

**FUNCTIONAL SERVICING & PRELIMINARY
STORMWATER MANAGEMENT REPORT**

**AQUAVIL
TOWN OF THE BLUE MOUNTAINS**

ROYALTON HOMES INC.

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1.0 INTRODUCTION

C.F Crozier & Associates Inc. (CFCA) was retained by Royalton Homes Inc. (Developer) to prepare a Functional Servicing and Preliminary Stormwater Management Report in support of a Redline Draft Plan Application for the Aquavil development (Site), formerly Silver Creek at Craigleith. The Site is bounded by Georgian bay to the north, Highway 26 to the south, Blue Mountain Drive to the west and Long Point Road to the east, in the Town of The Blue Mountains, County of Grey. The property is part of Registered Plan 529, formerly Township of Collingwood, County of Grey. The 25.6 ha Site is divided by Brophy's Lane and wetland area in the center with 15.8 ha of land on the west side (West Lands) and 9.8 ha of land on the east side (East Lands). The site location plan is provided in Figure 1.

The Developer has assembled a multi-disciplinary consulting team to assist with the technical studies in support of this development. The consulting team includes:

- DS Consultants (geotechnical and hydrogeological)
- Shoreplan Engineering Limited (Shoreline Hazard Assessment)
- Travis and Associates (planning)
- C.F. Crozier & Associates Inc. (civil, stormwater management, landscape architecture and transportation engineering)

This report should be read in conjunction with the studies, plans and reports prepared by of other members of the development team.

2.0 PROJECT BACKGROUND

Per the Town of The Blue Mountains Official Plan (June 2016) both portions of the Site are designated as Craigleith Village Residential, Craigleith Village Commercial, Craigleith Village HSFPSW, Wetlands, and Hazard. The Site is zoned as Residential (R1 and R2), Commercial (C6), Institutional (I), Recreational (R3), Hazard (H) and Wetland (WL) in the Town Zoning By-Law No. 2018-65.

In 2010 Draft Plan approval was obtained for the Site by a previous owner (Block Plan of Subdivision, 42T-2010-03). In support of this Draft Plan Application the following engineering reports were prepared:

- "Preliminary Servicing and Stormwater Management Report" – CFCA (April 2008)
- "Floodline Analysis Report" – CFCA (November 2008)
- "Traffic Impact Study Update" – CFCA (May 2009)

The current Developer, Royalton Homes Inc., is proposing to revise the Draft Plan to address various revisions including but not limited to the location of public road allowances, as well as distribution, size and nature of the proposed development blocks. Refer to Figure 2 for the Draft Plan prepared by Lloyd and Purcell (September 2019).

As shown on the Draft Plan the proposed land use for the West Lands is primarily residential, while the East Lands will feature mixed-uses including commercial, institutional and residential. The Redline Draft Plan application and the associated Official Plan Amendment (OPA) and Zoning By-Law Amendment (ZBA) applications propose the following for the West Lands:

- 176 Apartment Units
- 36 Townhome Units

- 20 Semi-Detached Units
- 2 Single Family Residential Units

The proposed land use schedule for the East Lands is shown in Table 1.

Table 1: East Land Use Schedule

Land Use	Area (ha)	Units/Commercial Space
Apartment Rentals	0.86	100 Units
Retirement/Seniors	0.74	100 Units
Community Recreation Centre	0.10	-
Commercial	3.98	9,100 m ²
Residential/Commercial Mix	Inclusive of Commercial Space	50 Units

Since the West and East Lands can be serviced independently of each other, the Developer intends to proceed with the West Lands before submitting for planning applications to develop the East Lands.

To support this Redline Draft Plan Application the various approval agencies have requested that the supporting reports, which had been completed during the original application, be updated to reflect current conditions.

3.0 SITE DESCRIPTION

The 25.6 ha Site is predominantly characterized by 9.3 ha of wetland area in middle of the Site. This wetland divides the development lands into two portions, the East and West Lands. For the purposes of this report the Site will be referred to as two separate portions; the West Lands located between the wetland and Blue Mountain Drive and the East Lands located between Brophy's Lane and Long Point Road. Refer to Figure 3 for the Development Plan, which identifies the two portions of the Site.

The Site is covered by light to heavy coniferous forest, with the exception of the grassed areas and buildings within the West Lands. A series of existing and former commercial spaces front onto Highway 26 including the Alphorn restaurant and the recently demolished Craigleith General Store and Blue Mountain Inn. Frontage onto the Georgian Bay shoreline is limited to approximately 350 metres along the north limit of the former Easter Seals Camp site within the West Lands.

The entire Site is underlain by Granby sand soils, which are classified as Hydrologic Soil Group 'B' according to the Soils Survey of Grey County (1953). A geotechnical investigation was completed by Shaheen and Peaker (August 2008) and more recently by DS Consultants (October 2018). The 2018 report indicated that the Site generally consists of topsoil and native materials, followed by native silty sand/sandy silt, sand and gravel and sand layers. Assumed bedrock was found between 4.6 to 6.7m below ground surface.

The Preliminary Servicing and Stormwater Management Report prepared by our office in 2008 was based on the preliminary desktop hydrogeological work completed by Gartner Lee Limited. The

preliminary hydrogeological data suggested that the Provincially Significant Wetlands (PSW) were supported by the sandy soils overlying bedrock contact, which slopes towards the south away from Georgian Bay. As a result, the regional groundwater system cannot outlet to Georgian Bay due to the "bathtub effect" which causes standing water and generally wet areas in the sandy depressions (bounded by the recessional beach ridges) areas across the site.

Recently, a hydrogeological investigation was completed by DS Consultants Limited (January 2019), which found that the Site is generally under shallow groundwater conditions ranging between 0.2m to 1.4m below ground surface elevations.

4.0 ROAD NETWORK

It is important to note that the MTO encourages consolidating and closing entrances onto Highway 26 to facilitate free flow traffic movement. With that objective, the Draft Plan shows the closure of Blue Mountain Drive, alignment of the proposed public road (Street A) entrance to form a four-way intersection with Hope Street, the closure of three commercial entrances and the realignment of Brophy's Lane.

The Draft Plan incorporates a variety of ownership tenure such that a portion of the road network will be municipally owned, while the remainder will be under private ownership. As shown in the Draft Plan, the northern extension of Hope Street via Street A connecting to Blue Mountain Drive will be municipally owned, which will provide a public connection for the existing residents on Blue Mountain Drive. The remaining roads in the West Lands will be private.

The proposed roundabout in the West Lands will greatly assist traffic flow through the area and become an aesthetic amenity for the local community. The roundabout will be built according to accepted design criteria, similar to roundabouts found in Grey and Simcoe County.

In the East Lands, Brophy's Lane will be re-routed from Highway 26 and connect to Long Point Road. This connection will be a municipal road. Traffic movements eastward onto Highway 26 will be improved from the current intersection at Brophy's Lane as a result of the proposed alignment with Long Point Road.

The municipal roads will be built according to the Town of The Blue Mountains Engineering Standards and the Manual of Geometric Design Guidelines. The realignment of Blue Mountain Drive and Brophy's Lane through the subject lands will consist of a 20m road allowance constructed to a fully serviced urban cross section complete with mountable and / or barrier curb and gutter and an 8.5m asphalt platform. The private condominium road will consist of a 7.5m asphalt platform complete with a 1.5m wide asphalt walkway and service corridor contained within a 16m common element block. Refer to Figure 4 for the proposed cross-section for the private roadways.

5.0 SANITARY SEWAGE SYSTEM

5.1 Existing Sanitary Sewer Infrastructure

The sanitary servicing for the area falls within the Craigeleith Service Area as identified under the Town of The Blue Mountains Combined Environmental Assessment Master Plan for Craigeleith (MacViro and Skelton Brumwell, 2006). Sanitary flows from this area are conveyed west via gravity sewer to the Craigeleith Sewage Pumping Station (SPS), located at the intersection of Highway 26 and Lakeshore Road. Subsequently, this pumping station pumps sanitary flows to the Craigeleith Waste Water Treatment Plant (WWTP) located, north and east of the Site at the intersection of Brophy's Lane and Long Point Road.

5.1.1 Wastewater Treatment Plant & Sewage Pumping Station Capacity

The Environmental Services Department of the Town of The Blue Mountains produces annual reports on the operation of the Town water and waste water system. We reviewed the most recent report entitled "2017 Annual Performance Report" to assess the Treatment Plant's available capacity to support the Aquavil development.

The Craigleith Waste Water Treatment Plant (WWTP) was expanded in 2003 to provide an average daily capacity of 8,133 m³/day and peak design capacity of 19,640 m³/day. This was the second stage of a multi stage expansion. According to the 2017 Performance Report the WWTP is currently operating at 39% capacity (3,383 m³/day).

Based on the information available at the time of this report, the peak design capacity in the Craigleith SPS and forcemain is 10,541 m³/day and 12,182 m³/day respectively. Since design capacity of the SPS is the lowest, it governs the residual capacity in the Municipal system. Assuming the SPS receives the same sewage flows as the WWTP it is operating at 72% capacity. Refer to the calculations in Appendix A.

5.1.2 Existing Sanitary Sewer

The existing sanitary sewer infrastructure at or near the Subject Site includes the following:

- 300mm diameter sanitary sewer on the south side of Highway 26;
- 300mm diameter sanitary sewer stub on Blue Mountain Drive; and
- 200mm diameter sanitary sewer stub on Brophy's Lane.

The sewer on Highway 26 was installed in 1984 and conveys sanitary flows from the Craigleith area westward to the Craigleith Sewage Pumping Station (SPS) located at the intersection of Highway 26 and Lakeshore Road. During the installation of the sanitary sewer, leads were extended north beneath Highway 26 to Blue Mountain Drive and Brophy's Lane. The existing gravity sewer on Highway 26 across the frontage of the development is a 300mm diameter PVC pipe, which increases to a 750mm diameter sewer near the Craigleith Sewage Pump Station (SPS).

5.1.3 Future Sanitary System Upgrades

The Town prepared a Water and Wastewater Servicing Extension Plan, dated September 2018, which identifies two planned projects that may impact the proposed development:

- Extension of the Municipal wastewater servicing on Brophy's Lane; and
- Extension of the Municipal wastewater servicing on Blue Mountain Drive.

Both upgrades include the use of low pressure forcemains to convey the wastewater from the service areas to the existing sanitary stubs on the north side of Highway 26. The extensions on Brophy's Lane and Blue Mountain Drive are expected to be completed within 10 – 20 and 5 – 10 years respectively. Since these improvements will likely follow the construction of the proposed development, the internal sanitary services should be designed to accommodate the future improvements. Refer to Appendix B for an excerpt from the Water and Wastewater Servicing Extension Plan, which provides details on the proposed sanitary sewer improvements. The proposed sanitary servicing design does not materially change the servicing strategy for the planned improvements.

5.2 Proposed Servicing Strategy

Internal sanitary servicing for Aquavil will be provided by a gravity sewer following the internal roadway network with individual connections to each building that will be sufficiently deep to service basements with gravity connections, wherever possible. Due to grading constraints some units may require sanitary pumping via a low-pressure system or similar solution.

The proposed sanitary sewer in the West and East Lands will be independent from one another. Refer to Figure 5 for the proposed sanitary services for both portions of the Site.

5.2.1 West Lands

The West Lands will have a single sanitary connection to the existing sanitary sewer stub on Blue Mountain Drive, which was previously extended to the north side of Highway 26. From Highway 26 the wastewater produced by the proposed development will be conveyed to the SPS via the existing 300mm and 750mm diameter sanitary sewers on Highway 26.

The Town of The Blue Mountains Engineering Standards (2009), and the MOECC Design Guidelines for Sewage works (2008) were used to determine the future sanitary design flows for the West Lands. Based on the number of units above the expected sanitary flows for the proposed development is approximately 14.73 L/s. Refer to Appendix C for the full calculations.

5.2.2 East Lands

The East Lands will also have one sanitary connection. The connection will be via the existing 200mm sanitary stub on the north side of Highway 26 in the Brophy's Lane right-of-way (ROW). Gravity stubs will be extended to the various development blocks on the East Lands. This collection system will serve the various land uses including commercial, institutional and residential blocks. Based on the proposed land uses in Table 1, the estimated sanitary flow is approximately 15.22 L/s. Refer to Appendix C for the full calculations.

6.0 WATER SUPPLY

6.1 Existing Potable Water Supply Infrastructure

6.1.1 Water Treatment and Storage Capacity

The water supply for the Craigleith area is provided from the water intake and treatment plant in Thornbury as well as through a connection to the Town of Collingwood system. The water reservoir at Hidden Valley Road, several pressure reducing valves (PRV) and booster pumping stations maintain an adequate supply and system pressure throughout the Craigleith Service Area.

