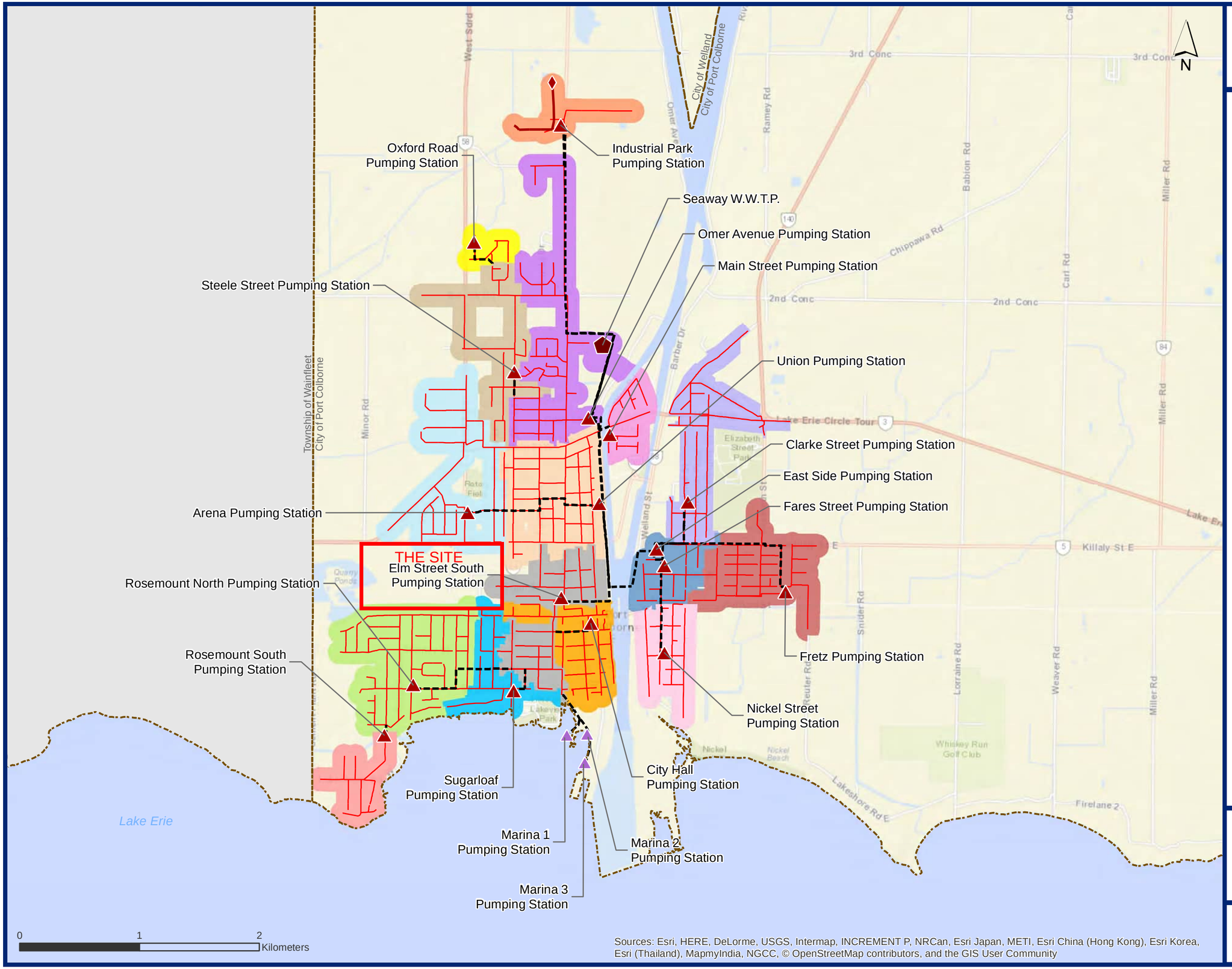
Figure 4.J.1 presents an overview of the wastewater system, and Figure 4.J.2 shows a schematic of the wastewater system.

