CANADA LANDS COMPANY

SHANNON PARK SCHEMATIC SERVICING AND INFRASTRUCTURE DESIGN

REVISED REPORT

PROJECT NUMBER: 201-04925-00

SEPTEMBER 23, 2020

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September 23, 2020

Mr. Chris Millier, Director, Real Estate
Canada Lands Company
1701 Hollis Street
Halifax, NS
B3J 3M8

Email: CMillier@clc.ca

Subject: Revised Schematic Servicing and Infrastructure Design – Shannon Park Draft Report

Dear Sir,

Please find enclosed our Revised Schematic Servicing and Infrastructure Design Report for the Shannon Park Redevelopment project in Dartmouth, NS.

This report summarizes our 2016 report and updates that work to compliment the current application for a development agreement under Halifax's recently created Centre Plan Package 'A'. This report includes discussion and recommendations for wastewater, potable water, and stormwater servicing; roadway infrastructure; electrical servicing; and natural gas servicing. We would be pleased to discuss any aspects of this report at your convenience.

Yours truly,

Original Signed

Ronald A Hiltz, P.Eng., FEC

RH/cm

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EXECUTIVE SUMMARY

Canada Lands Company (CLC) acquired approximately 33.2 hectares of land known as Shannon Park. The site was a former Department of National Defence (DND) property consisting of permanent married quarters (PMQs) and supporting infrastructure. CLC retained WSP to conduct a Master Planning exercise to develop a Preferred Development Concept Plan (PDCP). WSP was then retained to undertake a preliminary schematic servicing design. That report addressed the infrastructure needs, both on-site and off-site, to service the PDCP. Municipal water, wastewater, stormwater, electrical power, communications, and natural gas infrastructure availability and conceptual design were included in that report. Subsequently, after much debate HRM has adopted new urban core zoning called the Centre Plan which now includes the Shannon Park lands and allows for their redevelopment. Canada Lands has submitted an application for a development agreement under the newly created Centre Plan Package 'A' criteria. In support of this application WSP has been requested to revise, update and issue a new schematic servicing and infrastructure design report that is specific to the current application.

The proposed redevelopment of Shannon Park will create a modern residential community for some seven thousand residents at full build out. The site will greatly benefit from its close proximity to the Dartmouth trunk sewer, Halifax Harbour, natural gas distribution lines and the large diameter water lines serving Bedford Institute of Oceanography (BIO). No long-term off-site infrastructure capacity issues attributable to the redevelopment of the CLC lands were identified in preparing this report that are not already included in Halifax Water's master planning.

The trunk wastewater main parallels the rail line along the site's eastern border. The pipe presently has capacity as observed dry weather flows during the late afternoon peak were estimated at less than 10% of pipe capacity. Halifax Water, in their initial application review comments, has indicated that there is currently no plan for a detention storage facility on the Shannon Park lands. The CLC lands, as shown in the concept plan, can be serviced conventionally using a wastewater pumping station (WWPS) to minimize the amount of infilling required. A large portion of Phase 4 could be serviced with gravity sewer to the HW trunk sewer paralleling the rail line. This would avoid the need for wastewater sewerage pumping for those lots. Servicing of the abutting Millbrook lands will require a wastewater pumping station with a force main to connect to the proposed CLC infrastructure.

The existing water system, named Princess Margaret Low, which currently services Shannon Park has a hydraulic grade line between 58m and 63m. However, HW has indicated that the redevelopment of Shannon Park would be allowed to connect directly to the Burnside Low Pressure Zone currently servicing Windmill Road, BIO and Hudson Way. This pressure zone is approximately 30 psi higher which would help service the multi-storey buildings proposed for the Shannon Park Redevelopment. HW has indicated that the old and undersized watermain on Windmill Road is already identified for upgrading. With that upgrade, long-term supply to the CLC lands is assured. We are proposing multiple connections to existing mains at all four street connections to the existing infrastructure. The two connections to the Princess Margaret Pressure Zone would be normally isolated and used only in an emergency situation. Conventional water system design in accordance with HW's standards and specifications should be easily achieved. Discussions should take place with HW at the detailed design stage on pipe material selection. The use of PVC water pipe should be considered as the buried infrastructure will be subjected to a saltwater environment.

Stormwater from the CLC lands will discharge to Halifax Harbour at two locations, Tufts Cove and Norris Point. Therefore, no off-site upgrading of stormwater infrastructure is required. The discharge of piped flow from the Windmill Road area onto CLC lands creates concerns. No easement seems to exist permitting the discharge which is not identified on HW infrastructure mapping. As well, no visible route for surface flow could be found which would accommodate the major drain from Windmill Road crossing the rail line. Responsibility for the off-site minor and major drain flows needs to be agreed to prior to detailed design.

While typically no controls for stormwater runoff are required by NSE when discharging to large water bodies, HW's Design and Construction Specifications require each individual site to match pre-and post-development flows.

The proposed street cross sections developed in the Planning Stage are not committed to by CLC. If they are to be proposed for detail design, they would need to be approved by HRM as they are not standard HRM typical cross sections. However, we have shown that the two proposed street cross sections are capable of accommodating all necessary street infrastructure above and below grade. The Traffic Impact Study prepared by Harbourside/Design Point gives recommendations for intersection design and off-site upgrades. We understand that the current Concept Master Plan Version 802 dated April 15, 2020 reflects their most recent recommendations.

The CLC lands sit adjacent to NSPI's Tufts Cove Generating Station. They have indicated that they can supply adequate power to the site. The development will use underground primary and secondary electrical servicing. Therefore, the conduits pull boxes and transformer vaults would be installed by CLC who then retain NSPI for supply and installation of the wiring and any main line transformers. Each building site would have its own individual transformer installed as part of the building construction phase. Communication conduits will parallel the underground power lines.

The site sits adjacent a Maritimes and North East (MNE) gas line feeding the NSPI Tufts Cove Generating Station and the Heritage Gas line feeding BIO. Natural Gas, a clean-burning, efficient fuel source should be part of this development for obvious environmental reasons. Heritage Gas will supply and install the piping as part of the street development process. This has become standard practise in areas with natural gas access within Metro Halifax.

A proposed street grading design has been prepared for the streets shown on the concept plan. Centreline profiles have been prepared to assist with the servicing design. The existing school building, already located in a hole by the two existing abutting streets, creates significant grading challenges. New roads will need to be kept low to avoid creating a walled pit with the school located at the bottom of the pit. It will also create some lots at elevations below the 3.8m (CGVD28) flood risk elevation for residential development identified in the Regional Plan policy E-22, none of which abut the coastline. The minimum 4.86m (CGVD2013) elevation identified in HW's 2020 Design Specifications and Supplementary Standard Specifications can not be obtained in all locations. HW has recently advised us that they want the storm sewer outfall to operate during hightide with sea level rise (2.23m CGVD2013) and piping to be flood protected. To achieve this all streets would need to be raised by approximately 1 metre creating a dyke like scenario around the school property.

It should be remembered that the site was originally a multi-family housing development with institutional, commercial and recreational uses included. Technically those same uses are what forms the current redevelopment plan. The CLC lands were previously serviced with municipal water, wastewater and stormwater, power and communication systems. Only natural gas service is being added to the mix. While the density is being increased and therefore demands can be assumed to be higher, no impediments to servicing the redevelopment of Shannon Park were identified. Construction of underground infrastructure should be able to be completed in accordance with existing standards and specifications, however, the street cross sections and flood risk elevations are non-standard and therefore require acceptance during the subdivision approval process with HRM.

ABBREVIATIONS

BIO	Bedford Institute of Oceanography
CGVD2013	Canadian Geodetic Vertical Datum of 2013
CGVD28	Canadian Geodetic Vertical Datum of 1928
CLC	Canada Lands Company
Ha	Hectares
HRM	Halifax Regional Municipality
HW	Halifax Water
kPa	Kilopascal
MNE	Maritimes and North East Gas
NSE	Nova Scotia Environment
NSPI	Nova Scotia Power Inc.
PDCP	Preferred Development Concept Plan
psi	pounds per square inch
ROW	Right of Way
SMPS	Secondary Municipal Planning Strategy
TIS	Traffic Impact Study
WSP	WSP Canada Inc.
WWPS	Wastewater Pumping Station

1 GENERAL OVERVIEW

1.1 BACKGROUND

Canada Lands Company CLC Limited (CLC) acquired a large portion, approximately 33.2 hectares (82.1 acres), of the land known as Shannon Park in 2014. The site was a former Department of National Defence (DND) property consisting of residential buildings and supporting infrastructure. The existing buildings have been demolished and removed from the site. CLC plans to redevelop the property into a mixed-use residential community. Canada Lands will act as the master land developer in the redevelopment of the property. In this role, CLC will make application and gain municipal planning approval; install roads and services in a phased approach; and market and sell serviced lots or blocks to builders as each phase is developed.