A Combined EA Master Plan for Craigleith, Castle Glen and Osler was prepared by MacViro and Skelton Brumwell and Associates (May, 2006). The EA identified a future extension of the Town of Collingwood's existing 300mm diameter watermain on Grey Road 21 to connect with the Town of The Blue Mountain's existing 200mm diameter watermain on Highway 26, which would increase the available supply for the propose development. However, the 2019 Development Charges Background Study prepared by Tatham Engineering (May, 2019) did not identify a schedule to complete these works.

According to the 2017 Year End Water and Wastewater Capacity Assessment the Town's water system has a total capacity of approximately 15,699 units (16,390 m³/day), which included the water supply available from the Town of Collingwood (1,250m³/day). At the end of 2017, 9,383 units were

allocated and 3,064 units were reserved, which leaves 3,252 units available. Per the Technical Memo #6 prepared by C3 Water (August 2016) the existing Municipal water system will have supply and treatment capacity until 2029, which is beyond the expected construction date for the proposed development.

On May 29, 2019 a Public Information Centre meeting was held by the Town to provide information on the Water Distribution System Master Plan Class Environmental Assessment (EA) that was being conducted by J.L. Richards. The Master Plan will evaluate the Town's long-term water distribution needs and identify solutions.

The proposed development is located within Pressure Zone 1 of the service area. The issues that were identified for Zone 1, that will arise within the next 20 years, include the following:

- There is a need to provide adequate, secure supply water supply to meet projected demand; and
- Additional storage will be required to meet current requirements.

Per Technical Memo #6 (C3 Water, 2016) there is an existing storage deficit in Zone 1 of approximately 2,500 m³. The EA being completed by J.L. Richards will identify preferred solutions to address the issues noted above. If any improvements to the Municipal system are required to service the proposed development, they will be determined during detailed design.

6.1.2 Existing Distribution Network

The existing water distribution infrastructure at or near the Subject Site includes the following:

- 200 mm diameter watermain on the south side of Highway 26 (Town of The Blue Mountains);
- 150 mm diameter watermain on Blue Mountain Drive (Town of The Blue Mountains);
- 150 mm diameter watermain on Brophy's Lane (Town of The Blue Mountains);
- 150 mm diameter watermain on Long Point Drive (Town of The Blue Mountains); and
- 300 mm diameter watermain on Silver Creek Drive (Town of Collingwood).

6.2 **Proposed Water Demands and Servicing**

Domestic Water Demand

The water system demand has been separated into the residential land uses in the West Lands and the mixed-use commercial/institutional in the East lands.

The requirements for water supply for domestic uses and fire protection are outlined in the Town of The Blue Mountains Engineering Standards under Section 4.4 (Water Supply System). The average daily demand is 450 L/capita/day with a maximum day factor of 2.0 and a peak hour factor of 4.5. Based on the proposed land uses and unit counts it is estimated that the water demands for the Subject Site will be as shown in Table 2 below. Refer to Appendix D for the full water demand calculations.

Table 2: Aquavil Domestic Water Demands

	West Lands	East Lands
Average Day Demand (L/s)	2.80 L/s	3.29 L/s
Maximum Day Demand (L/s)	5.61 L/s	6.58 L/s
Peak Hour Demand (L/s)	12.61 L/s	14.80 L/s

Based on the water demand calculations above, it is expected that there will be adequate supply in the existing Municipal water system.

Fire Flows

The Town of The Blue Mountains considers the fire flow calculations endorsed by the Fire Underwriters Survey (FUS). The FUS calculations take into account building materials, building sizes, building separations, occupancy, etc. In addition, the Ministry of the Environment, Conservation and Parks (MECP) requires the minimum fire flow to be 38 L/s plus the maximum day demand; however, they note that the decision to set fire flow requirements rests with the local municipality.

Using the FUS calculations, the estimated fire flow demand for the residential portion (West Lands) range from 83.3 L/s to 166.7 L/s. Per the Ontario Building Code (OBC) the estimated fire flow demand ranges from 45 L/s to 150 L/s. Refer to Appendix E for the full calculations based on the proposed unit types. The range of fire flow for both the East and West Lands is subject to the building configuration, fire walls between adjoining structures, separation distances and building sizes. The actual fire flow and storage requirements will be subject to the detailed design of the buildings.

6.3 Proposed Servicing Strategy

6.3.1 West Lands

The proposed development will be serviced by extending local mains through the West Lands and connecting to the municipal system at a minimum of two of the following three locations:

1. The 200mm diameter watermain on Highway 26 via the site access on Street A opposite Hope Street;
2. The 150mm diameter watermain on Brophy's Lane via the emergency access; and
3. The 150mm diameter watermain on Blue Mountain Drive.

Since there are more than two connections available to the municipal network, the Town and MECP requirements for a looped water distribution system will be satisfied. Therefore, there should be no issue with respect to providing adequate water circulation and preventing the potential for stagnant potable water.

Local watermain with individual service connections for each unit will follow the alignment of internal roadways per municipal standards. Sizing for the internal watermain will be determined during detailed design. Design flows for the West and East Lands will be provided to the Town to incorporate into the Town-wide water model to confirm sizing and available pressures. Internal watermain sizing may be subject to change, as a result. Fire hydrant and valve spacing will be set based on the applicable Town Engineering Standards during detailed design. Refer to Figure 6 for the proposed water services in the West Lands.

6.3.2 East Lands

Similar to the West Lands, the proposed development will be serviced by extending local mains through the East Lands and connecting to the municipal system at two locations:

1. The 150mm diameter watermain on Long Point Road via the proposed site access; and
2. The 150mm diameter watermain on Brophy's Lane via the proposed realigned Brophy's Lane.

The proposed looped water distribution system will provide adequate circulation. Service connections will be provided for the individual development blocks. The sizing for the internal watermain and service connections will be determined during detailed design once final unit counts and commercial space areas are available. Refer to Figure 6 for the proposed water services in the East Lands.

7.0 UTILITIES

In the preparation of this report we contacted area utility companies to confirm the availability to service the proposed developed. The responses provided by each company is summarized below:

- Rogers Cable confirmed that they have services in the area to support the development;
- Hydro One intends to service the proposed development and did not provide any details about external improvements;
- Bell Canada has a main fibre cabinet at the corner of Highway 26 and Long Point Road, which would be used for the proposed development. There is also a Bell pole line along Highway 26 to access the site, depending on where the entrance is located; and
- Union Gas did not respond to our request for information.

8.0 STORMWATER MANAGEMENT AND SITE DRAINAGE

8.1 Stormwater Management Criteria

The stormwater management (SWM) and site drainage for the proposed development must comply with the policies and standards of the various agencies including the Town, Grey Sauble Conservation Authority (GSCA), and Ministry of Environment, Conservation and Parks (MECP).

The stormwater management criteria for the Subject Development include:

- Water Quantity Control
 - Applies to lands not discharging directly to Georgian Bay;
 - "Post to Pre" control for storms up to and including the 100-year event; and,
 - The proposed SWM design must accommodate runoff generated from external lands.
- Water Quality Control
 - "Enhanced Protection" given Georgian Bay as the ultimate receiver.
- Erosion Control
 - Due to the proximity of the development to Georgian Bay erosion control is not required.

- Development Standard
 - Lot grading at 2% optimum grade; and,
 - Minor and major drainage system to convey runoff from frequent and infrequent rainfall events, respectively.

8.2 Existing Drainage Conditions

In 1993 the Craighleith Camperdown Subwatershed Study (GSCA, 1993) studied watercourses within the Craighleith Camperdown area, including the Site. Based on this study the Site extends across four subwatersheds identified in the study as:

- Subwatershed 1
- Subwatershed 4
- Subwatershed 5
- Subwatershed 6

The subject lands are characterized by low-lying areas with poorly defined drainage features and overall imperfect drainage characteristics. The lack of defined drainage features is primarily a result of the recessional beach ridges, which exist across the property and are commonly found in the lands adjacent to the Georgian Bay shoreline. The recessional beach ridges and imperfect drainage in these areas have promoted a series of Provincially Significant Wetlands (PSW), which are configured in a linear fashion over portions of the property.

According to the GSCA delineations (1993), a portion of the West Lands is located between Subwatersheds 5 and 6 and drains directly to Georgian Bay via sheet flow. Consequently, this portion of the property is not included in any of the above-noted subwatersheds. Figure 7 illustrates the overall subwatershed divides across the subject lands. A detailed description of the drainage patterns is described below on a subwatershed basis, consistent with GSCA (1993).

Various sources of topographic information are available for the subject lands and surrounding area. The Ontario Base Maps (OBM) were originally used by GSCA in 1993 to delineate the overall subwatershed throughout the Municipality. This mapping source includes 5 metre contours and provides a good overall representation of the regional topography. First Base Solutions (FBS) completed an aerial survey of the subject lands in 2008, which provides additional topographic data. The West Lands were also surveyed by KRCMAR Surveyors Limited in 2017, which provides the most detailed topographic data available for this portion of the Site. Consequently, the KRCMAR (2017) and FBS (2008) topographic survey data have been utilized with the delineations of local subwatersheds herein.

Based on review of this topographic data, seven drainage outlets were identified for the Site. A brief description of each of these outlets is provided in the following section.

8.2.1 West Lands

Drainage from the West Lands contributes to four separate outlets and is included in three subwatersheds as originally delineated by GSCA (1993). The outlet locations and subwatershed delineations across the property are illustrated on Figure 7, and a detailed description of the existing drainage conditions is provided below according to the identified outlets.

Outlet #1 - Highway 26 (Existing 600mm Culvert at Blue Mountain Drive)

According to GSCA (1993), approximately 2.7 ha (Catchment EX-1) of the southwest portion of the West Lands are within Subwatershed 6, which drains a total of 500 ha extending from the

Escarpment to Georgian Bay. Drainage from Subwatershed 6 reaches Georgian Bay via Watercourse 6 which flows north beneath Highway 26 and discharges to Georgian Bay approximately 300 m west of the subject lands.

The 2.7 ha portion of the West Lands which lies within Subwatershed 6 consists of light forest, open field and existing buildings and parking area. Discharge from the site enters the existing Highway 26 roadside ditch primarily by way of sheet flow, with the exception of a series of poorly drained depressions located adjacent to Highway 26. The roadside ditch conveys drainage to the west and passes beneath Blue Mountain Drive via a 600 mm CSP culvert before reaching Watercourse 6 approximately 300 metres to the west.

As reflected in Figure 7, there are no roadside ditches along Blue Mountain Drive adjacent to the Site. Runoff from a portion of the Blue Mountain Drive ROW drains by way of sheet flow to the existing roadside ditch along Highway 26, similar to the West Lands contributing to Outlet #1.

Outlet #2 – Georgian Bay (Sheet Flow)

According to the GSCA (1993) subwatershed delineations, a 4.2 ha portion of the West Lands drains directly to Georgian Bay by way of sheet flow. This area was not identified as being part of the above-noted subwatersheds; however, this report identifies this area as EX-2, which discharges to Georgian Bay via Outlet #2. It includes open grassed areas, several buildings and approximately 350 metres of the Georgian Bay shoreline.

A portion of the lands within EX-2 consist of various poorly drained depressions, similar to the lands in EX-1. The depressed areas are a result of the natural topographic characteristics of the area, as well as the fill pads associated with the construction of the existing buildings. Runoff from the area north of the buildings discharges to Georgian Bay by way of sheet flow, whereas runoff from the area to the south of the buildings is intercepted by the poorly drained depressions before flowing overland to Georgian Bay.

Outlet #3 – Georgian Bay (Via Cut-off Ditch)

Approximately 3.8 ha (Catchment EX-3) of the central portion of the West Lands lies within Subwatershed 5 and drains directly to Georgian Bay. Subwatershed 5 extends north from Highway 26 to Georgian Bay and includes a portion of the west spur of Brophy's Lane.

As illustrated on Figure 7, the southern portion of EX-3 includes a series of PSW's, recessional beach ridges and associated poorly drained depressions. These areas are ultimately drained by way of an existing ditch, which passes along the northeast property limit, adjacent to the west terminus of Brophy's Lane, and discharges to Georgian Bay at the northeast corner of the West Lands (Outlet #3). A portion of the drainage from Brophy's Lane enters the aforementioned outlet ditch and the remainder enters Georgian Bay by way of sheet flow.