[1] *Hemson Consulting Ltd, 2016. Niagara Region TAZ Forecasts to 2041*

[2] *Ministry of Environment, 25 February 2011. Ammeded Certificate of Approval. Number 8101-8BAPJ9*

Niagara Region

2016 MASTER SERVICING PLAN



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Wastewater Facilities

- Wastewater Treatment Plant
- Combined Sewage Detention Facility
- Lagoon
- Odour Control Facility
- Leachate Pumping Station

Pumping Stations

- Regional
- Municipal
- Private

Wastewater Network

- Regional
- Local
- Private
- Forcemain

Wastewater Catchments*

*Catchment limits are shown based on property boundaries and are within 100 m of sewers.

- Arena
- City Hall
- Clarke Street
- East Side
- Elm Street
- Fares Street
- Fretz
- Industrial Park
- Main Street
- Nickel Street
- Omer Avenue
- Oxford Road
- Rosemount North
- Rosemount South
- Steele Street
- Sugarloaf
- Union

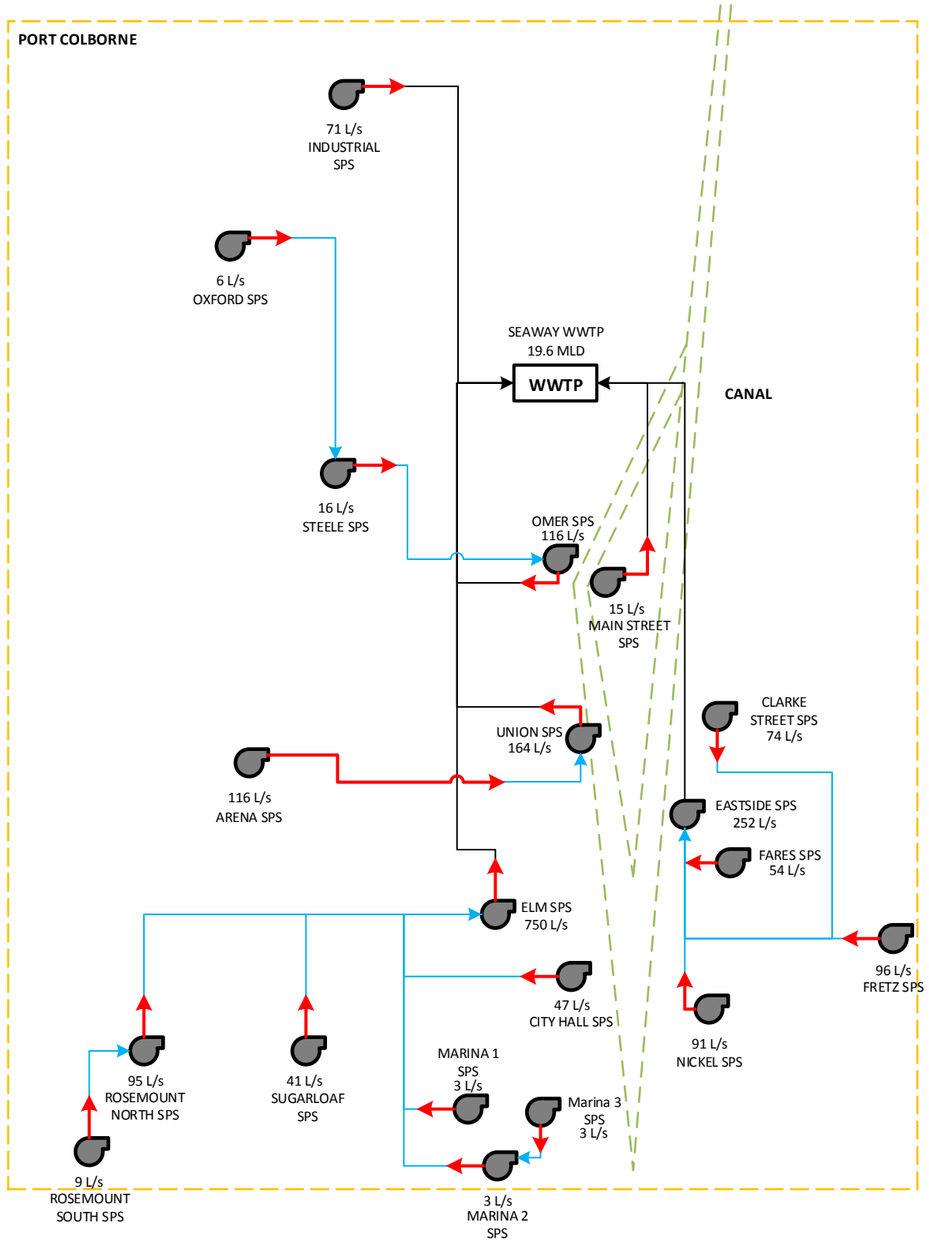
Figure 4.J.1

Existing Wastewater System

Seaway WWTP

BluePlan Engineering Inc

June 2017
715023-WW-2-Existing System (Port Colborne)
NAD 1983 UTM Zone 17N



N

Niagara Region

2016 Master Servicing Plan

Seaway WWTP

EXISTING COLLECTION SCHEMATIC

Legend

WWTP
RATED CAPACITY — Wastewater Treatment Plant

FIRM CAPACITY — Sewage Pumping Station