Figure 1.1: Bird's Eye View of Existing Shannon Park Site

In 2015, CLC retained WSP to conduct a Master Planning exercise to develop a preferred development concept plan (PDCP). This plan, Figure 1.2, was unveiled to the public in April of 2016. CLC then retained WSP to prepare a schematic servicing design based on the PDCP. The schematic servicing design prepared in 2016 was needed to pursue planning approvals from HRM and to establish design parameters for detailed engineering design. That report presented an overview of the preliminary schematic servicing and infrastructure design completed to date, including discussion and recommendations for wastewater, water, and stormwater servicing; roadway infrastructure; electrical servicing; natural gas servicing; site earthworks; and preliminary estimates of probable cost.

In preparing that report, the WSP project team members contacted representatives of Halifax Water, Heritage Gas and Nova Scotia Power. The purpose of those meetings was to inform the utilities of the scale and timing of the proposed redevelopment and determine if the utilities anticipated any problems with servicing a community of 7,000 people with their existing infrastructure. WSP also conducted multiple visits to the unrestricted portion of the site. As well, we field-truthed the surrounding upstream lands to determine drainage boundaries.

Now, in 2020 with the adoption by HRM Council of the new Centre Plan designation, CLC has submitted a development agreement application for a revised conceptual plan. To support that application CLC has requested that WSP submit a new schematic servicing and infrastructure design report that is specific to the current application.

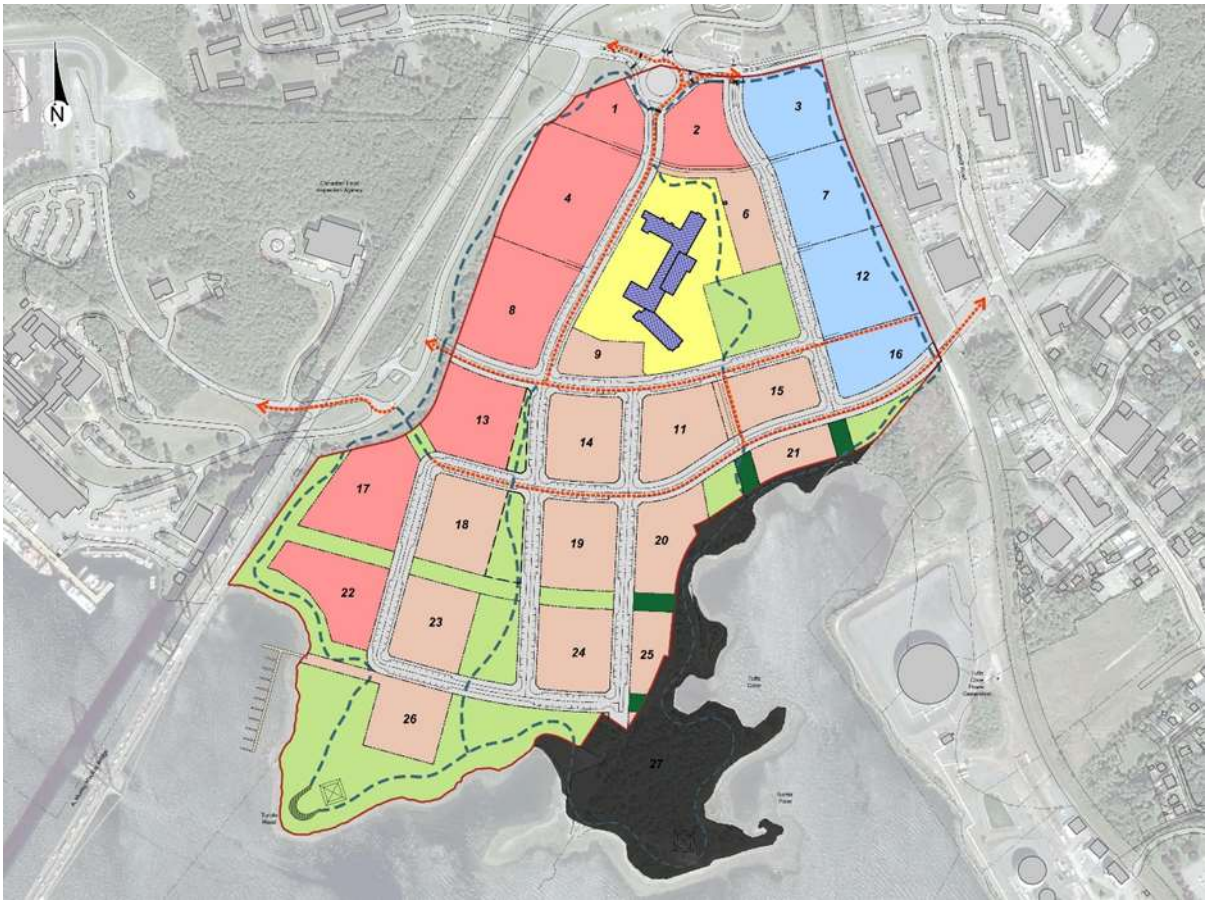

Figure 1.2 Preferred Development Concept Plan

1.2 DESIGN CRITERIA

Situated on the Dartmouth waterfront, redevelopment of the Shannon Park site requires approval from Halifax Regional Municipality (HRM) and Halifax Water (HW). HRM approvals are related to land use planning, parkland, streets and traffic considerations. HW approvals are required for the water, stormwater and wastewater servicing systems. Both organizations have well documented civil engineering design standards and guidelines. HRM publishes the Municipal Design Guidelines (Red Book), last updated in 2013. HW annually publishes their Design and Construction Specifications (Municipal Water and Wastewater Systems), with 2020 being the most recent version. Additionally, the construction and regulatory industries within Nova Scotia have worked together to produce a provincial document “Standard Specifications for Municipal Services”, locally referred to as the Blue Book. These three documents are the basis for municipal design in HRM and will guide the standard design and approval requirements for redevelopment of the Shannon Park site.

The Regional Centre Land Use By-law (Package A) Section 64 (1) stipulates where a lot abuts the coast of the Atlantic Ocean, including its inlets, bays, and harbours, a development permit shall not be issued for any portion of a dwelling, including a basement, that is proposed to be erected, constructed, altered, reconstructed, or located at an elevation less than 3.2 metres above the Canadian Geodetic Vertical Datum 2013 (CGVD2013) standard.

The Regional Centre SMPS contains a clause within the Shannon Park specific policy which states: The design and location of buildings and public infrastructure so as to mitigate potential climate change and storm surge risks in vulnerable areas by:

i. designing new buildings to be flood resistant to a storm surge/sea level rise elevation established in the Regional Plan;

ii. designing and locating roads, parks and other public infrastructure to comply with engineering standards to minimize risks of damage caused by future sea level rise and storm surge;

The Regional Plan Policy E-22 states: HRM shall, through the applicable land use by-law, prohibit all residential development on the coast within a 3.8 m elevation above Canadian Geodetic Vertical Datum (CGVD 28). Provisions shall be made within the by-law to permit residential accessory structures, marine dependant uses, open space uses, parking lots and temporary uses within the 3.8 m elevation. Consideration may be given to amending the by-law requirements where an updated system of measurement has been adopted or studies have been undertaken which recommend that such amendments are deemed prudent to provide a reasonable level of safety or to conform with guidelines or statements of interest adopted by the Province.

These policies are intended to reduce the risks associated with coastal flooding and storm surge. Halifax Water's newest design specification raises this plausible upper boundary flooding level to 4.86 metres (CGVD2013) for piping infrastructure. However, HW does allow the design engineer an opportunity to show how infrastructure below this elevation can provide an acceptable level of service. In recent correspondence from HW they are indicating that they would like to the stormwater outfalls to operate at high tide plus a 1.5m allowance for sea level rise due to climate change which is 2.23m (CGVG2013).

1.3 DEVELOPMENT PROJECTIONS

For schematic design purposes, we have adopted development projections from the PDCP completed by WSP in April 2016. Projections from the Master Planning process anticipate that at full buildout of the Shannon Park site there will be approximately 3,000 units. This will be comprised of mostly residential units in multi-unit dwellings and podium level townhouse forms, and up to 145,000 square feet of commercial space. Land uses will be urban living, mixed-use neighbourhood, commercial/residential and parkland/open space.

1.4 ADJACENT MILLBROOK FIRST NATION LAND

A small strip of land between the CLC lands and the waterfrontage on Halifax Harbour and Tufts Cove is owned by the Millbrook First Nation Band. Figure 1.4 below shows the layout of the existing Shannon Park site, with the approximate extents of the adjacent Millbrook First Nation property highlighted in blue.