Outlet #4 – Brophy's Lane (Existing 400mm Culvert)

The remaining 5.2 ha portion of the West Lands (Catchment EX-4) are located within Subwatershed 4 according to the GSCA (1993). These lands primarily consist of heavily forested PSW's, recessional beach ridges and poorly drained depressions, with the exception of the lands fronting Highway 26, which includes the former Craighleith General Store.

Drainage from the Highway 26 corridor enters the existing roadside ditch and does not contribute to Subwatershed 4. The lands surrounding the former Craighleith General Store are generally low-lying and contribute runoff northward to the forested areas noted above. Runoff from the forested areas

disperses through the PSW's and into the poorly drained depressions, ultimately reaching the roadside ditch along the west side of Brophy's Lane in an undefined fashion. This roadside ditch passes beneath Brophy's Lane at the northeast corner of the property via a 400 mm dia. CSP culvert (Outlet #4).

Another roadside ditch exists along the east side of Brophy's Lane, which drains a portion of the existing gravel road and several residences. Both roadside ditches connect downstream of the above-noted culvert and convey runoff to the downstream portion of Subwatershed 4, which consists of PSW's and poorly drained depressions to the northeast (off-site).

In total, the West Lands contribute drainage to four primary outlets, referred to as Outlet #1, #2, #3, and #4. The East Lands consist of the balance of the site which drains to three additional outlets referred to as Outlet #5, #6, and #7, as described in detail below.

8.2.2 East Lands

Drainage from the East Lands contributes to three separate outlets and is included in two subwatersheds as originally delineated by GSCA (1993). A detailed description of the existing drainage conditions is provided below according to the identified outlets.

Outlet #5 – Brophy's Lane (Existing 450mm Culvert @ Bend)

According to the GSCA (1993), approximately 7.7 ha (Catchment EX-5) of the East Lands contributes to Subwatershed 4 in a manner similar to EX-4. The 7.7 ha portion of the East Lands extends from Highway 26 to the north property limit adjacent to the 90-degree bend along Brophy's Lane. With the exception of an existing residence on Brophy's Lane, former Blue Mountain Inn and Alphorn Restaurant fronting Highway 26, EX-5 consists of PSW's, recessional beach ridges and poorly drained depressions, similar to that of EX-4.

Runoff from EX-5, including the existing buildings and parking areas, flows north via sheet flow into the heavily forested areas. The runoff that is not captured in the depressed areas ultimately reaches the roadside ditch along the west side of Brophy's Lane or the Eastern Drain at Brophy's Lane. The roadside ditch combines with runoff from the balance of Subwatershed 4 and passes beneath Brophy's Lane at a second 90-degree bend approximately 200 metres north of the East Lands. Downstream of Brophy's Lane, the trapezoidal rip-rap ditch flows north between two residences before discharging to Georgian Bay. The remainder of the drainage reaching Brophy's Lane at the first 90-degree bend is collected by the Eastern Drain, which passes north across Brophy's Lane via an 850mm x 1100mm CSPA (Outlet #6).

Outlet #6 – Brophy's Lane (Eastern Drain at Existing Arch Culvert)

As illustrated on Figure 7, the Eastern Drain bisects the East Lands as it flows north from Highway 26 to Brophy's Lane adjacent to the Alphorn Restaurant. It was constructed in the 1980's during the construction of the Craighleith Wastewater Treatment Plant. It is a trapezoidal rip-rap ditch with a bottom width and depth each of approximately 1.5 metres. Although it is illustrated as being located along the east limit of Subwatershed 4 (GSCA, 1993), the Eastern Drain primarily provides a drainage outlet for external lands south of Highway 26, which includes the existing residences along Timmons Street and surrounding areas. Based on field reconnaissance completed by Crozier in support of the original Servicing and Stormwater Management Report (2008), it is estimated that approximately 3 ha of external lands south of Highway 26 contribute to the Eastern Drain.

Drainage from internal lands adjacent to the Eastern Drain generally flows north towards the low-lying forested areas and disperses in an undefined manner before reaching Brophy's Lane at multiple locations described above. The portion of the internal area EX-5 which is not captured by the roadside ditch enters the Eastern Drain upstream of Brophy's Lane and passes beneath the road via an 850mm x 1100mm CSPA culvert (Outlet #6).

Immediately downstream of Brophy's Lane, the Eastern Drain passes into Subwatershed 2B (off-site) and flows east along the south limit of the Craighleith WWTP. Drainage from the upstream portion of Subwatershed 2B is also collected in a ditch and passes beneath Brophy's Lane via a 375 mm CSP culvert before combining with the Eastern Drain. The Eastern Drain then continues to flow east before it turns north around the WWTP and passes along the west limit of Long Point Road as a roadside ditch. The Eastern Drain ultimately discharges to Georgian Bay approximately 450 m north of the intersection of Long Point Road and Brophy's Lane.

The external lands, which lie to the south of Brophy's Lane within Subwatershed 2B, consist of heavily forested areas that are subject to imperfect drainage. Field reconnaissance conducted by Crozier and the FBS topographic survey data, found a series of undrained depressions, which supports the imperfect drainage characterization of these lands.

Outlet #7 – Long Point Road (Watercourse #1 at Existing Twin Arch Culverts)

According to GSCA (1993), approximately 2.1 ha (EX-6) of the east portion of the East Lands were identified as contributing to Watercourse #1. These lands primarily consist of light to heavy forested areas including a series of poorly drained depressions causing imperfect drainage conditions. Runoff from these areas that is not captured in the depressed areas would flow overland to Watercourse #1 or flow north towards Subwatershed 2B; however, the exact drainage divide is only approximate due to the generally flat topography and coarse topographic information available for the East Lands. Drainage from the Highway 26 corridor is intercepted in the roadside ditches along the highway and conveyed directly to the East Drain and Watercourse #1.

Watercourse #1 is identified by GSCA (1993) as having a drainage area of approximately 400 ha extending from the tablelands of the Escarpment to Georgian Bay. It enters the subject lands at the southeast property limit via a 3660mm x 1520mm concrete box culvert beneath Highway 26. Downstream of Highway 26, the watercourse traverses the east limit of the property along the west side of Long Point Road before it makes a 90-degree bend east beneath the road via a pair of 1490mm x 920mm CSPA culverts. Watercourse #1 then passes through several open fields and forested areas before discharging to Georgian Bay, approximately 850 m downstream of Long Point Road in the Town of Collingwood.

8.3 Proposed Drainage Conditions

Throughout the development, a dual drainage system will be implemented to insure adequate conveyance of runoff. As explained in Section 4.0, the proposed development will be constructed to an urban standard complete with a 20.0 m public road and a series of 16.0 m private condominium roads. The minor drainage system will consist of storm sewers with a minimum 5-year storm return capacity. The major system will include the proposed internal road network and channels that will be designed to provide an overland flow route.

Refer to Figure 8 for the Post-Development Conditions Drainage Plan. The proposed drainage system will utilize the pre-development outlets where feasible as described below.

8.3.1 West Lands

Stormwater from the West Lands will discharge directly to the Georgian Bay.

Proposed drainage catchments 1 and 2, approximately 3.86 ha, will drain east via a storm sewer system to two stormwater outlets, which discharge into a linear stormwater management conveyance facility that will convey flows north to Georgian Bay. It is important to note that this stormwater conveyance facility will not provide any retention of flows. Refer to Appendix F for the Flowmaster modelling done for the proposed channel.

Catchment 1, which includes an area of approximately 1.19 ha, will drain west towards Blue Mountain Drive. A storm sewer outlet will be installed within the existing municipal block north of Blue Mountain Drive and west of the Site.

Catchment 4, which includes approximately 1.93 ha of Block 5 in the West Lands, will sheet flow north to Georgian bay.

Overall, the drainage area contributing to Outlet #1 (Watercourse 6) is reduced when compared to existing conditions. This is due to the redirection of drainage from the majority of the development lands to the proposed stormwater management facility. Additionally, drainage from the Highway 26 corridor will remain independent from the internal drainage network and continue to discharge to Watercourse #6 approximately 300 m west of the site.

Drainage from the PSW areas within the West Lands will remain unchanged as a result of the development. The heavily forested and poorly drained areas will continue to utilize the existing culvert under Brophy's Lane (400 mm CSP) as Outlet #3.

8.3.2 East Lands

The proposed linear stormwater management conveyance facility, located in the West Lands (Block 13), will provide the most suitable outlet for the East Lands due to the direct outlet to Georgian Bay. Consequently, approximately 3.07 ha of the East Lands will drain to the aforementioned stormwater management facility and, subsequently north to Georgian Bay. These flows will be conveyed via a channel located south of the PSW (Block 16).

We understand that this channel will be located within the 10m widening for Highway 26; however, based on a typical 5-lane road cross-section and the existing alignment of Highway 26, it is estimated that there would be approximately 8.1m of excess setback between the PSW and the Highway 26 ditch. Drainage from the Highway 26 corridor would remain independent from the internal drainage and continue to discharge directly to the Eastern Drain and Watercourse #1.

Proposed drainage catchments 7 and 8, which includes Block 21, 25 and 24, will drain to Outlets 6 and 7 respectively. For commercial blocks less than 5 ha, typical stormwater management practices include rooftop, parking lot and sub-surface storage for water quantity control, and end-of-pipe treatment (ie. oil/grit separator) for water quality control.

The direct discharge of treated runoff to the suitable outlets noted above will reduce the volume of runoff, which currently enters the poorly drained depressed areas. Overall, the proposed stormwater management measures will improve the local drainage conditions.

The proposed realignment of Brophy's Lane (public) to Long Point Road will require a crossing of Watercourse #1. As this watercourse is identified by GSCA (1993) as a "cold water fishery", a suitable crossing configuration will have to be designed such as an open-bottom culvert, subject to

approval of the Municipality, Department of Fisheries and Oceans (DFO) and GSCA. This will be completed upon detailed design.

Block 20 consists of the portion of the East Lands between the Brophy's Lane realignment and Eastern Drain that will remain undeveloped. These lands will continue to drain to the northeast towards Brophy's Lane, however the overall contributing area from the subject lands will be reduced. By doing so, the imperfect drainage conditions within the heavily forested areas will not be exacerbated.

8.4 Stormwater Quantity Control Requirements

The majority of the proposed development will not require stormwater quantity control due to the direct outlet to Georgian Bay via the proposed stormwater management facility. As such, quantity controls are only required on the East Lands at Outlets #6 and #7, where post-development runoff is conveyed to the Eastern Drain and Watercourse #1, respectively, before reaching Georgian Bay.

8.4.1 East Lands

Per the Town of The Blue Mountains Engineering Standards (2009), increases in runoff rates of any storm event, resulting from new development shall be controlled to pre-development runoff rates. Since the proposed development in the East Lands will feature primarily commercial land uses the total impervious area within these blocks will increase the runoff rates post development.

Since the total area of the catchments contributing the Outlets #6 and #7 is less than 5 ha, a SWM facility is not suitable to control the increased runoff as a result of the proposed development. Other methods of quantity control including underground and surface storage will be implemented within the commercial blocks. These methods include rooftop, parking lot, super pipes and sub-surface storage tanks. These types of runoff storage methods for water quantity control purposes are industry standard for commercial blocks.

As noted, a Concept Plan for the blocks in the East Lands has not been prepared to date, so storage volume requirements have not been calculated at this stage. The actual storage volumes required and quantity control methods within the development blocks contributing to Outlets #6 and #7 will be determined during detailed design based on "pre-to-post" peak flow control, and each block will be subject to Site Plan control.

8.5 Stormwater Quality Control

It will be necessary to implement stormwater management practices to address the water quality and erosion control requirements of the regulatory agencies. Since Georgian Bay, is the ultimate receiver of drainage from the proposed development, the development will incorporate measures to provide "enhanced protection" per the MOE (2003) guidelines. "Enhanced" water quality protection involves the removal of at least 80% of suspended solids from 90% of the annual runoff volume.

Erosion control measures, however, are only required for those areas which will discharge to Watercourse #1 and the Eastern Drain.

8.5.1 West Lands

Due to the grading of the linear stormwater management conveyance facility and the need for multiple storm sewer outlets, it was determined that oil/grit separators would be used at each proposed outlet.

The stormwater management conveyance facility will provide additional stormwater polishing prior to discharging to Georgian Bay.

The screening of potential stormwater quality control measures for the subject lands led to the recommendation of utilizing oil/grit separators at each proposed outlet.