Forcemain

Connection from SPS to SPS

Connection from SPS to WWTP

June 2017
Figure 4.J.2
Not to Scale

BluePlan ENGINEERING

J.1.2 Facility Overview

Table 4.J.2 Wastewater Treatment Plant Overview

Plant Name	Port Colborne Wastewater Treatment Plant
Address	30 Prosperity Ave, Port Colborne, ON, L3K 5X9
Discharge Water	Welland Canal
Rated Capacity: Average Daily Flow	19.6 MLD
Rated Capacity: Peak Flow Rate (Dry Weather)	Not Available
Rated Capacity: Peak Flow Rate (Wet Weather)	45.4 MLD
Key Processes	• Conventional activated sludge treatment with screening • Grit removal • Mechanical aeration • Effluent disinfection • UV treatment of secondary effluent

Table 4.J.3 Wastewater Treatment Plant Effluent Objectives

Effluent Parameter	Objective Concentration[3]
$CBOD_5$	15.0 mg/L
TSS	15.0 mg/L
Total Phosphorus	0.5 mg/L
E. Coli	200 organisms/100 mL
Total Chlorine Residual	0.5 mg/L

[3] *Ministry of Environment, 25 February 2011. Ammeded Certificate of Approval. Number 8101-8BAPJ9*

J.3 Assessment of Wastewater Infrastructure (Existing and Future)

J.3.1 Treatment Plant Capacity

Figure 4.J.3 shows the projected future demands at the Seaway Wastewater Treatment Plant. The plant has surplus capacity and will not reach 80% capacity within the 2041 time horizon.