The potential for an assumed 600 residential units on the Millbrook First Nation Land has been identified. As the Millbrook property is located immediately adjacent the shoreline, this site will need a wastewater pumping station to gain access to the CLC sewer system. CLC has undertaken to extend public roads and related sewer and water infrastructure necessary to enable development of the Millbrook lands. The provision of capacity to accommodate development of up to 600 units on the Millbrook property has been included in our preliminary servicing analysis.

A primary concern was the ability to access the Tufts Cove waterfrontage for stormwater discharge from the redeveloped CLC site. The original site had two piped discharges to harbour waters; both located on the Millbrook First Nation Land: a combined wastewater and stormwater system which discharged at Norris Point; and a stormwater system leading from the former recreation fields to the northern end of Tuft's Cove adjacent to Nootka Avenue. Today the Norris Point outfall has only 2 catchbasins on Sioux Road connected to it, but the Nootka

Avenue outfall is still active and services the school site as well as a large drainage area on Windmill Road. The Nootka Avenue outfall will need to be upgraded as part of the Shannon Park redevelopment. We understand that CLC has negotiated an agreement with Millbrook First Nation to secure access to this outfall and their eventual redevelopment.

Figure 1.4: Shannon Park – Existing Site Overview (WSP, 2015)

1.5 PRELIMINARY ANALYSIS OF SERVICING REQUIREMENTS

For the 2016 report WSP reviewed the background information, assessed the development demands based on the PDCP, and developed conceptual servicing strategies for the proposed development. The existing services surrounding the Shannon Park lands are shown on Figure 1.5. As part of the schematic design development process, Halifax Water was consulted to discuss water and wastewater servicing for the site. HW has provided additional record and design drawings as well as water system modeling information for the Dartmouth area in the vicinity of the site. WSP was advised by HW that policy allows them to assess new developments based on long term operating costs. HW inferred that a WWPS would be subjected to review under the new policy due to their long-term operating costs. However, with the need to minimize infilling to mitigate negative impacts to the existing school property a pumping station will be required.

Therefore, our servicing proposal utilizes a major wastewater pumping station to pump most of the sewage from the site into the trunk wastewater main paralleling the rail line. Potentially, some lots abutting the rail line could direct connect to the trunk wastewater main by gravity. The Millbrook lands which are located significantly below street grade would need to connect to the CLC wastewater system by force main(s).

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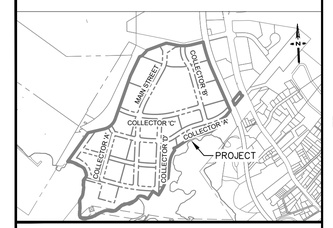

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APPROVED BY:
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40 30 20 10 0 40 80 120

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PROJECT:
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PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

TITLE:
EXISTING
SERVICES

SHEET NUMBER: FIG 1.5

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2 WASTEWATER SYSTEM

2.1 EXISTING WASTEWATER SYSTEM & FUTURE STORAGE REQUIREMENTS

2.1.1 EXISTING TRUNK SEWER

It is understood that an existing 1200 mm diameter trunk wastewater main runs parallel to the Canadian National Railway tracks at the east end of the site. The line runs north to south and services Burnside Industrial Park south of Burnside Drive to the harbour, as well as the Bedford Institute of Oceanography and nearby Ocean Breeze Estates. From our 2016 discussions with Halifax Water and the author of the Functional Wastewater Plan, it was understood that currently the trunk sewer had adequate capacity to accommodate the Shannon Park Redevelopment. For reference, WSP field observation in the trunk wastewater showed very low flow depths relative to pipe capacity at 5 PM on a weekday.

As well, a 450 mm diameter wastewater main is present in Princess Margaret Boulevard. This pipe currently accepts the sewage from Shannon Park through a pumping station and force main located at the north end of the school site.

2.1.2 FUTURE HALIFAX WATER WASTEWATER DETENTION FACILITY

HW has also recently indicated in their application review comments that their Infrastructure Master Plan does not presently include a sewage detention facility in Shannon Park.

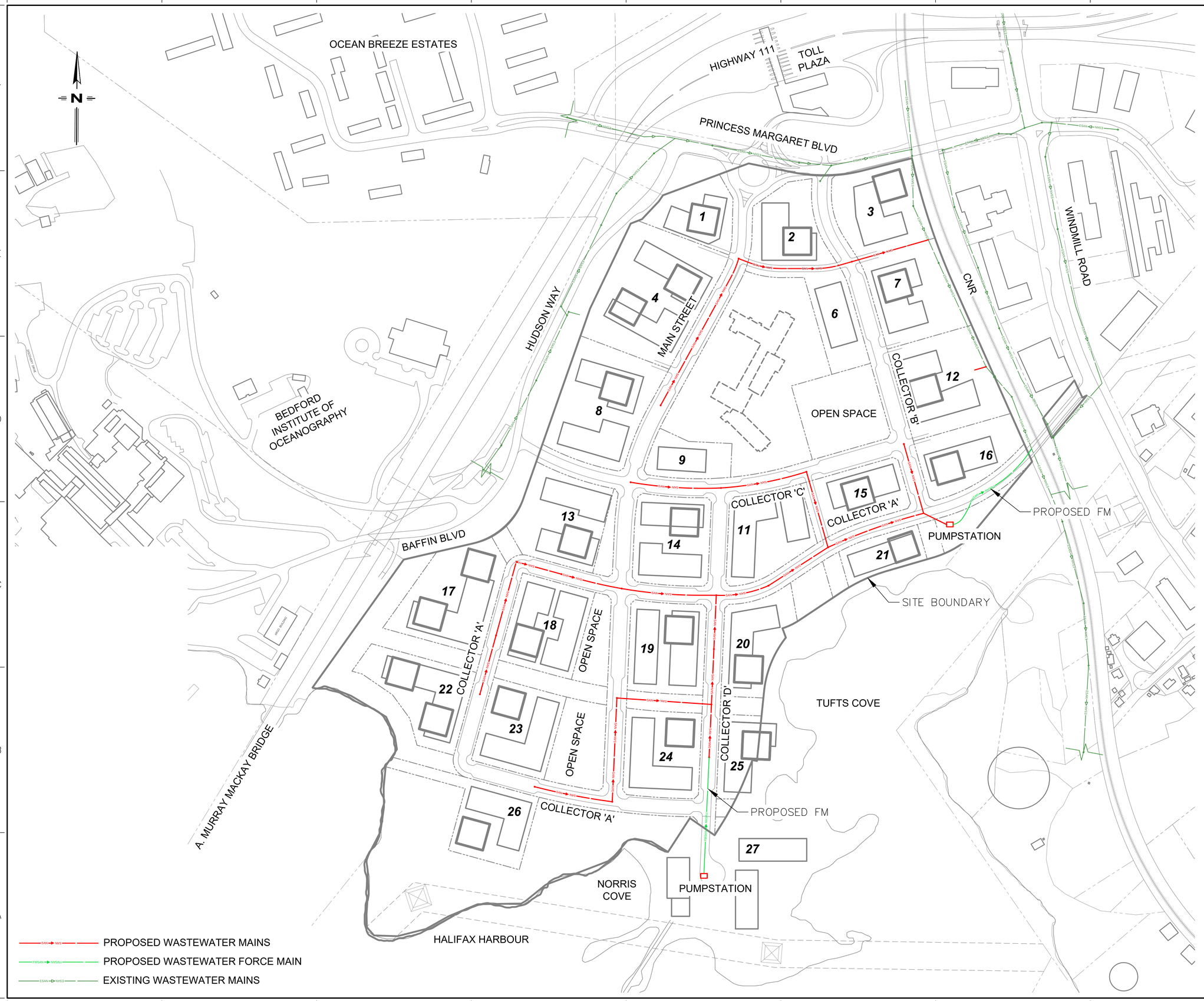
2.2 WASTEWATER SERVICING

Given the street profiles required to minimize impacts on the existing school site, the only option for servicing the site is a gravity collection system to a central low point and then a wastewater pumping station with force main to connect to the trunk sewer running parallel to the rail line. It should be noted that our servicing model shows Building Sites 1-4, 6-7 and some of 8 as potentially being serviced by a separate gravity sewer connecting to the trunk wastewater main between sites 3 and 7.

2.2.1 WASTEWATER PUMPING STATION

The proposed wastewater schematic is shown in Figure 2.1. It involves servicing CLC lands by gravity to the natural low point on Nootka Avenue at the head of Tufts Cove. From there, a WWPS is required to pump the sewage to the trunk sewer line running parallel to the train tracks. Development of the Millbrook First Nation lands at the south end of the site will require a separate WWPS to discharge to the proposed gravity system on the CLC lands. This design minimizes the depth of the hole that the school site, already well below street grade, will become with development on all four sides.