8.5.2 East Lands

As previously stated, Blocks 21 and 25 will be required to provide onsite quality controls that provide 80% TSS removal. Since these Blocks are less than 5 ha they are unsuitable for an end-of-pipe stormwater management facility (i.e. wet pond). Therefore, a treatment train approach will be developed, consisting of lot level control and end of pipe control. The proposed treatment train will provide the Enhanced Quality Control required by the review agencies.

9.0 CONCLUSIONS & RECOMMENDATIONS

Based on the foregoing, we have the follow conclusions:

1. Access to the site will be by way of two public roadway entrances. One will be the realignment of Blue Mountain Drive to align with the existing Hope Street intersection. The existing Brophy's Lane will be redirected eastward to Long Point Road to provide the second access;
2. The development will be fully serviced by way of municipal water and sewer. Ownership of the watermain be retained by the Municipality, whereas the sanitary conveyance system will be held under both private and public ownership corresponding to the ownership of the road network;
3. The domestic water supply will be provided by a looped system with connections to the existing watermains on Blue Mountain Drive, Brophy's Lane and Long Point Road. Fire and domestic water supply can be achieved through the existing municipal network;
4. Sanitary sewage conveyance for the site will be provided by gravity sewers and connect to the existing trunk sanitary sewer on the south side of Highway 26. Sewage from the site will ultimately be treated at the Craighleith Waste Water Treatment Plant (WWTP);
5. Utilities including hydro, gas, telephone and cable services are available to service the development since existing plants are located on the perimeter roads surrounding the subject lands;
6. The West Lands will not require stormwater quantity control due to the proximity to Georgian Bay. Stormwater quality control will be provided through the use of Oil/Grit Separators at each outlet to the stormwater conveyance facility;
7. Commercial Blocks 21, 24 and 25 in the East Lands will require quantity control, which will be subject to detailed design based on "pre-to-post" peak flow control, and each block will be subject to Site Plan control. Quality controls will provide 80% TSS removal.

8. The realignment of Brophy's Lane will cross Watercourse #1 by way of an open-bottom culvert, subject to detailed design and approval of the Municipality, DFO and GSCA.

Therefore, we recommend approval of the Planning Applications for the subject lands from the perspective of engineering servicing requirements. Thank you.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.



Kevin Morris, P.Eng.
Founding Partner

C.F. CROZIER & ASSOCIATES INC.



Brendan Hummelen, P. Eng.
Project Engineer

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LIST OF APPENDICES

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Appendix B:	Wastewater Servicing Extension Plans (Town of the Blue Mountains, 2018)
Appendix C:	Preliminary Sanitary Design Flow Calculations
Appendix D:	Preliminary Water Demand Calculations
Appendix E:	Fire Flow Calculations
Appendix F:	Flowmaster Modelling

APPENDIX A

Craigleith Sewage Pumping Station Capacity Calculations

Date 9/27/2019 Project No: 876-4866 Prepared By: GC Reviewed By: _____

Project Aquavil

Subject Approximate Sewage Pumping Station Capacity

- Craigleith Waste Water Treatment Plant - Peak Design Capacity = $19,640 \text{ m}^3/\text{day}$
 - Craigleith Waste Water Treatment Plant is operating @ 39% capacity per the 2017 Performance Report prepared by the Town
 - ∴ assumed peak day wastewater flow rate is approximately $7,659.60 \text{ m}^3/\text{day}$
 - Craigleith Sewage Pumping station has a peak design capacity of $10,541 \text{ m}^3/\text{day}$

$$\frac{7,659.60 \text{ m}^3/\text{day}}{10,541 \text{ m}^3/\text{day}} = 0.72$$
- ∴ The sewage pumping station is operating at approximately 72% capacity.

APPENDIX B

Wastewater Servicing Extension Plans (Town of the Blue
Mountains, 2018)



Water and Wastewater Servicing Extension Plan

Town of The Blue Mountains

Prepared by: Allison Kershaw

Manager of Water and Wastewater Services

Date: September 2018

Project #17 - Brophy's Lane Wastewater Servicing

This service extension is for the provision of municipal wastewater servicing to properties fronting Brophy's Lane. The provision of municipal sewers will eliminate older septic systems adjacent to Georgian Bay. Many of these properties are being redeveloped with significantly larger dwellings. This area is already serviced with municipal water.



Characteristics and Costing Estimate

Timeframe	10 to 20 years
Length	Gravity – 240 meters & LPF – 2,200 meters
Bench Mark Costing for Sanitary	Gravity - \$1,186/meter & LPF \$1,359/meter
Road reinstatement	To existing (Asphalt)
Project Cost Estimate	\$3,274,440
Equivalent Residential Units	148
Project Cost Estimate per ERU	\$22,124
Craigleith WWTP Costs	\$2,142
Trunk Cost	\$0
Total Servicing Cost per ERU	\$24,266

Additional Comments:

- Price does not include the purchase, installation and operation of grinder pump system.
- The cost per user exceeds the 5% affordability criteria by 15%, however it is within the 10% affordability criteria.

Project #14 - Blue Mountain Drive Wastewater Servicing

This service extension is for the provision of municipal wastewater servicing to properties fronting Blue Mountain Drive. The provision of municipal sewers will eliminate older septic systems adjacent to Georgian Bay. Many of these properties are being redeveloped with significantly larger dwellings. This area is already serviced with municipal water.



Characteristics and Costing Estimate

Timeframe	5 to 10 years
Length	460 meters
Bench Mark Costing for Sanitary (LPF 50-75mm)	\$1,245/meter
Road reinstatement	To existing (gravel)
Project Cost Estimate	\$572,700
Equivalent Residential Units (ERU)	26
Capital Cost per ERU	\$22,027
Craigleith WWTP Costs	\$2,142
Trunk Cost	\$0
Total Servicing Cost per ERU	\$24,169

Additional Comments:

- Price does not include the purchase, installation and operation of grinder pump system.
- The cost per user exceeds the 5% affordability criteria by 15%, however it is within the 10% affordability criteria.

APPENDIX C

Preliminary Sanitary Design Flow Calculations



File: 876-4866
Date: July 19, 2019
By: GC
Check By: KM

Aquavil - Sanitary Design Criteria
West Lands

Developed Site Area (Roads + Residences)	15.83 ha
Number of Residential Units	234 units
Person Per Residential Unit	2.30 persons/unit
Residential Population	538 persons

Unit Sewage flows

Residential	450 L/C-day
Infiltration (typical)	0.23 L/s/ha

Total Design Sewage Flows

Infiltration/Inflow Residential	3.64 L/sec
Average Daily Residential Flow	2.80 L/sec
Residential Peak Factor (Harmon Formula)	4.0

Total Peak Daily Flow	14.73 L/sec
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File: 876-4866
Date: July 19, 2019
By: GC
Check By: KM

Aquavil - Sanitary Design Criteria **East Lands**

Developed Site Area (Roads + Residences)	9.80 ha
Number of Residential Units	250 units
Commercial Area	0.91 ha

Person Per Residential Unit	2.30 persons/unit
Residential Population	575 persons

Unit Sewage flows

Residential	450 L/C-day
Commercial (per MOE Design Guidelines 2008)	28000 L/ha-day
Infiltration (typical)	0.23 L/s/ha

Total Design Sewage Flows

Infiltration	2.25 L/sec
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Average Daily Residential Flow	2.99 L/sec
Average Daily Commercial Flow	0.29 L/sec

Residential Peak Factor	(Harmon Formula)	3.9
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Total Peak Daily Flow	15.22 L/sec
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APPENDIX D

Preliminary Water Demand Calculations



File: 876-4866
Date: July 19, 2019
By: GC
Check By: KM

Aquavil - Domestic Water Design Criteria
West Lands

Developed Site Area	15.83 ha
Number of Residential Units	234 units
Persons Per Unit (Town of The Blue Mountains Engineering Standards)	2.3 persons/unit
Residential Population	538 persons
<u>Water Design Flows</u>	
Residential	450 L/C-day
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	2.80 L/sec
Max Day Peak Factor (Town of The Blue Mountains Engineering Standards)	2.00
Max Day Demand Flow	5.61 L/sec
Peak Hour Factor (Town of The Blue Mountains Engineering Standards)	4.50
Peak Hour Flow	12.61 L/sec



File: 876-4866
Date: July 19, 2019
By: GC
Check By: KM

Aquavil - Domestic Water Design Criteria
East Lands

Developed Site Area (Roads + Residences)	10.22 ha
Number of Residential Units	250 units
Commercial Area	0.91 ha
Persons Per Unit (Town of The Blue Mountains Engineering Standards)	2.3 persons/unit
Residential Population	575 persons
<u>Water Design Flows</u>	
Residential	450 L/C-day
Commercial (per MOE Design Guidelines 2008)	28000 L/ha-day
<u>Total Domestic Water Design Flows</u>	
Average Residential Daily Flow	3.29 L/sec
Max Day Peak Factor (Town of The Blue Mountains Engineering Standards)	2.00
Max Day Demand Flow	6.58 L/sec
Peak Hour Factor (Town of The Blue Mountains Engineering Standards)	4.50
Peak Hour Flow	14.80 L/sec

APPENDIX E

Fire Flow Calculations

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 \times C \times \sqrt{A}$$

where

- F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible)
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings	Ordinary Construction
1 number of floors	1.0 C
185 sq.m. floor area	
100% Floor 1	
0% Floor 2	
0% Floor 3	
0% Floor 4	
185 sq.m. total floor area	

Therefore F= 3,000 L/min (rounded to nearest 1000 L/min)

- Fire flow determined above shall not exceed:
- 30,000 L/min for wood frame construction
 - 30,000 L/min for ordinary construction
 - 25,000 L/min for non-combustible construction
 - 25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings 0% reduction

0 L/min reduction

Therefore UPDATED F= 3,000 L/min (rounded to nearest 1000 L/min)

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Sprinkler System Assume 0% reduction
0 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) esposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name	Distance		
Front	35	5%	150
Back	35	5%	150
Left	4	20%	600
Right	4	20%	600
1,500 L/min Surcharge			

Determine Required Fire Flow

No.1	3,000		
No. 2	0 reduction		
No. 3	0 reduction		
No. 4	1,500 surcharge		
Required Flow:	4,500 L/min		
Rounded to nearest 1000l/min:	5,000 L/min	or	83.3 L/s 1,321 USGPM

Determine Required Fire Storage Volume

Flow from above	5,000 L/min
Required duration	1.75 hours
Therefore:	525,000 Litres or 525 cu.m. is the required fire storage volume.

Required Duration of Fire Flow

Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

Fire Protection Water Supply Guideline
Part 3 of the Ontario Building Code (2006)

$Q = KVS_{TOT}$

Q = minimum supply of water in litres (L)
K = water supply coefficient
V = total building volume in cubic metres
 S_{TOT} = total of spatial coefficient values from property line exposures on all sides

K = 23.0 Group C building with combustible construction (Table 1)
V = 1017.5 sqm total floor area by 5.5m height
 S_{TOT} = 2 S_{TOT} Need Not Exceed 2.0

$Q = 46805 \text{ L}$

Based on ranges listed in Table 2, the required minimum water supply flow rate is

2,700 L/min
45 L/s

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

1. An estimate of fire flow required for a given area may be determined by the formula:

$$F = 220 * C * \text{sqrt } A$$

where

- F = the required fire flow in litres per minute
- C = coefficient related to the type of construction
 - = 1.5 for wood frame construction (structure essentially all combustible)
 - = 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
 - = 0.8 for non-combustible construction (unprotected metal structural components)
 - = 0.6 for fire-resistive construction (fully protected frame, floors, roof)
- A = The total floor area in square metres (including all storeys, but excluding basements at least 50 percent below grade) in the building considered.

Proposed Buildings	Ordinary Construction
3 number of floors	1.0 C
372 sq.m. floor area	
100% Floor 1	
100% Floor 2	
100% Floor 3	
0% Floor 4	
1116 sq.m. total floor area	

Therefore F= 7,000 L/min (rounded to nearest 1000 L/min)

- Fire flow determined above shall not exceed:
- 30,000 L/min for wood frame construction
 - 30,000 L/min for ordinary construction
 - 25,000 L/min for non-combustible construction
 - 25,000 L/min for fire-resistive construction

2. Values obtained in No. 1 may be reduced by as much as 25% for occupancies having low contents fire hazard or may be increased by up to 25% surcharge for occupancies having a high fire hazard.

