

November 15, 2021

Scott MacCallum, P.Eng., M.B.A
Clayton Developments Limited
255 Lacewood Drive
Suite 100C
Halifax, NS B3M 4G2

Dear Mr. MacCallum:

RE: Mount Hope Development – Servicing Assessment

Clayton Developments Limited is proposing the development of the Mt Hope property adjacent to Highway 111 in Dartmouth, Nova Scotia. The concept plans consist of a residential development with a mixture of detached, attached, and multi-unit buildings. The location and PIDs of the proposed properties under consideration for development are shown in Figure 1 below. This letter report provides a high-level infrastructure assessment for water and sanitary servicing of the proposed residential development in the Mount Hope property.



Figure 1: Exiting Site

Water Servicing

The Mt Hope property is bisected by a wetland. The lands north of the wetlands fall within the Dartmouth Intermediate pressure zone while the lands south of the wetlands currently fall within the Woodside Low pressure zone. The *Woodside Industrial Park Water System Master Plan - Mount Hope Avenue Water Extension Study* prepared by CBCL Limited (CBCL) in 2008 forms the basis of the water servicing of the Mt Hope property. The key points noted in the report are summarized as follows:

- ▶ The Mt Hope lands (referred to as Mt. Hope Extension Development in the 2008 report) cannot be serviced by the low zone and must be serviced by the intermediate zone. With this change, it was proposed that some of the lands on Mt. Hope Ave. and Neptune Cres. currently serviced from the low zone would transition to the intermediate zone.
- ▶ The isolation between the intermediate and low zones was proposed to be via a closed valve at the intersection of Neptune Cres. and Mt. Hope Ave. However, an allowance had been made in the piping for a future PRV installation on Mt. Hope Ave. between Orion Ct. and Estates Rd. The study noted that 20 properties off Neptune Cres. below 55m in elevation would require individual pressure reduction and the Ocean Nutrition Building would no longer require local boosting if Neptune Cres. is incorporated into the Intermediate zone.
- ▶ It was proposed that a 400 mm diameter connection be made between the 400 mm diameter Mt. Hope and the 600 mm diameter transmission main on Baker Dr. The report stated that this main will achieve two significant benefits for the region: improve pressures in the park and a larger diameter feed to the low zone via a future PRV.
- ▶ The study also allowed for servicing of residential demands through the Mt Hope property, referred to in the 2008 study as the "Development Area – Future".
- ▶ A connection to Lynn Dr was recommended to improve pressures in that area and a connection to Neptune Cres. from the Mt. Hope lands was recommended for looping.

In 2013, CBCL completed an options analysis for water services extension to Mt. Hope Ave. as an update to the proposed alignment in the 2008 report. A total of three (3) options were presented. Options 1 and 2 both considered crossing under Highway 111 at different locations to make the connection to the 600 mm watermain on Baker Dr. Option 3 considered routing the 400 mm watermain across Highway 111 by suspending it under the Mt Hope Ave overpass and connecting to the existing Baker Dr. at the intersection with Mt Hope Ave. It is not clear if Option 3 remains viable and would require further consultation with Nova Scotia Transportation.

Proposed Servicing Concept

The concept plan for the Mt. Hope property, as prepared by Clayton, is a mixture of detached, attached, and multi-unit residential buildings. The design parameters based on this concept plan and the 2020 Halifax Water Design specifications and are as follows:

- ▶ Population Densities
 - Single Unit Dwellings: 3.35 people /unit
 - Semi-detached & townhouse: 3.35 people/unit
 - Multi-unit dwellings: 2.25 people/unit
- ▶ Population Equivalent: 2,105
 - Multi Unit: 355 units.
 - Town House / 4 Plex: 307 units.
 - Detached Single Family: 83 units.
- ▶ Domestic Demands based on average consumption of 375 L/cap/day:
 - ADD: 789 m³/d.
 - MDD: 1,303m³/d (MDF = 1.65)
 - PHD: 1,974 m³/d (PHF = 2.5)
- ▶ Fire Flows:
 - Town House: 4,542 L/min.
 - Multi-Unit: 13,620 L/min.
- ▶ Allowable Service Pressures:
 - MinHD / PHD: 275 – 620 kPa (40 – 90 psi).
 - MDD + FF: 150 kPa (22 psi) at any point in the system.
- ▶ Maximum Allowable Velocities:
 - 1.5 m/s under PHD.
 - 2.4 m/s during MDD+FF.