The proposed WWPS on CLC land will need to be designed to accommodate the smaller flows associated with the initial phases of the development while being able to be easily adapted to handle increasingly larger flows as the development proceeds over time. Designers will need to address storage time, odour control, variable flow rates as development proceeds, and force main sizing for initial and final development flow rates. Since street grades follow the existing contour of the land to minimize impacts to the school building, the adjacent building sites will be below



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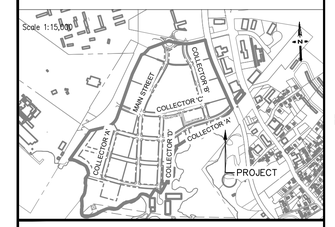

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SHANNON PARK
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FIG2.1

the 3.2m CGVD2013 / 3.8m CGVD28 contour. The ground level in the buildings located at the existing low point in the vicinity of the proposed WWPS will therefore need to be used for parking or commercial purposes only as per the current Regional Plan policy. The WWPS itself will need to be flood protected as well as it will be below the 4.86m (CGVD2013) contour that HW has identified as long-term flood risk.

2.3 WASTEWATER SERVICING DEMANDS

PHASE	NO. OF UNITS	PEAK WET WEATHER FLOW
Phase 1	650 res. units, 0.31 Ha Com.	26 l/s
Phase 1B	224 res. units	9.2 l/s
Phase 2	320 res. units	14.1 l/s
Phase 3	720 res. units	27.3 l/s
Phase 4	1054 res. units, 1.04 Ha Com., 620 student school	51.2 l/s
Millbrook lands	600 residential units	22.9 l/s
TOTAL FLOW		151 l/s

A peak wet weather flow of approximately 150 l/sec represents less than 10% of the theoretical capacity in the 1200 mm concrete trunk wastewater main at 0.3 percent grade. With a strong emphasis on proper design and construction techniques, the wastewater system should be able to be built to minimize infiltration and inflow (I/I) into the wastewater collection system which would create lower than calculated theoretical flows.

3 WATER SYSTEM

3.1 CONNECTION TO EXISTING WATER SYSTEMS

The proposed redevelopment will have 4 connection points to existing Halifax Water infrastructure. These connections are split between 2 pressure zones. The existing water system currently servicing Shannon Park from Princess Margaret Boulevard is named the Princess Margaret Low Pressure Zone. It has a hydraulic grade line that floats between 58m and 63m. Windmill Road and Hudson Way connection points are in the Burnside Low Pressure Zone which is approximately 30 psi higher in pressure. This zone also serves BIO. HW has indicated that the redevelopment of Shannon Park would be allowed to connect directly to the Burnside Low Pressure Zone currently servicing BIO and Hudson Way. The added pressure in this zone would be advantageous in servicing multi-storey buildings proposed for the Shannon Park Redevelopment.

Therefore, we are proposing that potable and fire protection water for the new mixed-use development should be drawn from the two connection points to the Burnside low Pressure Zone, at Windmill Road and Hudson Way. Connections should also be made at the two intersections with Princess Margaret Boulevard but because of the different pressure zone they would be normally isolated and available only in an emergency. The connection locations to the existing Halifax Water Distribution system are shown in Figure 1.5.

HW has indicated that the old and undersized watermain on Windmill Road is already identified for upgrading. With that upgrade, long-term supply to the CLC lands is assured. Conventional water system design in accordance with HW's standards and specifications should be easily achieved. Discussions should take place with HW at the detailed design stage on pipe material selection. The use of PVC water pipe should be considered as the buried infrastructure will be subjected to a saltwater environment.

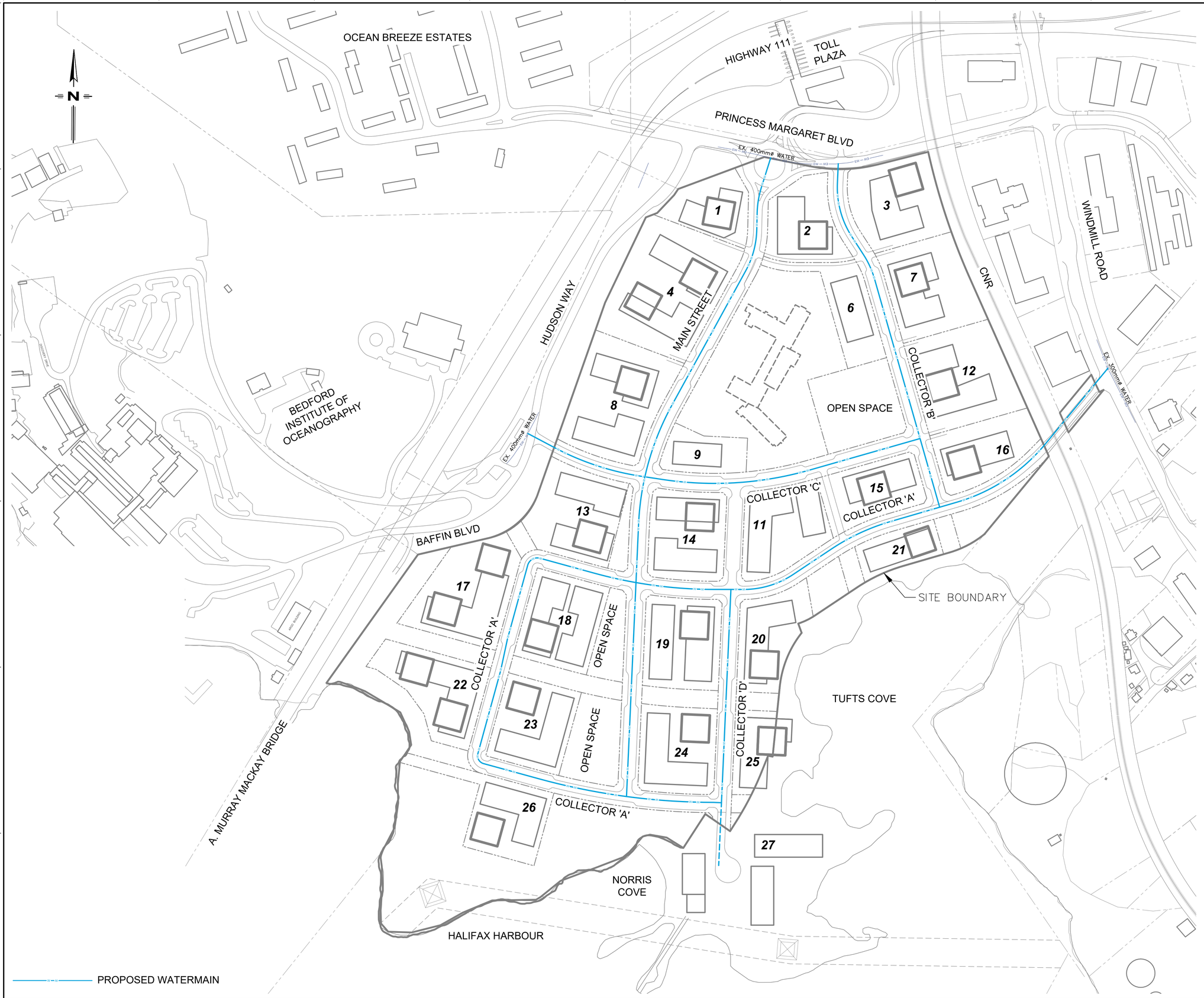
3.2 WATER SYSTEM LAYOUT

The proposed conceptual water system layout is shown in Figure 3.1. The water distribution system for the Shannon Park site will be laid out in a grid pattern, with pipes creating closed "loops" throughout the site. This will allow water to be drawn from multiple directions to a single point for high demand events such as instantaneous peaks and firefighting. Dead end pipes will be avoided where possible, and where they cannot be avoided hydrants will need to be provided for flushing and maintenance.

For the purposes of conceptual design, it is anticipated that most water pipes through the site will likely be 200 mm diameter to service the buildings. A larger main-line pipe such as a 300 mm diameter main should be installed centrally through the development to deliver large volumes of water during fire flow/peak events. This pipe would connect Windmill Road to Hudson Way. A more detailed water modelling analysis will be required at the detailed design stage in order to confirm the water system pipe sizing requirements.

3.3 WATER SERVICING DEMANDS

In our original report we indicated that planning projections anticipate that at full buildout of the Shannon Park site there will be approximately 3,000 units on CLC land and an additional assumed 600 units on the Millbrook First Nation development. The Shannon Park units will be primarily residential, all located in multi-unit dwellings and podium level townhouses, with up to 145,000 square feet of commercial space. Demand calculations were performed based on HW's Design and Construction Specifications.



