

“The Crossing” Ashburn Road Development

Conceptual Design Report Water and Sanitary Servicing

Type of Document:

Concept Design

Project Name:

The Crossing Ashburn Road Development

Project Number: FRE-00235545-A0

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Date Submitted:

September 26, 2017

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Project No.: FRE-00235545-A0	Date: September 26, 2017
Type of Document: Preliminary Report	Revision No.: 0
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1.0 Introduction and Scope of the Work

EXP Services Inc. (EXP) was retained by Horizon Management Limited to evaluate existing Municipal Services, and determine feasibility of providing water and sanitary services and develop a servicing strategy for the proposed "The Crossing" development. The proposed 50-hectare "The Crossing" commercial development (Figure 1) is located on Ashburn Road, and is bounded by NB Route 1, Rothesay Road and Drury Cove Road. It is estimated that The Crossing will ultimately consist of approximately 850,000 ft² of building floor area, including commercial, retail, residential, and recreational space.

Full build out is expected to occur in three phases, over a 15-year horizon as follows

- **Phase 1** completed by 2023 (approximately 250,000 ft²)
- **Phase 2** completed by 2028 (approximately 260,000 ft²)
- **Phase 3** completed by 2033 (approximately 340,000 ft²)

Existing municipal services in the area are limited to water and sanitary services on Rothesay Road, Drury Cove and the northern portion of Ashburn Road. Review of existing service capacities and generation of design water demands and sanitary flows were carried out based on the development concept plan, building uses, square footages, projected populations, and per-capita or square foot design flows from the Atlantic Canada Waste Water Design Guidelines manual. Proposed site development sanitary and water servicing concepts were reviewed and analyzed to generate appropriate configuration options and demonstrate that the development can meet or exceed City of Saint John requirements and identify significant infrastructure upgrading needs.

2.0 Sanitary Servicing

The existing sanitary services situate the proposed development include the following:

- Existing Drury Cove Wastewater Pumping Station (WWPS); this pumping station primarily services the gravity sewer from the Drury Cove Subdivision as well as some limited gravity sewer on Ashburn Road and Rothesay Road.
- Existing 150mm Sanitary Force main that conveys waste water from the Drury Cove Waste Water Pumping Station to the receiving municipal sewer near Simpson Drive.
- Existing 250mm and 200mm Sanitary sewer along the developments frontage on Rothesay Road and a small portion (approximately 90 meters in length) of Ashburn Road. These gravity sewers convey wastewater to the Drury Cove WWPS

Figure 2 shows existing infrastructure as well as proposed concept design site servicing.

Existing System Capacities and Loadings:

Existing Sanitary Catchment areas and land use types were evaluated using mapping data and record information provided by the City of Saint John and loads and capacities for the system were calculated on this basis. Design flows were generated using the foregoing and the Atlantic Canada Wastewater Guidelines document. The results of the review are presented in Table 2.1 below. Calculated flows shown in the table are peak (maximum hourly) flows with Harmon Peaking factors applied based on population