Based on the previous master planning studies and the above design parameters, the proposed servicing concept for the Mt Hope Property is as follows:

- ▶ A 400 mm diameter watermain connection to the existing 600 mm diameter will be required as the primary water supply to the property. It is understood that the 400 mm will connect to the 600 mm on Baker Dr at the north end of the property.
- ▶ The 400 mm diameter watermain will follow Road 2 to Road 1 and connect to the existing 400 mm watermain on Mt Hope Ave. As noted in the 2008 study, properties along Neptune Cres and Orion Crt currently falling within the low zone could transition to the intermediate zone. However, the exact location of the zone isolation (between Orion Crt. or Estates Rd) should be determined in consultation with Halifax Water.
- ▶ A connection to the 200 mm diameter water on Lynn Dr. is assumed to satisfy the non-fire flow supply redundancy to the Mt Hope Development
- ▶ Local watermain pipe sizes within the property should be determined through hydraulic modelling. The minimum allowable pipe size is 200 mm diameter.
- ▶ Lands with elevations above 73 m serviced from the Intermediate Zone will have pressures less than 275 kPa (40 psi) under domestic demands and may constrain available fire flows in the MDD+FF scenario.

Refer to the attached Figure 2 for the proposed water system layout. Note that the preceding servicing concept should be confirmed through hydraulic modelling.

Sanitary Servicing

Figure 3 provides a layout of the existing sanitary sewer as well as connection points for the proposed development to the existing system. The proposed sanitary sewer services for the proposed Mt Hope development will be connected to the existing sanitary sewer system in two different locations: Highway 111 and Mt Hope Ave. (west side of the Highway 111 overpass). This section describes the connection at each location and the associated downstream capacity.

Existing flows for the receiving sewer were determined from flowmeter data provided by Halifax Water. The wastewater flows from the Mt Hope property have been calculated in accordance with the Halifax Water Design Specifications (2020 edition) as follows:

- ▶ 3.35 people per unit in houses and townhouses.
- ▶ 2.25 people per unit in 4-plexes and multi-unit buildings.
- ▶ Residential dry weather flow of 300 L/person/day

Highway 111 Connection

The sanitary sewer on Highway 111 collects the pumped sewage flow from the Russell and Morris Lake pump stations, as well as the businesses and apartment buildings around the Baker Dr and Mt Hope Ave. intersection. The existing sewer on Highway 111 is a 600 mm diameter concrete gravity sewer and connects to a 750 mm diameter concrete gravity sewer on Pleasant St which flows to a pump station and is pumped to the Dartmouth Wastewater Treatment Plant.

The full capacity flow of the sewer on Highway 111 is dictated by the section of pipe between manholes MH30301 and MH30302, which has a capacity of 538.2 L/s. This section receives all existing flows from upstream contribution areas and will also receive the flows from the proposed development. Based on flow monitoring data at manhole MH30305, from April 11, 2018 to March 31, 2021, the measured peak flow 232.3 L/s on December 17, 2019.

The calculated wastewater generation from the community into the Highway 111 gravity sewer is 34.4 L/s. This would increase the peak flow from 232.3 L/s to 266.6 L/s which is less than the calculated full flow capacity of 538.2 L/s.

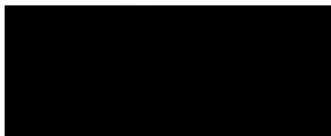
Mt Hope Ave Connection

The two proposed multi-unit buildings on Mt Hope Ave. will contribute a calculated peak design flow of 4.7 L/s. The sanitary sewer services from these buildings will connect to the existing gravity sewer on Mt Hope Ave near MH49034. This sanitary sewer is part of the woodside sewer shed that had a capacity analysis completed in 2019 by CBCL.

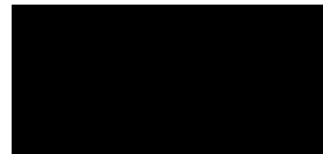
The capacity of the Mt Hope sewer is controlled by a 25m section of pipe between manholes MH17065 and MH17067 which appears to be installed at 0.15% slope. The capacity of this section of pipe is calculated to be 27.2 L/s. The estimated existing wastewater generation from the Woodside sewer shed is 32.2 L/s. This indicates that this short section of pipe is causing a restriction in the system and may require an upgrade to accommodate the current flows as well as additional flows. If there are no services connected to this section of pipe this may not be an issue, depending on how the upstream system behaves during peak flows. The existing flows and grade of this pipe should be confirmed prior to making any infrastructure upgrades.