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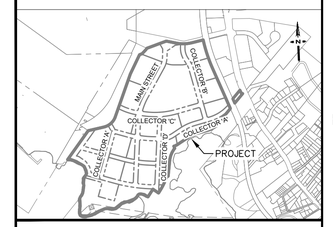

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WSP REF. NO.: 201-04925 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-SERVICING.DWG FIG3.1 PRINTED: 4:23 PM BY: CRAIG.MUTCH

Using a population density of 2.25 people per unit and a design average day demand of 375 liters per person per day, the average day demand from the residential portion of the site is approximately 3.0 million liters per day.

The proposed development contains approximately 3.6 hectares of land where the first two storeys are for commercial use. Based on the Ontario Water Guidelines a rate of 28,000 litres per hectare per day can be applied to commercial lands. Based on these assumptions the development will have a total commercial average day water demand of approximately 100,000 litres per day.

Combining the residential and commercial demands gives a total average day demand of 3.1 million litres per day. Halifax Water indicated in 2016 that the 300 mm main on Windmill Road needed to be upgraded to 600 mm. The upgrade needs to be done whether or not Shannon Park is redeveloped. This upsizing is currently planned for the years 2026-2031 but HW has indicated that the timing is flexible if needed. The need would depend on the speed of the build out of the Shannon Park and Harbour Isle lands.

4 STORMWATER MANAGEMENT

4.1 EXISTING STORMWATER DRAINAGE SYSTEMS

As noted in our original report the original subsurface stormwater system on the Shannon Park site discharged at two separate locations: an existing 1050 mm diameter concrete pipe discharges to Tufts Cove (Outfall No. 1) while a 1200 mm diameter combined sewer previously discharged into the Narrows of Halifax Harbour at Norris Point (Outfall No. 2).

Windmill Rd. Stormwater Outfall

Field investigation conducted by WSP identified that a piped concrete stormwater system serving Windmill Road between Princess Margaret Boulevard and Nootka Avenue, including higher lands east of Windmill Road, discharges across the rail line into a short S-shaped ditch. The ditch channel is well vegetated with steep sides. This ditch ends at a partially collapsed corrugated metal pipe inlet located near the right of way boundary in the area of the trunk wastewater main and the Maritimes and Northeast Pipeline transmission line. The Windmill Road piped drainage is located at a local low point on Windmill Road. Therefore, this represents the major drain for this area as well. The area for this major drain extends to Victoria Road extension to the east and west to Highway 111. While it was visually evident how surface water would flow to the rail line, it was not possible to see a surface or piped route for crossing the tracks. Despite the ditch being deepest at this point, no cross culvert was observed. It was assumed that in major storm events, when pipe capacity is exceeded, water finds its way through the ballast rock in the track bed or builds up high enough to cross the tracks at Nootka Avenue. The major drain discharge was therefore assumed to outfall near Outfall No. 1. The existing major drain watersheds are shown on Figure 4.1.

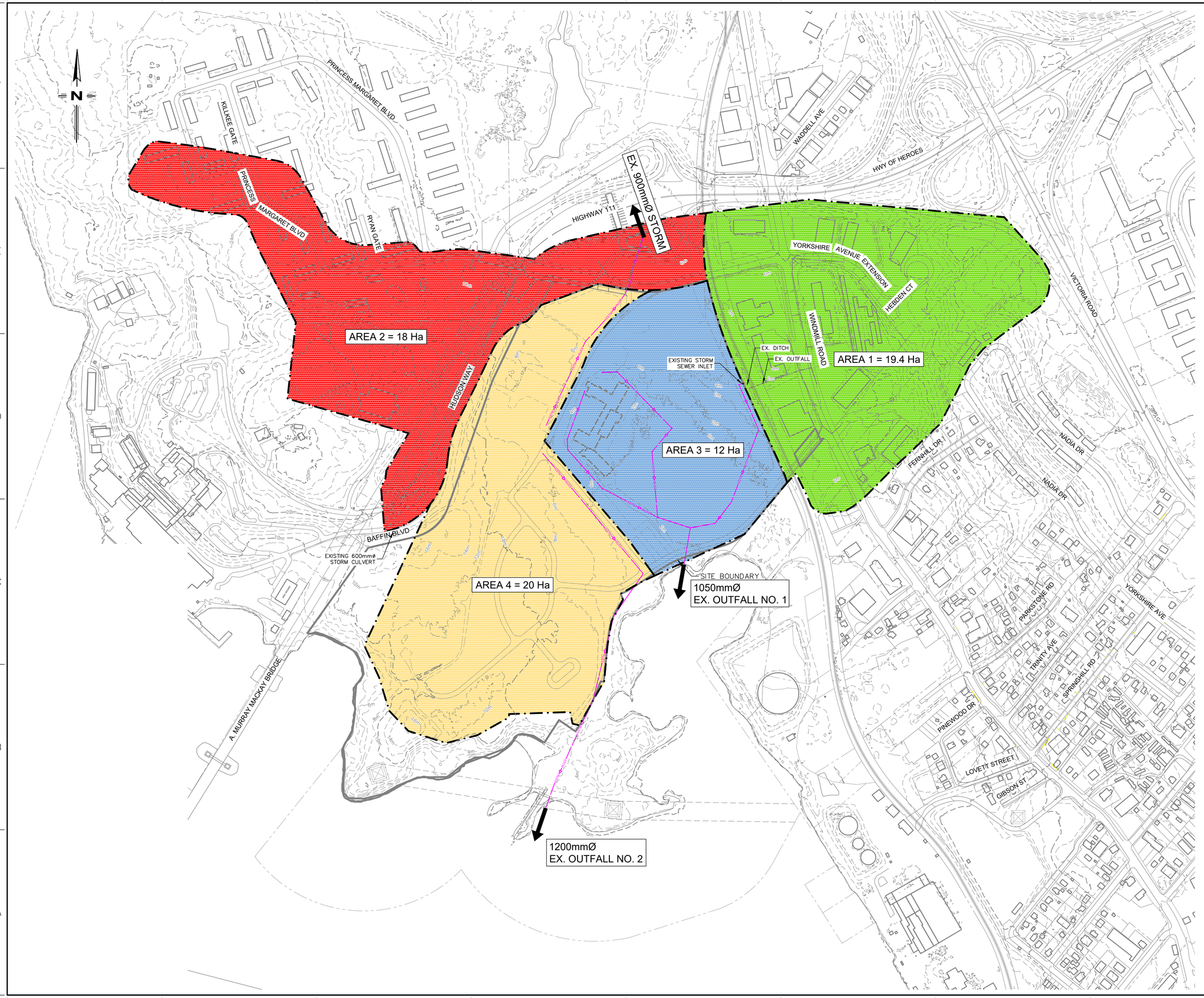
4.2 STORMWATER OUTFALL RECOMMENDATIONS

4.2.1 MAINTAIN EXISTING OUTFALL LOCATIONS

Windmill Rd. Outlet to Shannon Park Inlet

The existing concrete pipe at Outfall No. 1 is badly deteriorated due to repeated exposure to saltwater. The existing outfall will need to be replaced during the site redevelopment. It is recommended that the use of PVC or HDPE pipe be considered for areas subjected to saltwater immersion. The existing pipe at Outfall No. 2 has a submerged outlet and is therefore not presently accessible. It is understood that this pipe was abandoned as part of the site demolition work and removed. It is recommended that a new stormwater outfall be constructed in this area discharging directly into the harbour. Outfall No. 1 collects flow from the northern portion of the site as well as a significant off-site watershed area. Outfall No. 2 would collect a smaller runoff volume from the southern portion of the site. No off-site watershed flows will impact Outfall No. 2. Both outfalls should be equipped with low head, one-way discharge valves such as Tideflex to prevent tidal surge from entering the stormwater system.

We understand that CLC has an agreement in place with Millbrook First Nation that will allow outfall No. 1 to be upgraded.



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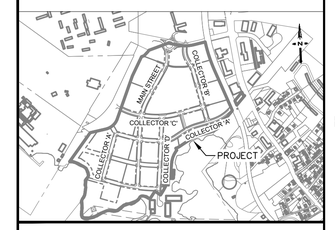

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PROJECT:
SHANNON PARK
PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

TITLE:
EXISTING STORMWATER
MAJOR DRAIN AREAS

SHEET NUMBER:
FIG 4.1

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WSP REF NO.: 201-04925 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-SERVICING.DWG FIG4.1 PRINTED: 4:24 PM 2020/09/23 BY: CRAIG.MUTCH

4.3 TRIBUTARY STORMWATER AREA

As part of our 2016 original report the tributary storm areas to the Shannon Park site were delineated as part of the schematic design process. Figure 4.1 identifies existing stormwater major drain areas, and Figure 4.2 shows the stormwater major drain areas for the fully developed site.