Figure 1 - Revised Conceptual Rendering of the Developed Site Plan



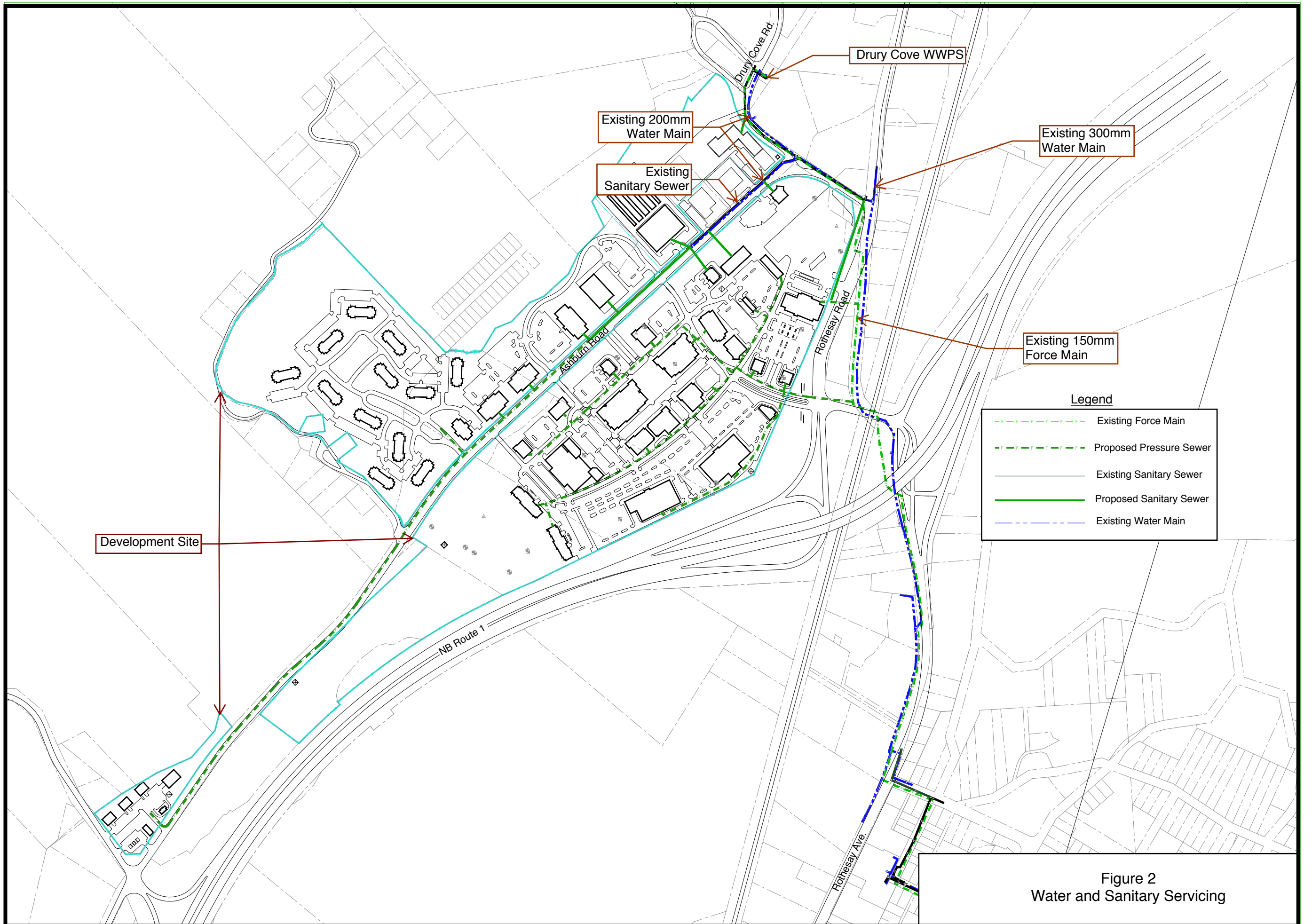


Figure 2
Water and Sanitary Servicing

Table 2.1

Item	Existing Capacity (Ips)	Existing Loading (Ips)	Available Capacity (Ips)
Drury Cove WWPS	22	2 to 4	18 to 20
Drury Cove 150mm Force Main	30	2 to 4	24 to 26
Rothesay Road Sanitary Sewer	35	Less than 1	34
Drury Cove Sanitary sewer	25	Less than 1	24

Design Flows:

Design flows were generated based on the concept design building square footages and use. Concept design peak flows for each phase of development are summarised in table 2.2 below.

Table 2.2

Design Phase	Peak Design Flow (Ips)
1	8 to 10
2	11 to 14
3	13 to 16
Total	32 to 40

Design Scenarios:

Several design scenarios were generated and reviewed for the site, based on estimated available infrastructure capacities, existing topography, geotechnical conditions and proposed site grades. Existing capacity exists in the Drury Cove WWPS and Force Main to accommodate all of phase 1 development and potentially most or all of Phase 2 development. Potential WWPS and force main upgrades may be required to provide sufficient capacity to the service Phase 3 development.

Based on the site topography and geotechnical conditions and existing gravity sewer elevations it is estimated that only a small portion of the site (10% to 15%), in the north-eastern corner of the development, can be serviced by gravity sewer.