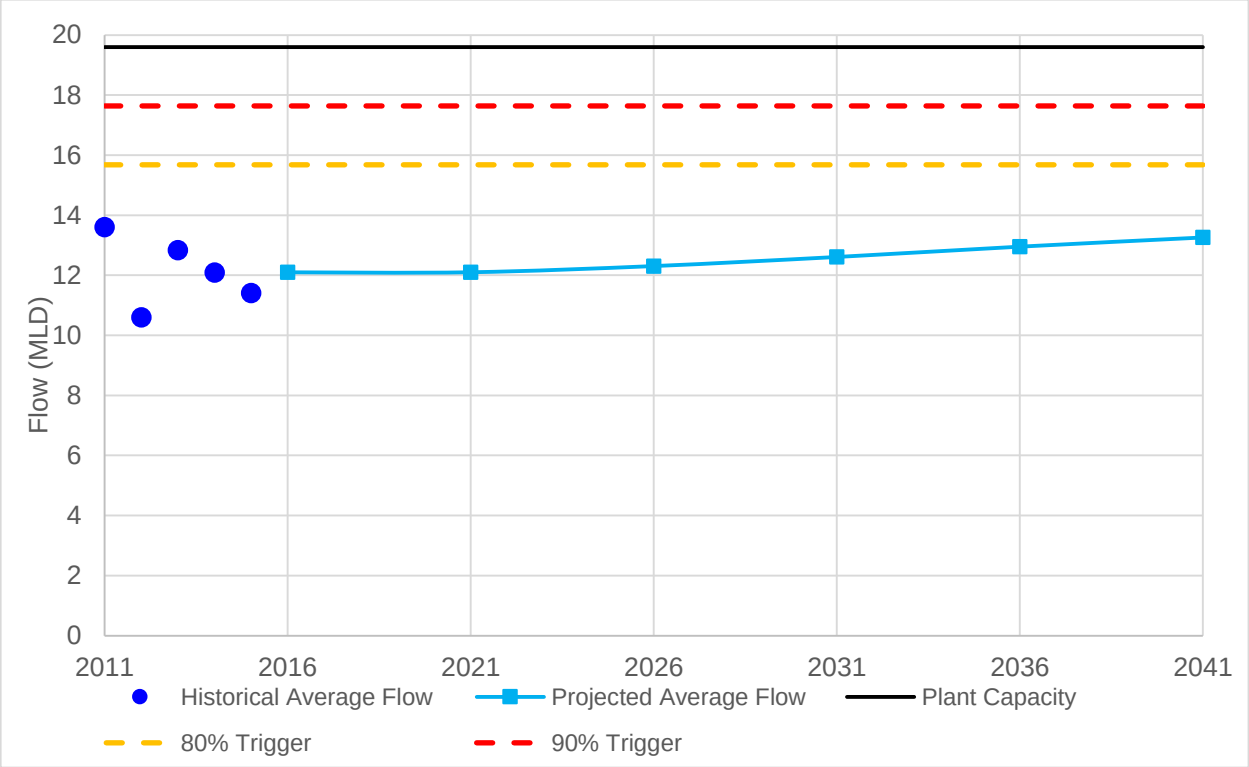


Figure 4.J.3 Projected future demands at Seaway Wastewater Treatment Plant

J.3.2 Sewage Pumping Station

Table 4.J.12 highlights the sewage pumping station existing and projected capacity.

Table 4.J.12 System Sewage Pumping Station Performance

Sewage Pumping Station	Contributing Catchments	Operational Capacity (L/s)	Existing Design Peak Wet Weather Flow (L/s)	2041 Design Peak Wet Weather Flow (L/s)	2041 Surplus/ Deficit (L/s)
Industrial SPS	Industrial SPS	71.2	46.1	49.0	22.2
Omer Avenue SPS	Omer SPS Steele SPS	116.3	70.3	83.7	32.6
Steele Street SPS	Steele SPS	16.0	28.0	33.5	-17.5
Oxford Road SPS	Oxford SPS	6.4	5.0	6.6	-0.2
Eastside SPS	Eastside SPS Nickel SPS Fares SPS Fretz SPS Clarke Street SPS	252.0	143.7	155.3	96.7
Nickel Street SPS	Nickel SPS	91.1	18.6	19.4	71.7
Fares Street SPS	Fares SPS	53.9	15.1	15.3	38.6
Fretz SPS	Fretz SPS	95.8	49.9	55.7	40.1
Clarke Street SPS	Clarke St SPS	73.8	60.0	66.5	7.3
Main Street SPS	Main Street SPS	14.6	11.8	12.7	1.9
Union SPS	Union SPS	164.0	38.9	39.4	124.6
Elm SPS	Elm SPS Arena SPS City Hall SPS Sugarloaf SPS Rosemount North SPS	750.0	207.6	220.8	529.2
Arena Sewage Pumping Station (SPS)	Arena SPS	116.3	38.6	51.1	65.2
City Hall SPS	City Hall SPS	47.4	45.7	46.8	0.6
Sugarloaf SPS	Sugarloaf SPS	41.3	18.7	18.8	22.5

Sewage Pumping Station	Contributing Catchments	Operational Capacity (L/s)	Existing Design Peak Wet Weather Flow (L/s)	2041 Design Peak Wet Weather Flow (L/s)	2041 Surplus/ Deficit (L/s)
Rosemount North SPS	Rosemount North SPS Rosemount South SPS	95.0	73.8	75.1	19.9
Rosemount South SPS	Rosemount South SPS	9.0	16.8	16.9	-7.9

The following sewage pumping stations have projected pumping deficits:

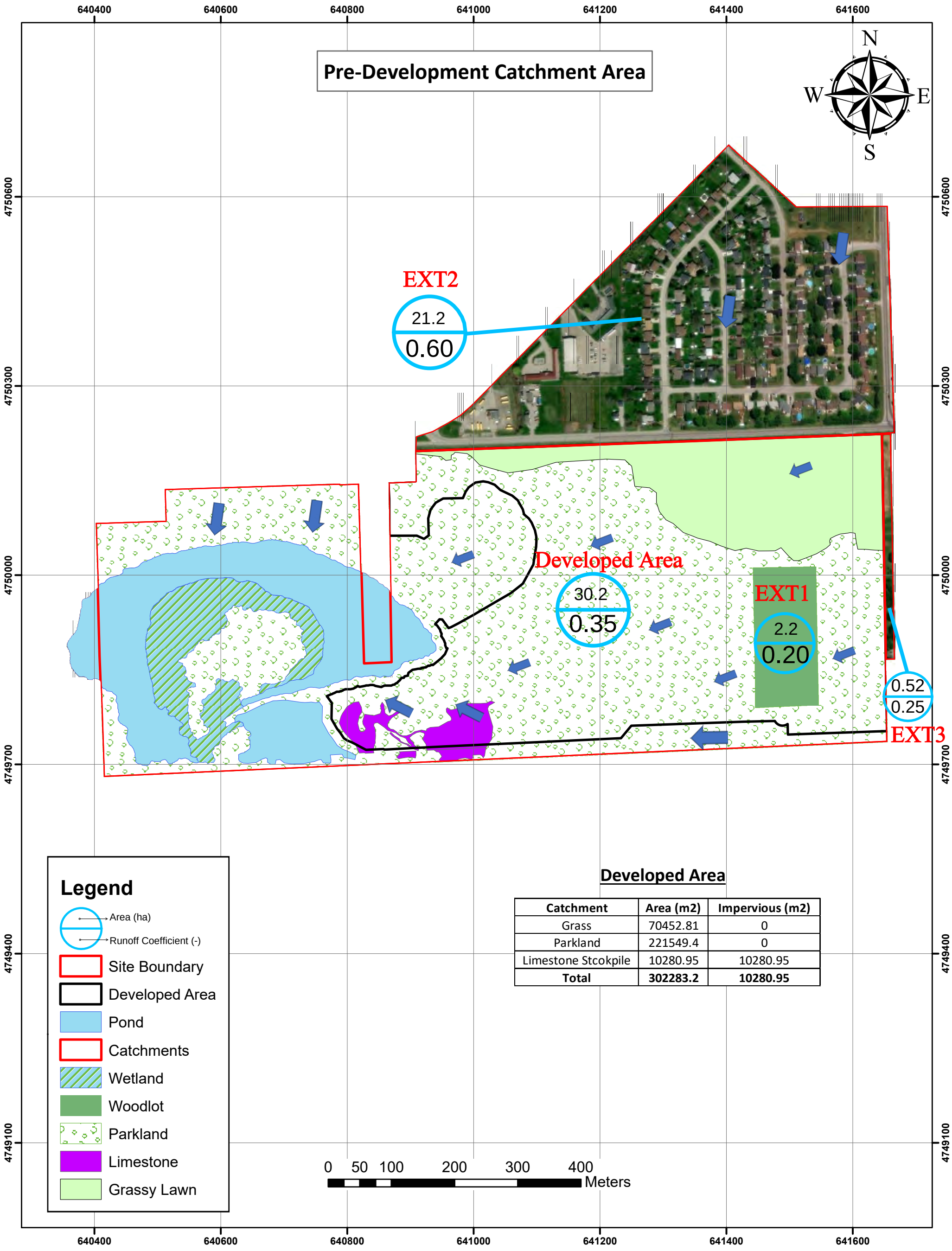
- Oxford Sewage Pumping Station
- Rosemount South Sewage Pumping Station
- Steele Street Sewage Pumping Station

J.3.3 Forcemain

Table 4.J.13 highlights the existing and projected forcemain performance.

APPENDIX V –STORMWATER DRAINAGE PLAN

Pre-Development Catchment Area



Developed Area

Catchment	Area (m2)	Impervious (m2)
Grass	70452.81	0
Parkland	221549.4	0
Limestone Stcokpile	10280.95	10280.95
Total	**302283.2**	**10280.95**