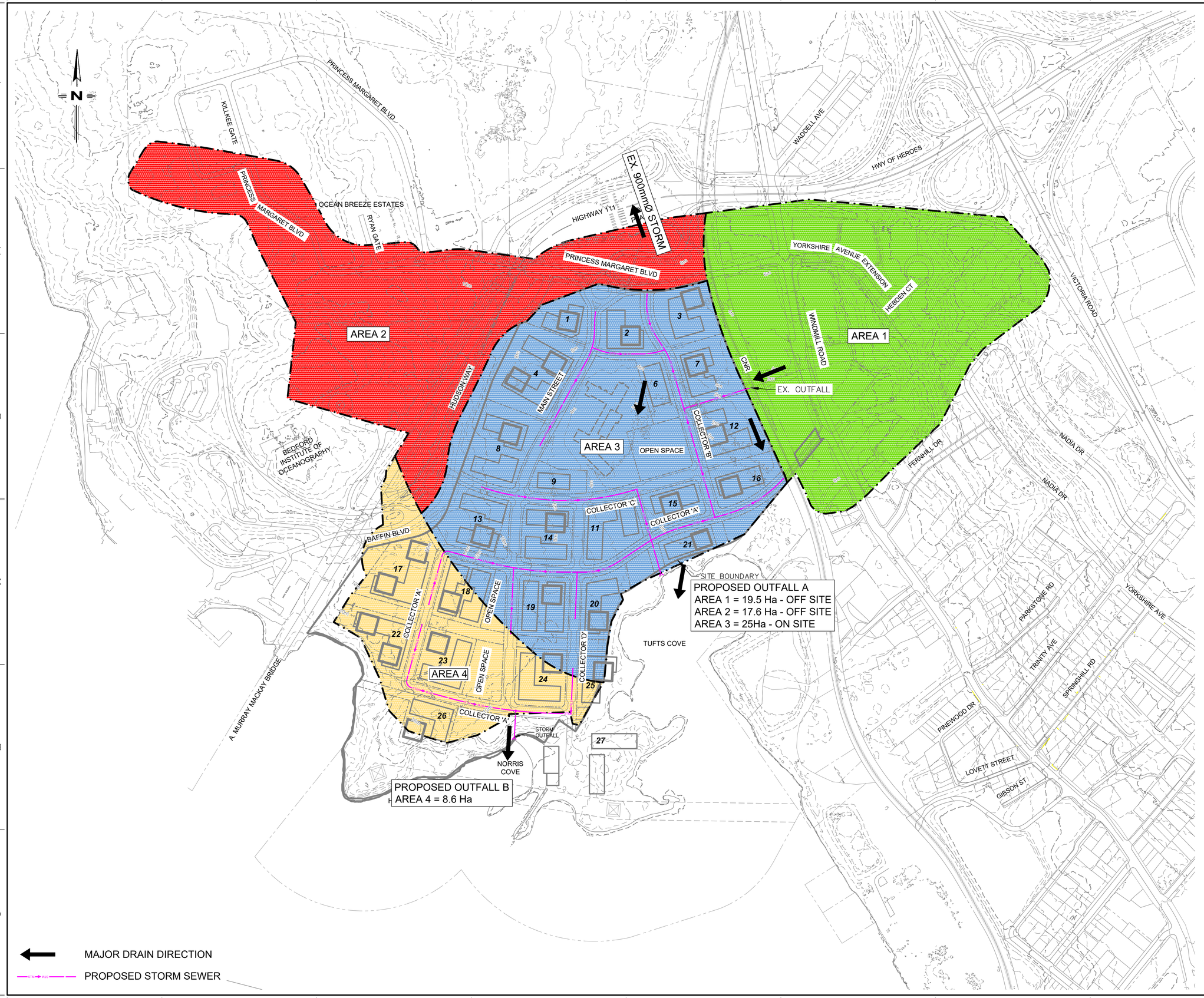
4.3.1 OFF-SITE DRAINAGE CONTRIBUTIONS

Area No. 1 is a 19.5 Ha swath of land extending above the low point on Windmill Road in front of the existing Kia Motors dealership. This area extends north to Victoria Road Extension and west to the MacKay Bridge Approaches. Review of available Lidar information indicates that the major drainage route is directed towards the CN rail line to the west of Windmill Road.

In 2016 WSP conducted an extensive field investigation in an attempt to locate the presence of a culvert crossing under the CN rail line. Despite the ditch becoming much deeper on the east side of the tracks along Windmill Road, no obvious cross culvert to pass stormwater under the tracks was identified. In the absence of a cross-culvert, it appears that in a major storm event water would build up and infiltrate through the track ballast stone. Further investigation should be performed as part of the detailed design phase to confirm if an existing crossing exists. Additionally, CN Rail and HRM should be consulted to determine if installation of a defined major drainage crossing is desired to reduce the risk of flooding and/or overtopping of the railway. Provision for this major drainage route, if required, will need to be considered as part of Shannon Park's detailed design, but should be the responsibility of others. We are unaware of any legal easement which permits the discharge of stormwater onto the Shannon Park site, although it does appear to have been happening for some time. It is not uncommon for the Federal level of government to avoid encumbering their land to lower levels of government so an agreement may not exist. Should CLC wish to enter into easement agreements relating to the off-site stormwater drainage, they should do so with a full understanding of the long-term financial considerations related to that decision. The cost of piping off-site public stormwater should not fall to CLC.

A discrepancy was noted by WSP in the HW record drawings which showed the stormwater piping on Windmill Road discharging to a sewer on the north side of the CN rail lines. HW has field checked and confirmed our findings. During WSP's field investigation in 2016, a concrete outfall pipe was observed on the west side of the tracks adjacent the Shannon Park lands. That pipe appeared to be the outlet for stormwater drainage on Windmill Road. From this outlet there is a short "S" shaped open channel ditch connecting to a partially collapsed corrugated metal pipe (CMP) inlet. This inlet is assumed to be the entry point for the piped stormwater system discharging to Tufts Cove. A coarse rock drain was found at the edge of the old sports field. No catchbasins or manholes were found in this area, but it seemed to be part of the storm drainage system. HW had indicated that the actual piping alignment and CN crossing will need to be confirmed as part of the detailed design phase. Any investigation would need to be coordinated with Halifax Water.

Area No. 2 comprises approximately 18 Ha of land on the west side of Highway 111 and comprises Ocean Breeze Estates (Wallace Heights), BIO, and a portion of Princess Margaret Boulevard. Area No. 2 has a piped discharge, which is intended to handle the minor storm event that discharges across Highway 111 into a wooded wetland, away from the Shannon Park lands. However, with the bridge approach acting as a physical barrier, the major drain for this area appears to be directed towards the CNR line. Therefore, in larger storm events, overland surface flow which cannot be captured by the pipe system would likely cross the Shannon Park lands and eventually discharge into Tufts Cove.



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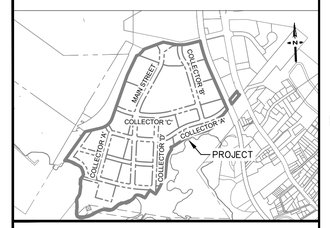

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PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

TITLE:
PROPOSED STORMWATER
MAJOR DRAIN AREAS

SHEET NUMBER: FIG 4.2

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4.3.2 ON-SITE DRAINAGE

Within the Shannon Park site, it is estimated that approximately 40% of the piped stormwater runoff, including the school site, currently discharges to Outfall No. 1. The remainder of the developed site currently discharges to Outfall No. 2. The proposed redevelopment plan increases the area draining to Outfall No. 1, however, the location of the discharge for both minor and major drainage systems remains unchanged at that location. A new outfall will need to be constructed west of Outfall No. 2 where CLC land abuts the harbour for the remainder of the development (see Figures 4.2 and 4.3).