Non-Combustible	-25%	Free Burning	15%
Limited Combustible	-15%	Rapid Buring	25%
Combustible	No Charge		

Low fire Hazard occupancy for dwellings	-15% reduction
-1,050 L/min reduction	

Therefore UPDATED F= 8,000 L/min (rounded to nearest 1000 L/min)

Note: Flow determined shall not be less than 2,000 L/min

3. Sprinklers - The value obtained in No. 2 above maybe reduce by up to 50% for complete automatic sprinkler protection.

Sprinkler System Assume 50% reduction
4,000 L/min reduction

Water Supply for Public Fire Protection - 1999
Fire Underwriters Survey

Part II - Guide for Determination of Required Fire Flow

4. Exposure - To the value obtained in No. 2, a percentage should be added for structures exposed within 45 metres by the fire area under consideration. The percentage shall depend upon the height, area, and construction of the building(s) being exposed, the separation, openings in the exposed building(s), the length and height of exposure, the provision of automatic sprinklers and/or outside sprinklers in the building(s) esposed, the occupancy of the exposed building(s) and the effect of hillside locations on the possible spread of fire.

Separation	Charge	Separation	Charge
0 to 3 m	25%	20.1 to 30 m	10%
3.1 to 10 m	20%	30.1 to 45 m	5%
10.1 to 20 m	15%		

Exposed buildings

Name	Distance		
Front	19	15%	1200
Back	19	15%	1200
Left	2.6	25%	2000
Right	2.6	25%	2000

6,400 L/min Surcharge

Determine Required Fire Flow

No.1	7,000
No. 2	-1,050 reduction
No. 3	4,000 reduction
No. 4	<u>6,400</u> surcharge

Required Flow: 10,450 L/min

Rounded to nearest 1000l/min: 10,000 L/min or 166.7 L/s
2,642 USGPM

Determine Required Fire Storage Volume

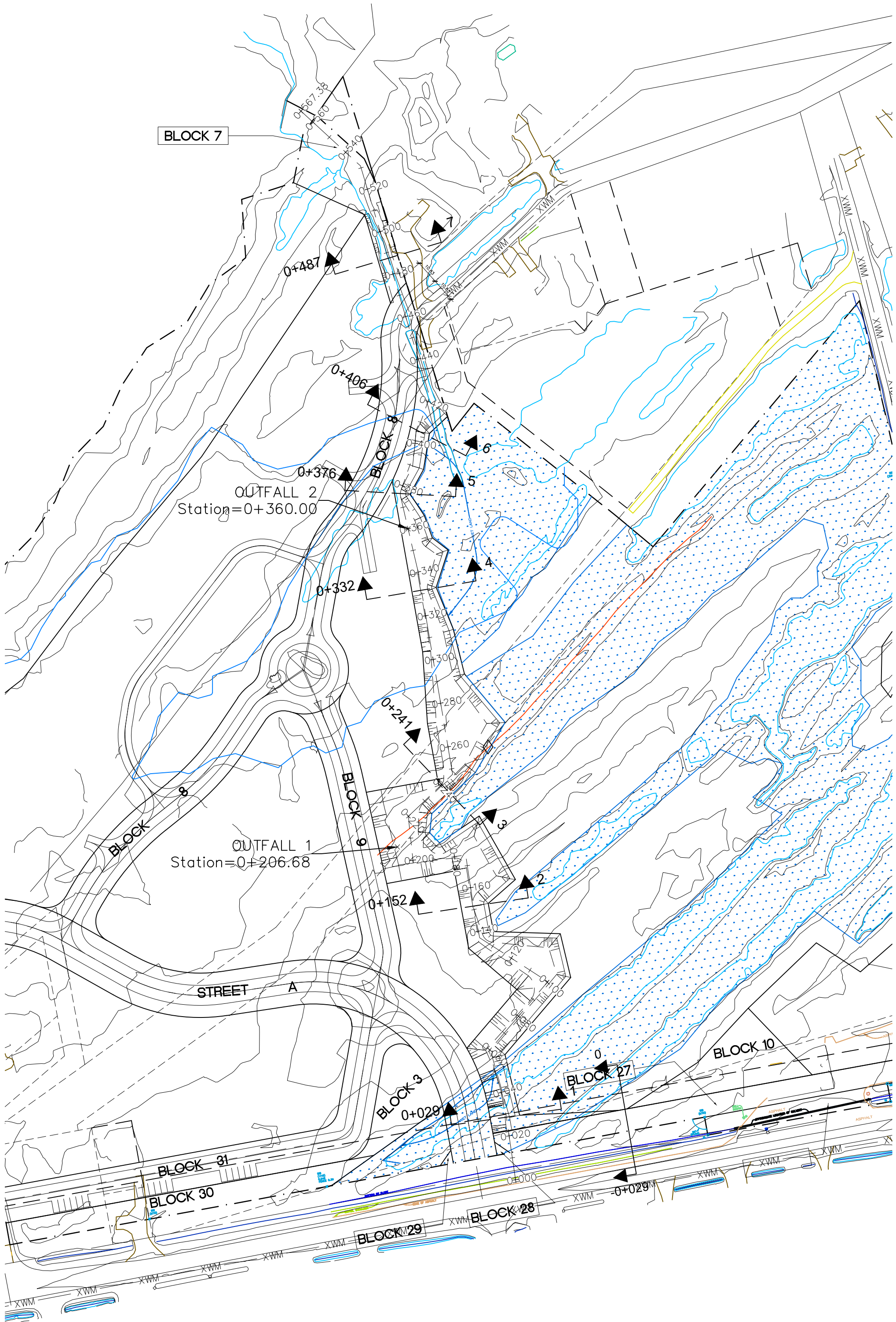
Flow from above	10,000 L/min
Required duration	2.00 hours

Therefore: 1,200,000 Litres or
1,200 cu.m. is the required fire storage volume.

Required Duration of Fire Flow	
Flow Required L/min	Duration (hours)
2,000 or less	1.0
3,000	1.25
4,000	1.5
5,000	1.75
6,000	2.0
8,000	2.0
10,000	2.0
12,000	2.5
14,000	3.0
16,000	3.5
18,000	4.0
20,000	4.5
22,000	5.0
24,000	5.5
26,000	6.0
28,000	6.5
30,000	7.0
32,000	7.5
34,000	8.0
36,000	8.5
38,000	9.0
40,000 and over	9.5

APPENDIX F

Flowmaster Modelling



Date 9/27/2019

Project No: 876-4866

Prepared By: GC

Reviewed By:

 Project
 Aguavil

 Subject
 Rational Method Calculations

Catchment #2

5-Year Storm

$$\begin{aligned}
 Q &= 2.78 ACI / 1000 \\
 &= 2.78 (2.15 \text{ ha}) (0.5) (79.4 \text{ mm/hr}) / 1000 \\
 &= 0.2373 \text{ m}^3/\text{s}
 \end{aligned}$$

$$\begin{aligned}
 I &= A \times T^B \\
 &= 79.4 \text{ mm/hr}
 \end{aligned}$$

$$\begin{aligned}
 A &= 29.1 \\
 B &= -0.72 \\
 T &= 0.25 \text{ hr}
 \end{aligned}$$

100-Year Storm

$$\begin{aligned}
 Q &= 2.78 ACI / 1000 \\
 &= 2.78 (2.15 \text{ ha}) (0.5) (133 \text{ mm/hr}) / 1000 \\
 &= 0.3965 \text{ m}^3/\text{s}
 \end{aligned}$$

$$\begin{aligned}
 I &= A \times T^B \\
 &= 133 \text{ mm/hr}
 \end{aligned}$$

$$\begin{aligned}
 A &= 47.7 \\
 B &= -0.74 \\
 T &= 0.25 \text{ hr}
 \end{aligned}$$

Catchment #3

5-Year Storm

$$\begin{aligned}
 Q &= 2.78 ACI / 1000 \\
 &= 2.78 (1.71 \text{ ha}) (0.5) (79.4 \text{ mm/hr}) / 1000 \\
 &= 0.1887 \text{ m}^3/\text{s}
 \end{aligned}$$

100-Year Storm

$$\begin{aligned}
 Q &= 2.78 ACI / 1000 \\
 &= 2.78 (1.71 \text{ ha}) (0.5) (133 \text{ mm/hr}) / 1000 \\
 &= 0.3154 \text{ m}^3/\text{s}
 \end{aligned}$$

Date 9/27/2019

Project No: 876-4866

Prepared By: GC

Reviewed By:

Aguavil
Project

Rational Method Calculations
Subject

Catchment #6

100-Year Storm

$$\begin{aligned} Q &= 2.78 A C I / 1000 \\ &= 2.78 (3.07 \text{ ha}) (0.75) (133 \text{ mm/hr}) / 1000 \\ &= 0.8493 \text{ m}^3/\text{s} \end{aligned}$$

Worksheet for Hwy. 26 Corridor

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Discharge 0.85 m³/s
Section Definitions

Station (mm)	Elevation (m)
0+000	180.17
2+220	179.43
7+080	179.43
8+100	179.77

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+000, 180.17)	(2+220, 179.43)	0.030
(2+220, 179.43)	(7+080, 179.43)	0.030
(7+080, 179.43)	(8+100, 179.77)	0.030

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.22 m
Elevation Range 179.43 to 180.17 m
Flow Area 1.21 m²
Wetted Perimeter 6.24 m
Hydraulic Radius 0.19 m
Top Width 6.17 m
Normal Depth 0.22 m

Worksheet for Hwy. 26 Corridor

Results

Critical Depth	0.14	m
Critical Slope	0.01756	m/m
Velocity	0.70	m/s
Velocity Head	0.03	m
Specific Energy	0.24	m
Froude Number	0.51	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

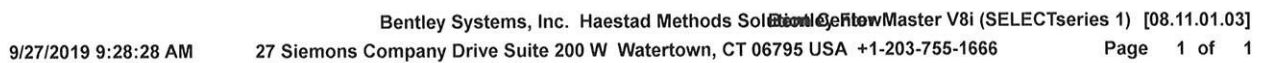
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.22	m
Critical Depth	0.14	m
Channel Slope	0.00400	m/m
Critical Slope	0.01756	m/m

Project Description

Input Data

Cross Section Image



Project Description

Input Data

Elevation (m)

Roughness Segment Definitions

Roughness Coefficient

Bentley Systems, Inc. Haestad Methods Solution Center MicroStation V8i (SELECTseries 1) [08.11.01.03]

Worksheet for Station 0+029

Options

Current Roughness vveighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.32	m
Elevation Range	179.20 to 181.40	m
Flow Area	1.02	m ²
Wetted Perimeter	4.29	m
Hydraulic Radius	0.24	m
Top Width	4.19	m
Normal Depth	0.32	m
Critical Depth	0.22	m
Critical Slope	0.01606	m/m
Velocity	0.83	m/s
Velocity Head	0.04	m
Specific Energy	0.36	m
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

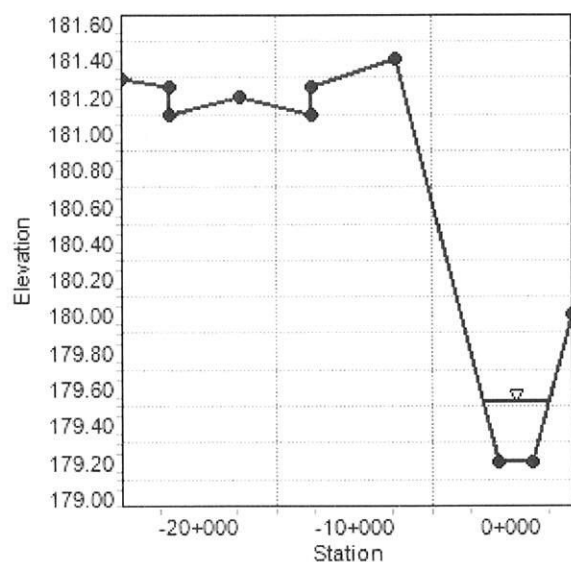
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.32	m
Critical Depth	0.22	m
Channel Slope	0.00420	m/m
Critical Slope	0.01606	m/m

Project Description

Input Data

Cross Section Image



Worksheet for Station 0+152

Results

Velocity	0.88	m/s
Velocity Head	0.04	m
Specific Energy	0.61	m
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.57	m
Critical Depth	0.44	m
Channel Slope	0.00400	m/m
Critical Slope	0.01569	m/m