Yours very truly,

CBCL Limited



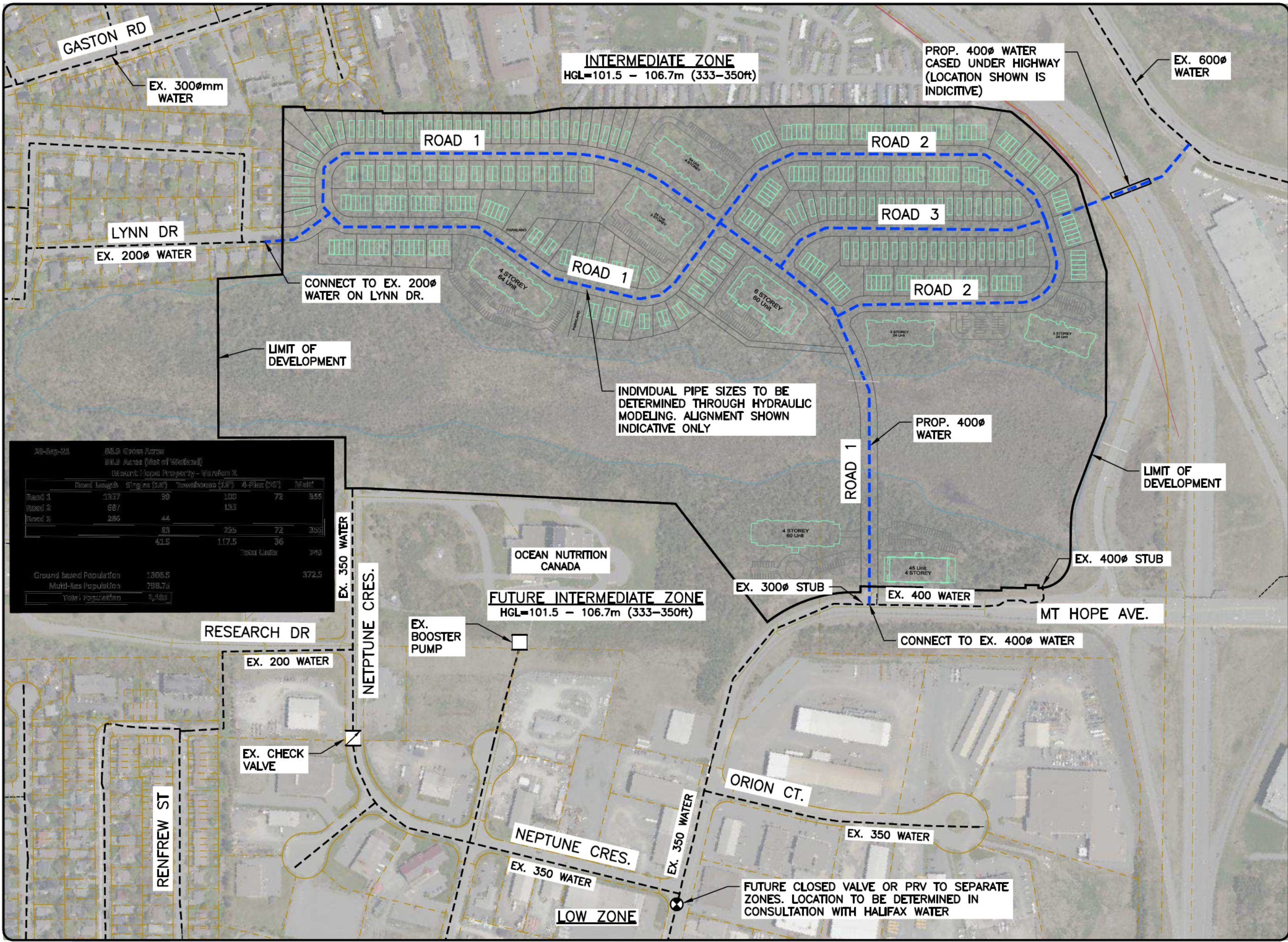
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Attachments: Figures

CC: Aaron Baillie, P.Eng., CBCL Limited



20-Sep-21

88.9 Gross Acres
88.9 Acres (Net of Wetland)
Mount Hope Property - Version 2

Road Length	Single (US)	Townhouse (US)	4-plex (US)	Mult
Road 1	1337	39	100	72
Road 2	687		135	
Road 3	286	44		
		83	235	72
		415	117.5	36
				745
Ground-based Population	1366.5			372.5
Multi-Res Population	788.75			
Total Population	2155.25			

MOUNT HOPE
PROPERTY

- LEGEND
- PROPERTY LINE (PR.)
 - WATERMAIN (EX.)
 - WATERMAIN (PR.)