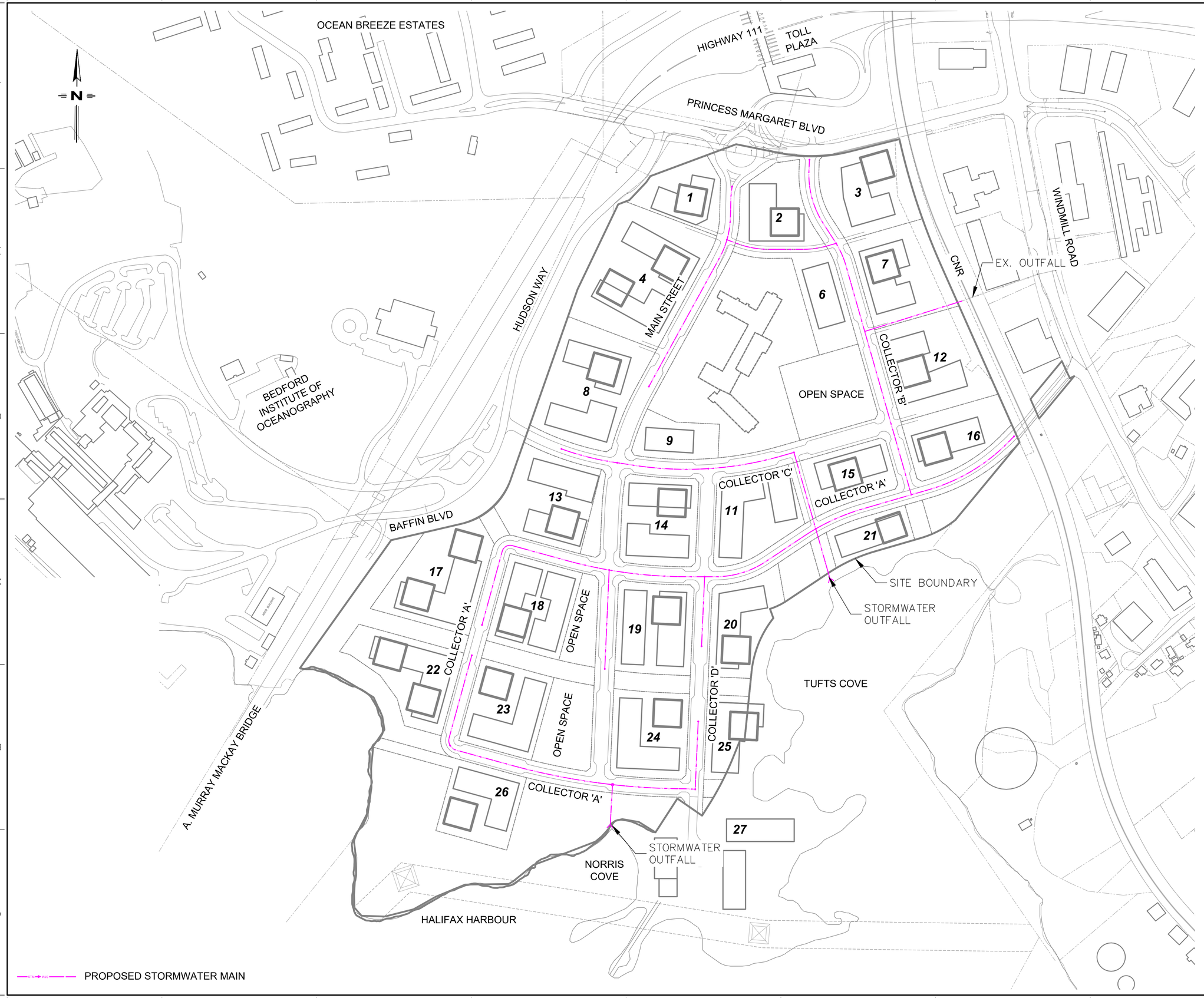
Any redevelopment of the Shannon Park lands will need to consider and accommodate both external (see section 4.3.1) and internal flows. Major drainage overland flow routes, which should handle 1:100 year design storm flows, need to be maintained to the harbour shoreline. Any proposed grading of streets and buildings needs to be done such that a clear channel is maintained for overland flow from the CN rail line to Tufts Cove.

Halifax Water has indicated that they want to see the storm outfalls above the 2.23m (CGVD2013) contour which is high tide plus 1.5m potential rise in sea level. This proposed requirement will require further discussion as we have a section of Collector 'A' at Outfall No. 1 that is below that elevation. Stormwater piping would obviously be lower still. This stormwater outfall requirement, if maintained, would significantly raise the roads surrounding the school site. The school would be isolated due to grade differences from the rest of the development. It would have the effect of putting the school in a much deeper hole.

4.4 STORMWATER DRAINAGE REGULATORY REQUIREMENTS

Nova Scotia Environment (NSE) typically requires that all new developments match pre- and post-development peak flow rates for the 1:5 year and 1:100 year events. However, this regulatory requirement typically does not apply when discharging to a receiving water body that can handle the increased flow rates due to development. Based on recent development approvals of a similar nature, it is possible that there will be no requirement by NSE to mitigate runoff peak flow rates from the site. Consultation with NSE will be necessary to confirm this assumption at the detailed design stage.

While it is assumed that no regulatory requirement exists for stormwater discharge to the Harbour for the overall development, HW has indicated that each individual site development at the Building Permit stage would be required to match pre- and post-development peak flow rates directed to the municipal system, on a lot-by-lot basis. As the CLC lands are a redevelopment of a fully-developed site, some lots will see negligible change in pre- and post-flow rates. Areas located within the old sports fields will see the greatest increase in runoff flow rates.



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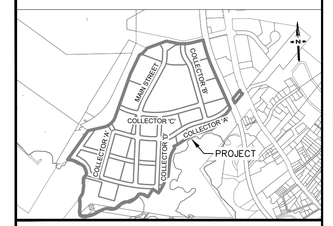

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SHANNON PARK
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DARTMOUTH, NOVA SCOTIA

TITLE:
STORMWATER
SCHEMATIC

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FIG 4.3

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FIG4.3
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5 STREET NETWORK

5.1 STREET CROSS-SECTIONS

The master planning work for the Shannon Park site was guided by the street hierarchy document developed by WSP in the Concept Planning Phase as part of the original PDCP. This work identified three (3) street classes: Collector, Local and Main streets. While no decision has been made to pursue non-standard street cross-section approval, it has been assumed for conceptual design purposes, that Collector and Local street cross sections will be similar in nature. Therefore, the following discussion supports the initial PDCP work. These two street cross sections which were developed during the Planning Concept phase would need to be negotiated with HRM as part of the development process as they are non-standard and site specific.

The conceptual cross sections for these streets have been based on HRM Red Book design standards for a 25.5 m Urban Major Collector, with the addition of underground electrical and communication lines. The Main Street has been considered as an enhanced version of the HRM design standard providing an aesthetic appearance as well as a pedestrian-friendly environment. Bike lanes have been eliminated from the cross section as dedicated bike paths are part of the overall development. The outside lanes which will be used for parallel parking are reduced in width to 3.0 metres. The proposed street cross sections are shown in Figures 5.1 and 5.2.

5.2 MAIN STREET COMPONENTS

As the central feature of the proposed site layout, the Main Street will be enhanced to showcase the development. A Right-of-Way (ROW) width of 22.2 metres has been assumed for conceptual design purposes. Curb to curb width is assumed to be 12 metres, with parallel parking stalls located on each side. The curb to curb width will narrow at intersections where parking is eliminated, and the sidewalks are widened. One side of the street will have a 4-metre-wide active transportation walkway, while the sidewalk on the opposite side will have a standard 1.8 m width. Sidewalks are assumed to be concrete pavers over a concrete surface. Crosswalks will be concrete pavers or stamped painted asphalt. The street will have ornamental street lighting on both sides and enhanced landscape features such as benches or art works. All electrical and communication lines will be underground to maximize the aesthetic impact of the street. It is important to note that this street cross section is non-standard and will need to be approved by HRM.