Cross Section for Station 0+152

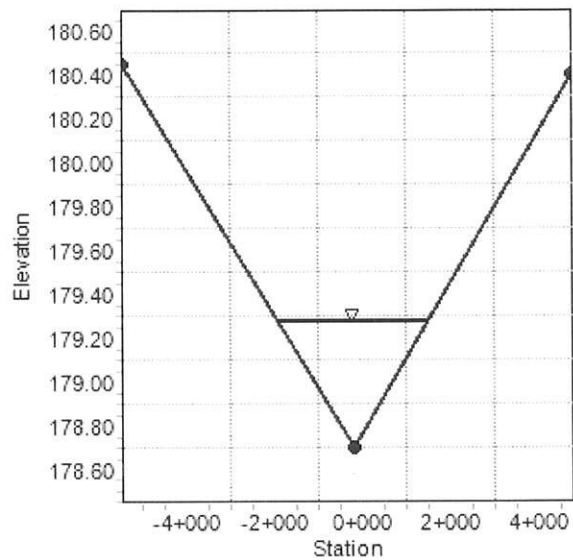
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Normal Depth 0.57 m
Discharge 0.85 m³/s

Cross Section Image



Worksheet for Station 0+241

Results

Critical Depth	0.36	m
Critical Slope	0.01504	m/m
Velocity	0.93	m/s
Velocity Head	0.04	m
Specific Energy	0.53	m
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.49	m
Critical Depth	0.36	m
Channel Slope	0.00400	m/m
Critical Slope	0.01504	m/m

Cross Section for Station 0+241

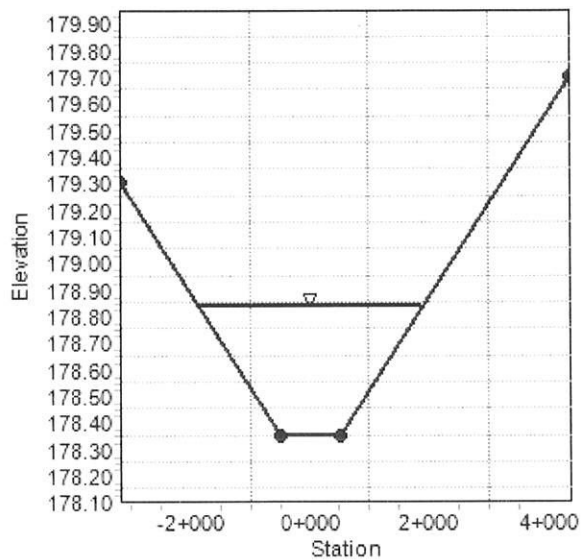
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Normal Depth 0.49 m
Discharge 1.09 m³/s

Cross Section Image



Worksheet for Station 0+332

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Discharge 1.09 m³/s
Section Definitions

Station (mm)	Elevation (m)
-4+300	179.30
-0+400	177.95
2+800	177.95
4+900	178.60

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-4+300, 179.30)	(-0+400, 177.95)	0.030
(-0+400, 177.95)	(2+800, 177.95)	0.030
(2+800, 177.95)	(4+900, 178.60)	0.030

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.31 m
Elevation Range 177.95 to 179.30 m
Flow Area 1.30 m²
Wetted Perimeter 5.22 m
Hydraulic Radius 0.25 m
Top Width 5.12 m
Normal Depth 0.31 m

Worksheet for Station 0+332

Results

Critical Depth	0.21	m
Critical Slope	0.01590	m/m
Velocity	0.84	m/s
Velocity Head	0.04	m
Specific Energy	0.35	m
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.31	m
Critical Depth	0.21	m
Channel Slope	0.00400	m/m
Critical Slope	0.01590	m/m

Worksheet for Station 0+376

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00420 m/m
Discharge 1.44 m³/s
Section Definitions

Station (mm)

Elevation (m)

-5+600	179.90
-4+600	179.25
0+000	177.80
2+800	178.70

Roughness Segment Definitions

Start Station

Ending Station

Roughness Coefficient

(-5+600, 179.90)	(-4+600, 179.25)	0.015
(-4+600, 179.25)	(0+000, 177.80)	0.030
(0+000, 177.80)	(2+800, 178.70)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.67 m
Elevation Range	177.80 to 179.90 m
Flow Area	1.42 m²
Wetted Perimeter	4.43 m
Hydraulic Radius	0.32 m
Top Width	4.22 m
Normal Depth	0.67 m

Worksheet for Station 0+376

Results

Critical Depth	0.53	m
Critical Slope	0.01464	m/m
Velocity	1.01	m/s
Velocity Head	0.05	m
Specific Energy	0.72	m
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

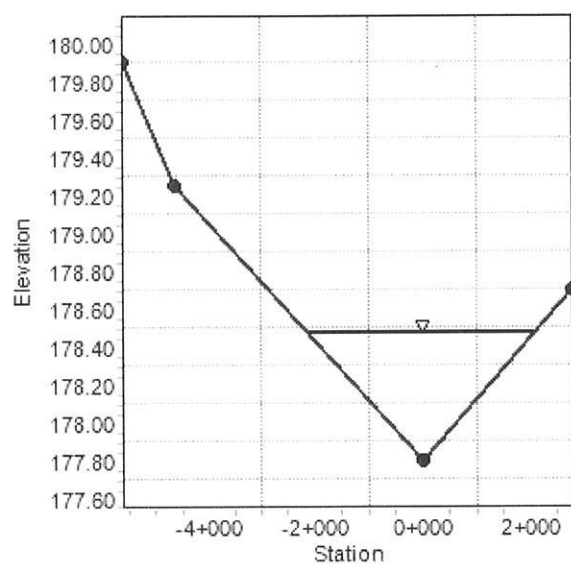
GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.67	m
Critical Depth	0.53	m
Channel Slope	0.00420	m/m
Critical Slope	0.01464	m/m

Project Description

Input Data

Cross Section Image



Worksheet for Station 0+406

Results

Critical Depth	0.51	m
Critical Slope	0.01486	m/m
Velocity	0.97	m/s
Velocity Head	0.05	m
Specific Energy	0.69	m
Froude Number	0.54	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.65	m
Critical Depth	0.51	m
Channel Slope	0.00400	m/m
Critical Slope	0.01486	m/m

Cross Section for Station 0+406

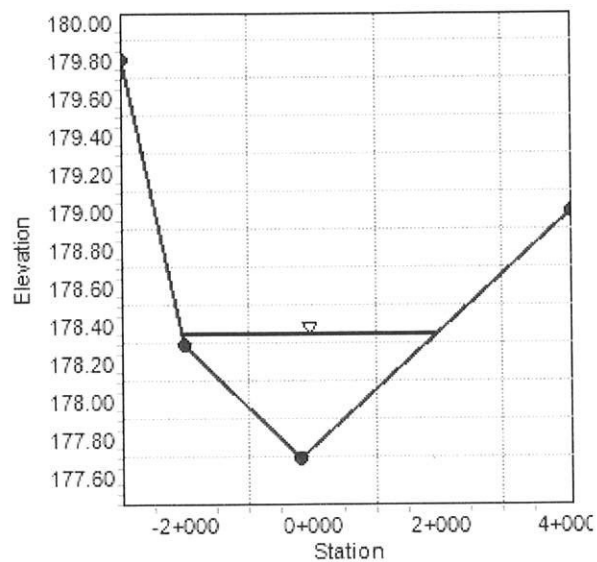
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Normal Depth 0.65 m
Discharge 1.28 m³/s

Cross Section Image



Worksheet for Station 0+487

Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

Channel Slope 0.00400 m/m
Discharge 1.56 m³/s
Section Definitions

Station (mm)	Elevation (m)
-4+600	177.85
-3+000	177.35
2+000	177.35
4+400	178.15

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(-4+600, 177.85)	(-3+000, 177.35)	0.030
(-3+000, 177.35)	(2+000, 177.35)	0.030
(2+000, 177.35)	(4+400, 178.15)	0.030

Options

Current Roughness Weighted Method Pavlovskii's Method
Open Channel Weighting Method Pavlovskii's Method
Closed Channel Weighting Method Pavlovskii's Method

Results

Normal Depth 0.31 m
Elevation Range 177.35 to 178.15 m
Flow Area 1.82 m²
Wetted Perimeter 6.99 m
Hydraulic Radius 0.26 m
Top Width 6.89 m
Normal Depth 0.31 m

Worksheet for Station 0+487

Results

Critical Depth	0.21	m
Critical Slope	0.01571	m/m
Velocity	0.86	m/s
Velocity Head	0.04	m
Specific Energy	0.34	m
Froude Number	0.53	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Downstream Velocity	Infinity	m/s
Upstream Velocity	Infinity	m/s
Normal Depth	0.31	m
Critical Depth	0.21	m
Channel Slope	0.00400	m/m
Critical Slope	0.01571	m/m

Cross Section for Station 0+487

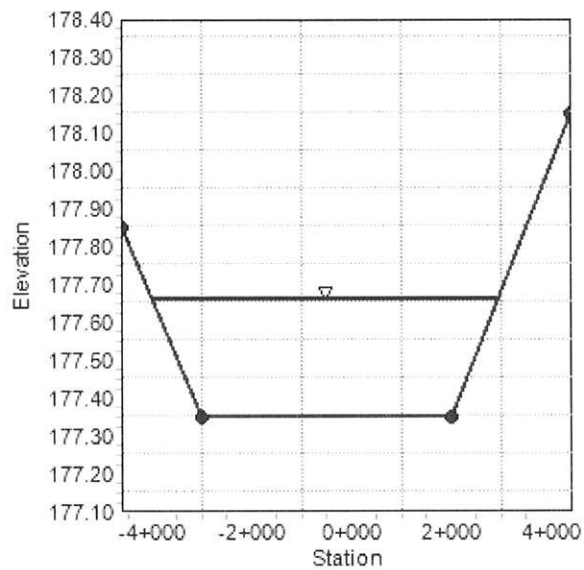
Project Description

Friction Method Manning Formula
Solve For Normal Depth

Input Data

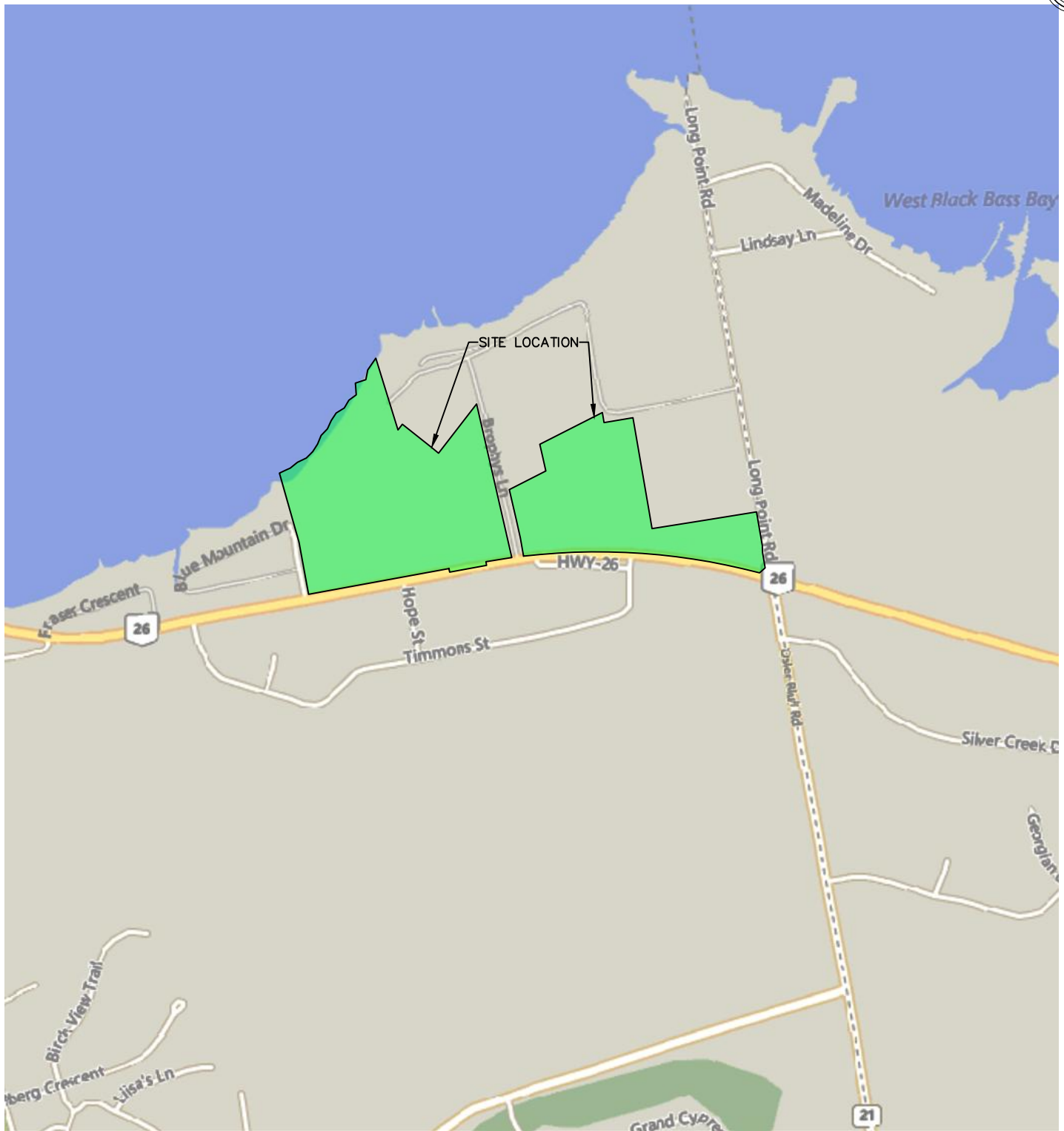
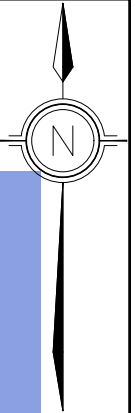
Channel Slope 0.00400 m/m
Normal Depth 0.31 m
Discharge 1.56 m³/s