Pre-Development Catchment Area

N
W
E
S

640400 640600 640800 641000 641200 641400 641600

4750600
4750300
4750000
4749700
4749400
4749100

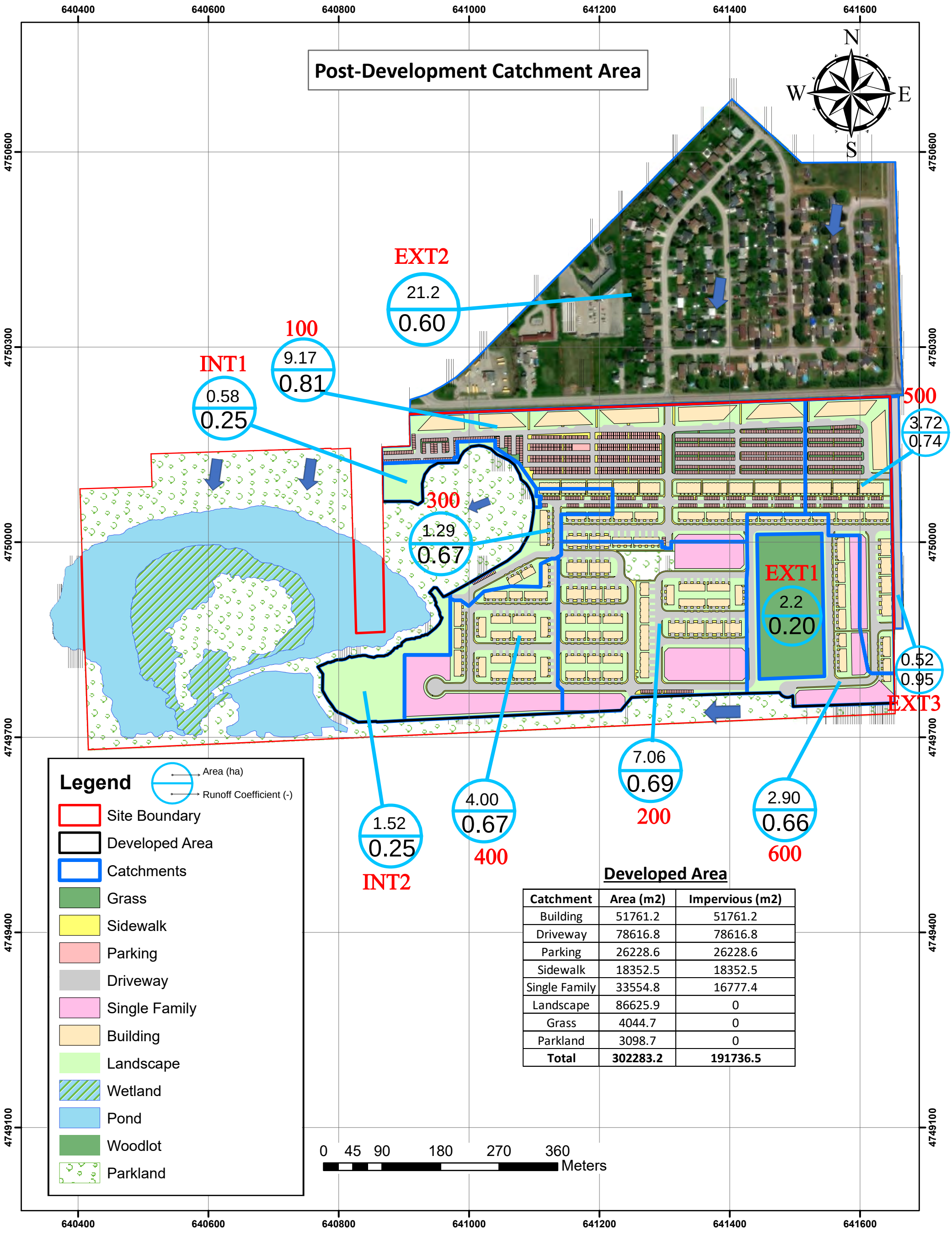
Legend

- Site Boundary
- Developed Area
- Pond
- Catchments
- Wetland
- Woodlot
- Parkland
- Limestone
- Grassy Lawn

0 50 100 200 300 400
Meters

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Post-Development Catchment Area



Developed Area

Catchment	Area (m2)	Impervious (m2)
Building	51761.2	51761.2
Driveway	78616.8	78616.8
Parking	26228.6	26228.6
Sidewalk	18352.5	18352.5
Single Family	33554.8	16777.4
Landscape	86625.9	0
Grass	4044.7	0
Parkland	3098.7	0
Total	**302283.2**	**191736.5**