Based on estimated site fills depths and geotechnical testing and reporting, predicted fill settlements are expected to be relatively high. This coupled with the flat topography of the existing and proposed site grading make the use of gravity sewers to service most of the site problematic. The recommended design wastewater servicing strategy for the portions of the site not feasible to service by gravity sewer is to service these areas with a pressure sewer system. The pressure sewer system is a closed, branched force main system with individual pumping stations for each building or group of buildings sized according to design flows for each building. Key features and advantages of the pressure sewer system are;

- Pressure sewer system is a closed system, therefore unwanted inflow and infiltration is significantly reduced;
- Pressure sewer system is not sensitive to grade changes and ground settlements;
- Pressure sewer system construction is easily phased;

- The pressure sewer system can inject wastewater into the Drury Cove Force Main downstream of the existing WWPS;
- The individual pump stations typically generate lower peak pumped flows than larger conventional waste water pumping stations and therefore lower peak flow loading on existing receiving infrastructure.

Conclusions

Review of existing infrastructure available capacities, concept design flows and proposed servicing strategy, indicates wastewater servicing of the development is feasible based on the following:

- **Phase 1** development flows can be accommodated by existing infrastructure via:
 - Gravity servicing of north eastern corner of the site near the Ashburn Road and Drury Cove Road intersection. Peak flows from this portion of the site are estimated to be approximately 2 to 4 lps.
 - Pressure sewer servicing of the remainder of the Phase 1 of the site development, peak flows from this portion of the site are estimated to be approximately 6 to 8 lps. These flows would be injected into the Drury Cove Force Main Downstream of the existing WWPS to utilize excess capacity in the force main and minimize impact on the WWPS.
 - No significant existing infrastructure upgrades are anticipated for Phase 1 development based on this design strategy.
- **Phase 2** development flows would most likely be serviced by the new pressure sewer system and injected into the Drury Cove Force Main Downstream of the existing WWPS to utilize excess capacity in the force main and minimize impact on the WWPS.
 - No significant infrastructure upgrades are anticipated based on the design strategy, however
 - Future flow monitoring study and analysis is recommended after Phase 1 development and prior to proceeding with Phase 2 development to confirm existing flows and available capacities in the WWPS and force main at that time.
- **Phase 3** development will most likely be serviced, by the new pressure sewer system and injected into the Drury Cove Force Main Downstream of the existing WWPS. This phase will likely require infrastructure upgrades to accommodate anticipated design flows. Infrastructure upgrades could include some of the following;
 - Future flow monitoring study is recommended after Phase 2 development and prior to proceeding with Phase 3 development to confirm existing flows and excess capacities in the WWPS and force main and to determine the most effective options
 - Reduce Coordinating pumped flows from portions of the development to occur when the Drury Cove WWPS is not pumping to reduce loading on the existing Drury Cove Force Main, or add additional wet well storage capacity to any new waste water pumping stations within the development to allow them to pump into the Drury Cove Force Main at off peak times.
 - WWPS upgrades such as;
 - Pump replacement with VFD pumps
 - Added sewage retention tank to effectively increase WWPS wet well capacity
 - Force main renewal, replacement or duplication

Water conservation measures can also be promoted in the new development to reduce water use and waste water flows such as the use of:

- High efficiency plumbing fixtures for toilets, urinals, faucets, showerheads and laundry equipment;
- High efficiency commercial kitchen equipment for restaurants and food preparation facilities, for known high water use equipment including:
 - Commercial Dishwashers and pre-rinse spray valves (PRSV)
 - air cooled ice machines,
 - Combination Ovens, steam cookers, steam kettles and wok stoves
 - Dipper wells
 - Food disposals
- Reduced water use building mechanical Systems
- Pressure sewers to reduce inflow and infiltration into the wastewater collection system,

3.0 Water Servicing

The existing water services situate the proposed development include the following:

- Existing 300mm Water Main on Rothesay Road.
- Existing 200mm watermains on Drury Cove Road and a portion of Ashburn Road.

Existing domestic water servicing requirements were estimated using the flows generated from the sanitary servicing study. Using those flows, peak demands are expected to be in the range of 30 to 35 lps. Design Fire flows for the development are expected to be more than this value, typical for some of the higher demand concept design uses and footprints would be in the order of 75 to 95 lps.

Review of existing water system capacity indicates that, to meet fire flow demands for the development, connection to the 300mm Rothesay Road water main is required to service the core area of the development. Extension of the 200mm watermain on Ashburn Road would also be required to service portions of the development fronting on Ashburn Road.

Further design, analysis and field hydrant flow testing would be required to verify proposed pipe sizes, routing, interconnections and demands as concept designs are advanced to preliminary and detailed design stages.