Cross Section Image




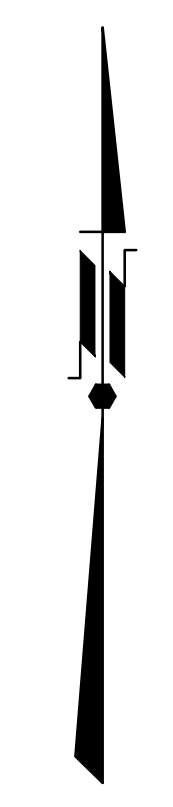
LIST OF FIGURES

Figure 1:	Site Location
Figure 2:	Draft Plan (Lloyd and Purcell, September 2019)
Figure 3:	Development Plan
Figure 4:	Proposed Condominium Roadway Cross-Section
Figure 5:	Sanitary Servicing Plan
Figure 6:	Water Servicing Plan
Figure 7:	Existing Conditions Drainage Plan
Figure 8:	Proposed Development Drainage Plan



SCALE: 1:10000

Project		AQUAVIL TOWN OF THE BLUE MOUNTAINS		 <div>CROZIER CONSULTING ENGINEERS</div> <div>8 MARKET STREET SUITE 600 TORONTO, ON M5E 1M6 416-477-3392 T WWW.CFCROZIER.CA</div>										
Drawing		SITE LOCATION												
Drawn By		M.V.R.	Design By		M.V.R.	Project		876-4866						
Scale		1:12500		Date		SEP/27/2019		Check By		B.H.	Drawing		FIG 1	



**DRAFT PLAN OF SUBDIVISION OF
LOTS 59, 110, 111 AND 112
PART OF LOTS 86, 87, 88, 89, 113 AND 114
PART OF BLOCK D (CLOSED BY BY-LAW)
REGISTERED PLAN 529
(FORMERLY TOWNSHIP OF COLLINGWOOD)
TOWN OF THE BLUE MOUNTAINS
COUNTY OF GREY**

SCALE 1:1000

20 10 0 10 20 30 40 50 60 Metres

LLOYD & PURCELL, A DIVISION OF SCHAEFER DZALDOV BENNETT LTD.

PLANNING ACT, SECTION 51(7)

- | | |
|------------------------------|--|
| (a) AS SHOWN ON DRAFT PLAN | (h) MUNICIPAL PIPED WATER AT THE TIME OF DEVELOPMENT |
| (b) AS SHOWN ON DRAFT PLAN | (i) SANITARY LOAM |
| (c) AS SHOWN ON DRAFT PLAN | (j) AS SHOWN ON DRAFT PLAN |
| (d) SEE SCHEDULE OF LAND USE | (k) AVAILABLE |
| (e) AS SHOWN ON DRAFT PLAN | (l) AS SHOWN ON DRAFT PLAN |
| (f) AS SHOWN ON DRAFT PLAN | |
| (g) AS SHOWN ON DRAFT PLAN | |

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN ON THIS PLAN.

____ DAY OF _____, 2019.

T. M. PURCELL
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

AS OF THE DATE ON THIS PLAN THE UNDERSIGNED BEING THE REGISTERED OWNERS OF THE SUBJECT LANDS HEREBY AUTHORIZE LLOYD & PURCELL, A DIVISION OF SCHAEFER DZALDOV BENNETT LTD., HENSEL DESIGN GROUP INC. TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION AND TO MAKE APPLICATION TO THE COUNTY OF GREY FOR APPROVAL THEREOF.

DATED THE ____ DAY OF _____, 2019.

2590019 ONTARIO INC.

PERSON, TITLE
I HAVE THE AUTHORITY TO SIGN THE CORPORATION

LLOYD & PURCELL
A DIVISION OF SCHAEFER DZALDOV BENNETT LTD.
ONTARIO LAND SURVEYORS

1228 CORHAM STREET, UNIT 28, NEWMARKET, ONTARIO, L3Y 8Z1
(905) 895-6416 Fax (905) 893-8887 E-MAIL: L.PURCELL@LLOYDANDPURCELL.COM
TORONTO LINE (905) 479-6300 Fax (905) 479-6315
WWW.ONTARIOLANDSURVEYORS.CA

CAD: BL/CF/DL P: 5 LOTS: 12-178
CALC: BI CHK'D: TMP FILE: PLAN 529

No. Date

13 Aug 16 2019 Revised Land Use Statistics, Streets and Block Layout
14 Apr 29 2014 Revised Land Use Statistics, Streets, Remove F, added E
15 Oct 31 2013 Block 22 removed, block 28 renamed block 22, block 21 area increase by 0.2ha
16 15/08/12 Revised alignment street c, d & remove block 25, add wave upturn line
17 28/06/12 Removed Wet Land Area Between Blocks 21 and 22 Extending into Street B
18 26/06/12 Added Land Use Statistics and Areas to Face of Plan
19 30/05/12 Add Dimensions to Proposed Block Fabric
20 29/05/12 Add contours and spot elevations
21 01/05/12 revised storm water blocks, added wetland/topo, change some lots to blocks, etc.
22 04/04/12 RESCALED DRAWING FROM 1:2000 TO 1:1000
23 02/04/12 REVISED AS PER CLIENTS
24 30/03/12 ISSUED FOR CLIENT REVIEW

LAND USE STATISTICS

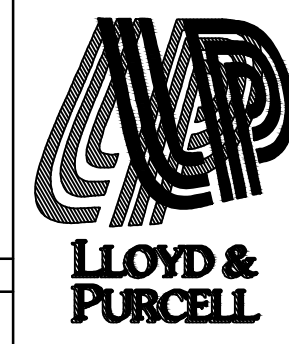
TOWNHOMES (BLOCK 1) 0.41 ha.
SINGLE FAMILY DWELLINGS (BLOCKS 17 AND 18) 0.97 ha.
SEMI DETACHED HOMES (BLOCKS 3 AND 4) 0.97 ha.
CONDOMINIUMS (BLOCKS 5 AND 11) 2.78 ha.
MIX-USE RESIDENTIAL/COMMERCIAL (BLOCKS 19 AND 24) 1.15 ha.
COMMERCIAL (BLOCKS 21 AND 25) 3.15 ha.
PRIVATE RECREATION (BLOCK 12) 0.23 ha.
INSTITUTIONAL (BLOCKS 15 AND 23) 0.65 ha.
OPEN SPACE/ ENVIRONMENTAL PROTECTION (BLOCKS 2, 6, 16, 20 AND 22) 10.79 ha.
STORM WATER MANAGEMENT (BLOCKS 7, 10 AND 13) 1.01 ha.
BLOCK USE TOTAL 223,808.1 m² (22.38 ha.)

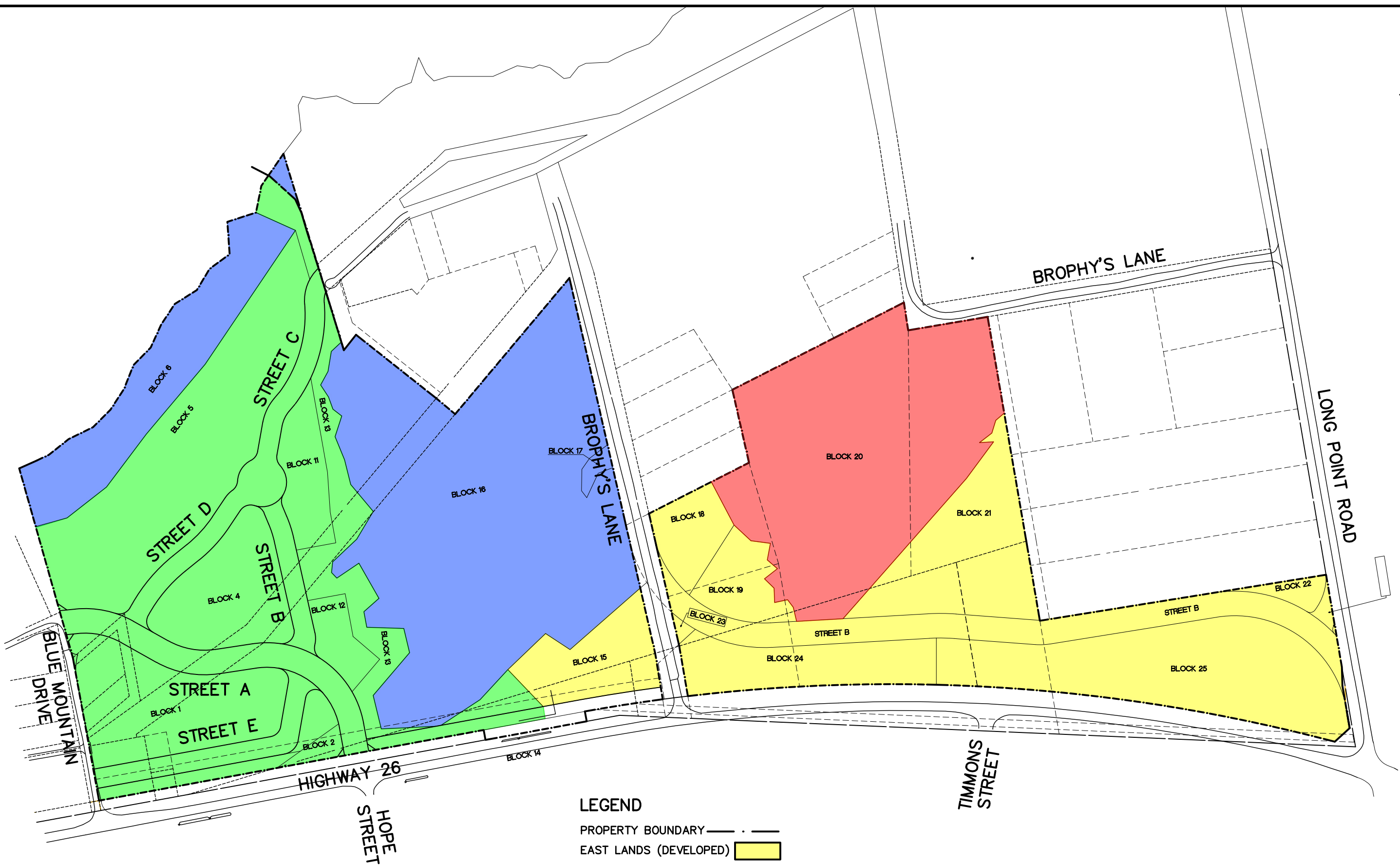
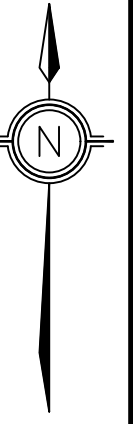
STREETS A, AND B
ROADS/ ROAD WIDENING/ DAY LIGHT TRIANGLE (BLOCKS 8, 9, 14, 26, 28, 29 AND 32 TO 35) 1.75 ha.
MTO SETBACK (BLOCK 27 AND 31) 1.27 ha.
ROAD SYSTEM TOTAL 34,198.5 m² (3.42 ha.)

TOTAL SITE 258,006.6 m² (25.80 ha.)
TOTAL OPEN SPACE 121,880.0 m² (12.19 ha.)