Post-Development Catchment Area

N
W
E
S

640400 640600 640800 641000 641200 641400 641600

4750600
4750300
4750000
4749700
4749400
4749100

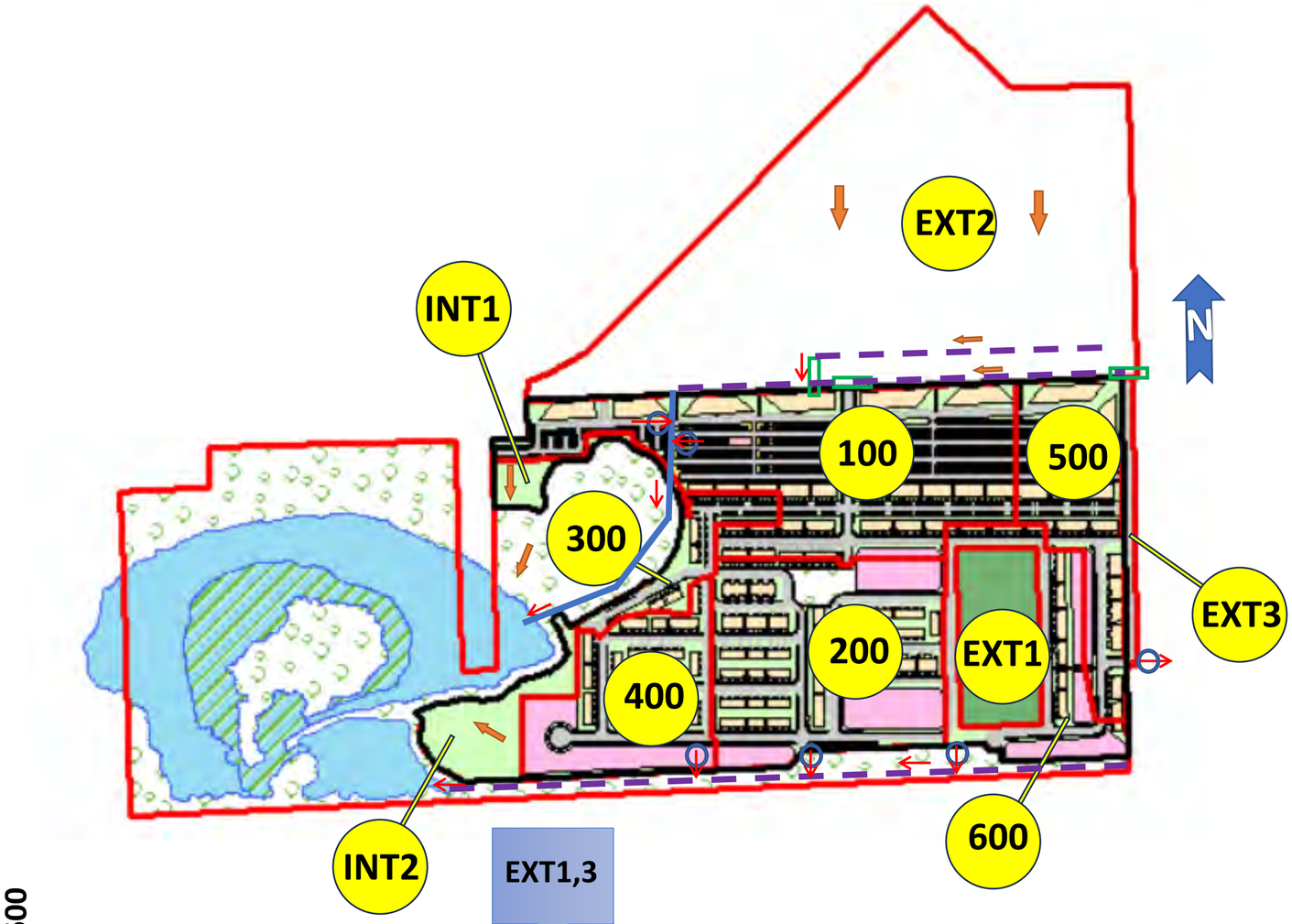
Legend

- Site Boundary
- Developed Area
- Catchments
- Grass
- Sidewalk
- Parking
- Driveway
- Single Family
- Building
- Landscape
- Wetland
- Pond
- Woodlot
- Parkland

0 45 90 180 270 360
Meters

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Stormwater Management Flowchart/Diagram



Legend

- Oil Grit Separator (OGS)
- Box Culvert
- Culvert
- Ditch/swale