DATE
NOVEMBER 2021

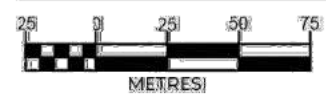
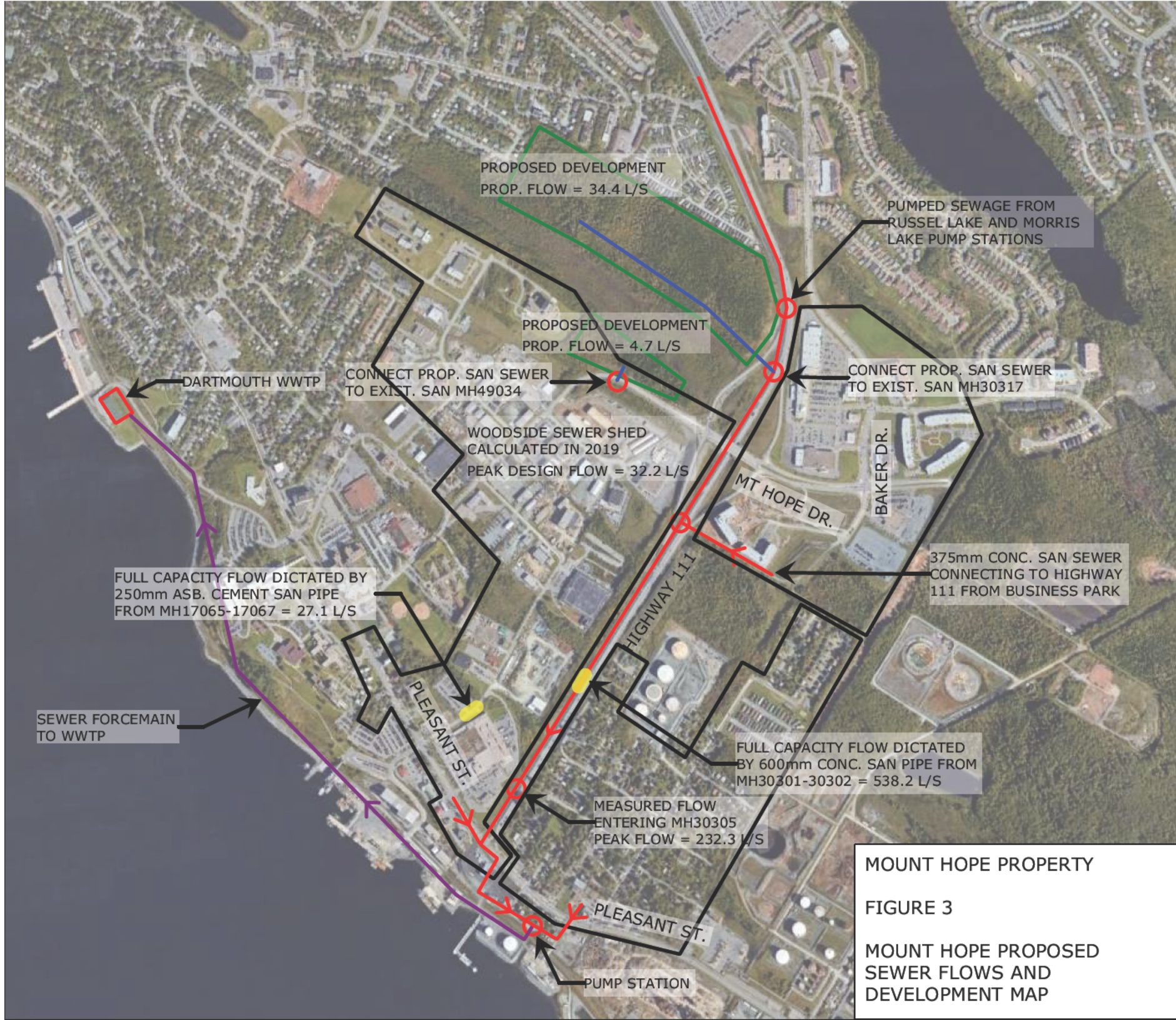


FIGURE 2

WATER
SERVICING
CONCEPT



MOUNT HOPE PROPERTY

FIGURE 3

MOUNT HOPE PROPOSED SEWER FLOWS AND DEVELOPMENT MAP