AREA

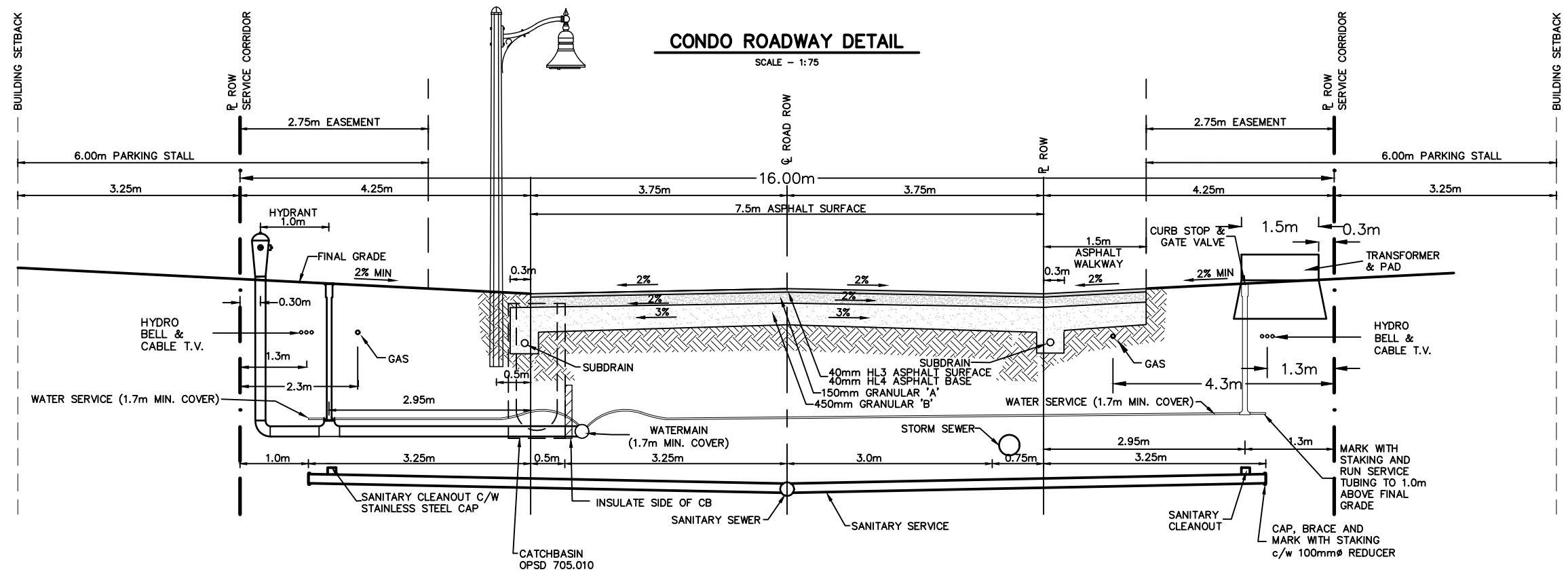
1.24 ha.
0.41 ha.
0.97 ha.
2.78 ha.
1.15 ha.
3.15 ha.
0.23 ha.
0.65 ha.
10.79 ha.
1.01 ha.
223,808.1 m² (22.38 ha.)




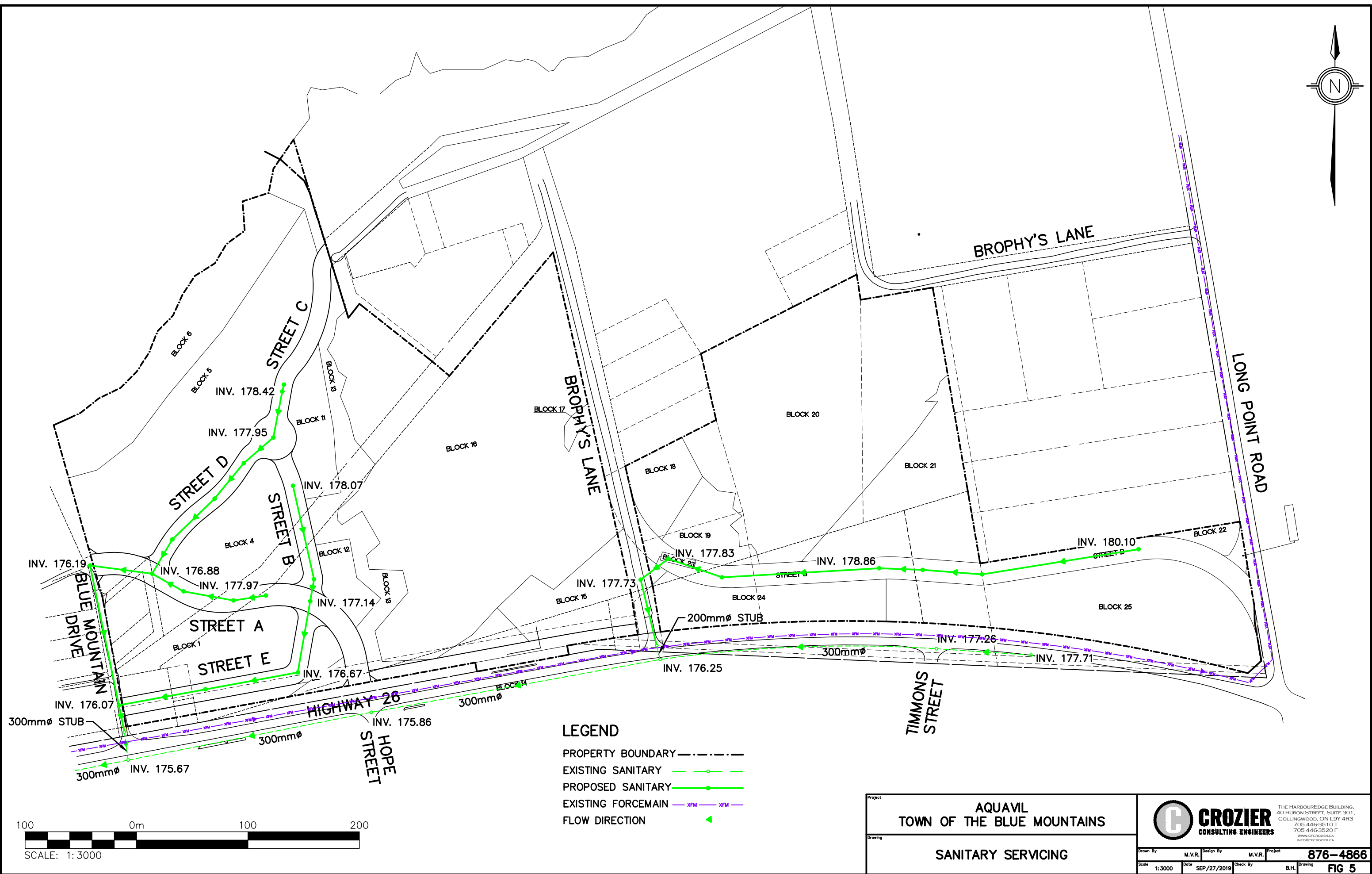
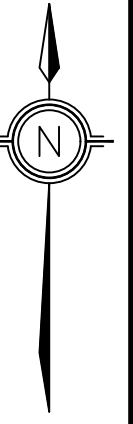


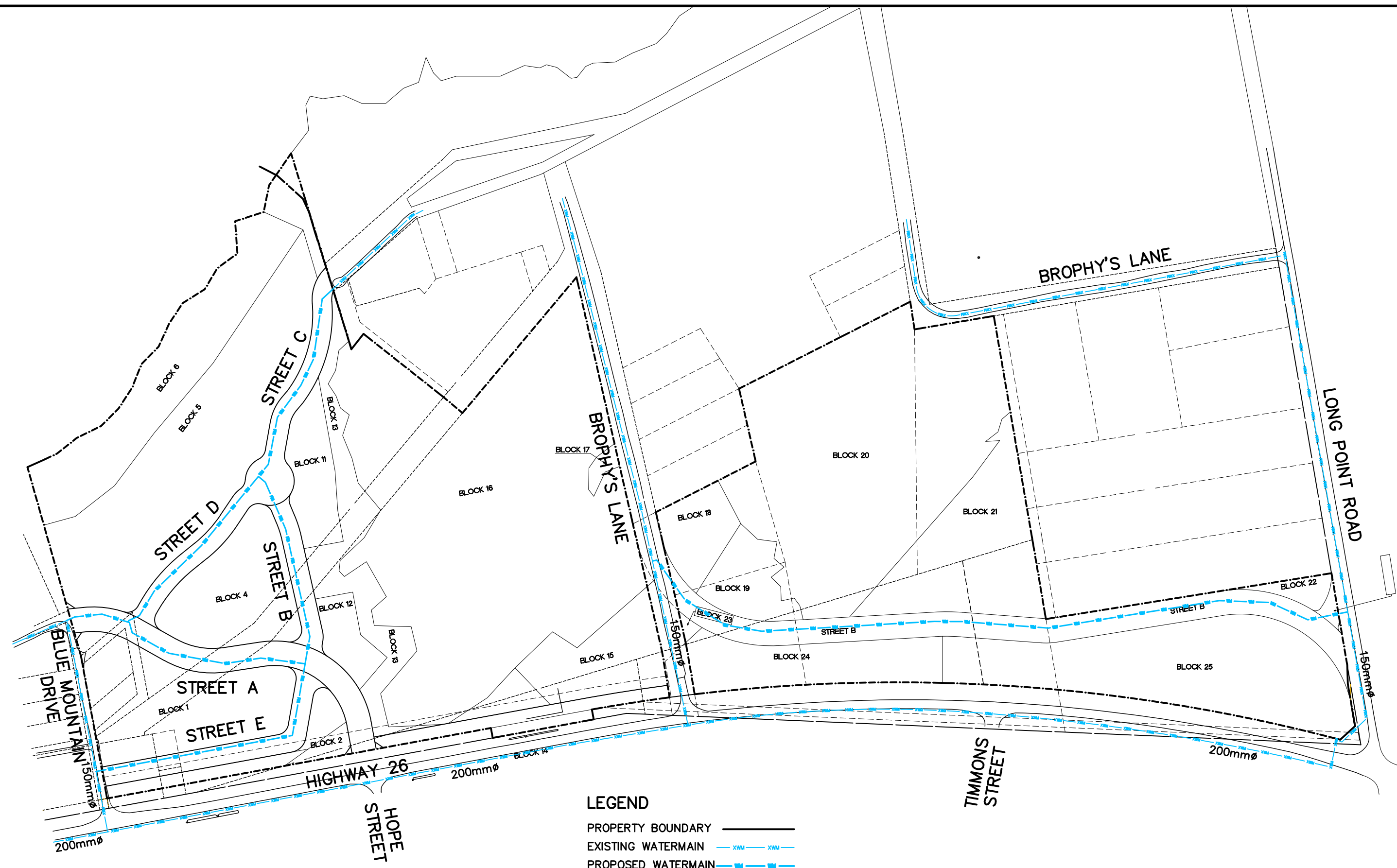
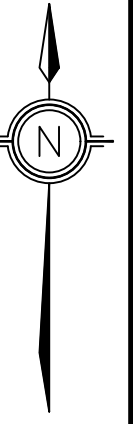
- LEGEND**
- PROPERTY BOUNDARY — . —
 - EAST LANDS (DEVELOPED) [Yellow box]
 - EAST LANDS (UNDEVELOPED) [Red box]
 - WEST LANDS (DEVELOPED) [Green box]
 - WEST LANDS (UNDEVELOPED) [Blue box]

Project		AQUAVIL TOWN OF THE BLUE MOUNTAINS		 CROZIER CONSULTING ENGINEERS <small>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CROZIER.CA INFO@CROZIER.CA</small>		
Drawing		DEVELOPMENT PLAN				
Drawn By	M.V.R.	Design By	M.V.R.	Project	876-4866	
Scale	1:3000	Date	SEP/27/2019	Check By	B.H.	
					Drawing	FIG 3




Project		AQUAVIL TOWN OF THE BLUE MOUNTAINS		 <div>CROZIER CONSULTING ENGINEERS</div> <div>THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA</div>			
Drawing		CONDO ROADWAY DETAIL					
Drawn By		M.V.R.	Design By		M.V.R.	Project	876-4866
Scale		1: 75	Date		SEP/27/2019	Check By	B.H.
						Drawing	FIG 4





- LEGEND**
- PROPERTY BOUNDARY ———
 - EXISTING WATERMAIN ——— XWM ———
 - PROPOSED WATERMAIN ——— XWM ———



Project		AQUAVIL TOWN OF THE BLUE MOUNTAINS		 CROZIER CONSULTING ENGINEERS		THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA	
Drawing		WATER SERVICING		876-4866		FIG 6	
Drawn By	M.V.R.	Design By	M.V.R.	Project			
Scale	1:3000	Date	SEP/27/2019	Check By	B.H.	Drawing	