Preliminary Design assumptions include:

- One streetlight for every 15 meter of street frontage
- 125 mm of asphalt (2 lifts)
- 750 mm of granular subbase and base
- Concrete curb and gutter
- Paving stone crosswalks
- Two street trees for every 25 m of street
- 10 m of service laterals for every 100 m of frontage
- 1.8 m. wide concrete paver sidewalk on one side
- 4.0 m wide asphalt active transportation sidewalk on one side
- Water main
- Wastewater system
- Stormwater system
- Catch basins

NOTES:
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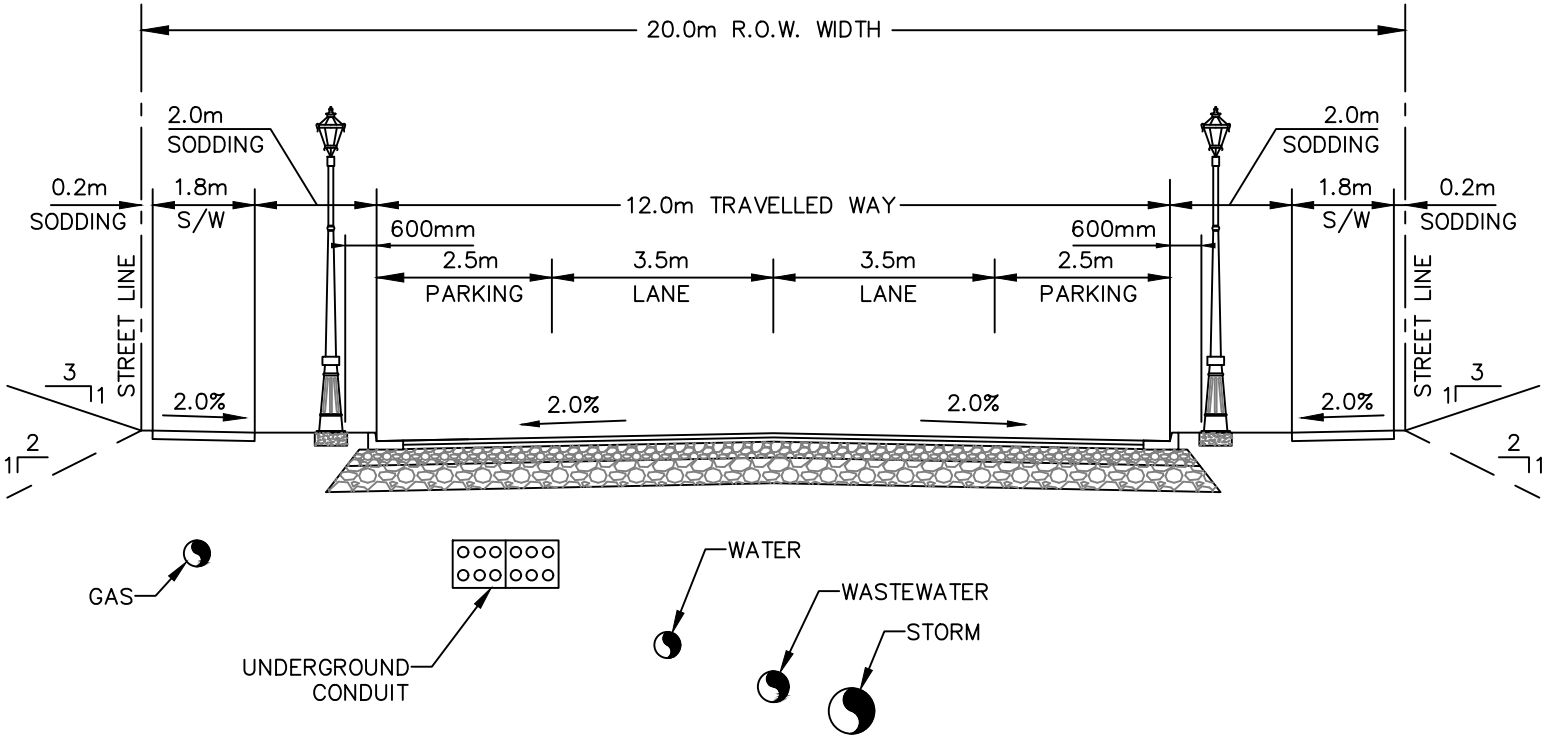

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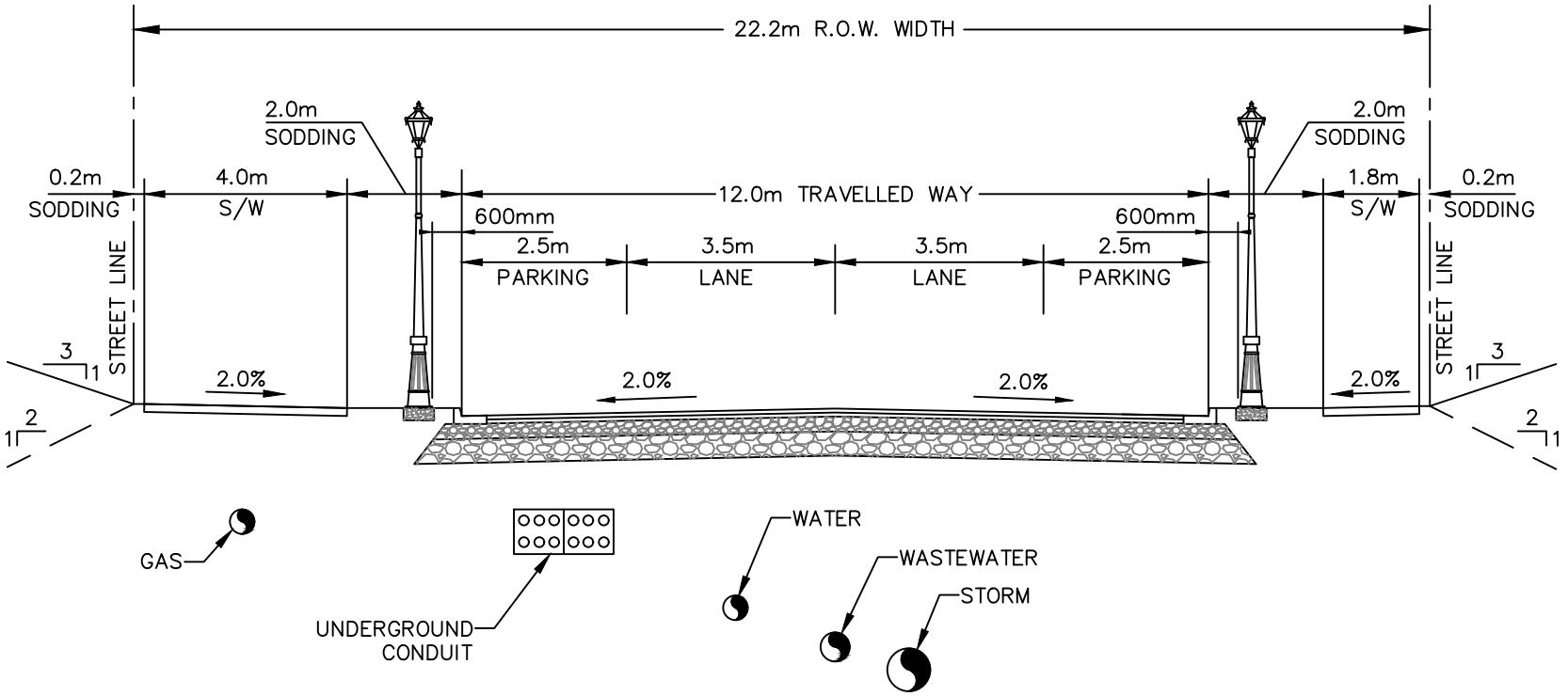

TYPICAL MAIN STREET CROSS SECTION

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PROJECT NO: 201-04925	

- Underground power and communications duct banks
- Natural gas line

5.3 COLLECTOR / LOCAL STREET COMPONENTS

It is understood that recommendations for Active Transportation (AT) design have been provided by the consultant retained by CLC to undertake a Traffic Impact Study (TIS). For this report, WSP has made generalized assumptions regarding street design. Typical cross-sections are shown in Figure 5.1 and 5.2. It is assumed that Collector / Local streets will conform to the HRM standards for an Active Transportation 25.5 m Urban Major Collector Street modified to show a 12-metre-wide travelway and a 20 m total width. This width allows for two 3.5-metre-wide travel lanes, two 2.5-metre-wide parking lanes, and two 1.8-metre-wide sidewalks. Given the internal trail system within the development, it is assumed that there will be no requirement for bike lanes on the collector and local streets. This is important to note, as the master plan shows parallel parking on almost every street, which does not facilitate bike lanes. If on-street parking is not required, the street right of way could be reduced to a 9.0 m travel way, including bike lanes. It is noted, however, that a reduction in proposed parking may not be appropriate due to the density of this development.

Preliminary Design considerations include the following:

- Concrete curb and gutter on both sides
- Concrete sidewalks on both sides
- Pavers/stone or stamped asphalt crosswalks
- 750 mm of granular subbase and base
- 125 mm of asphalt (two lifts)
- Two street trees for every 25 m of street
- One streetlight for every 15 m of street
- 10 m of service laterals per 100 m of frontage
- Topsoil and Sod between curb and sidewalk
- Water main
- Wastewater system
- Stormwater system
- Catch basins
- Underground power and communications
- Natural gas line.

These street cross sections will need to be reconciled with the recommendations in the geotechnical and traffic studies and submitted to HRM for approval if CLC decides to continue with a non-standard approach.

5.4 SIGNALIZED / ROUNDABOUT INTERSECTIONS

The Traffic Study prepared by Design Point/Harbourside Engineering for the re-development calls for new traffic signals at the Nootka/Windmill intersection and a roundabout to be located at the Princess Margaret/Iroquois intersection as well as other off-site upgrades. WSP has modified its PDCP reflect the relocation of the roundabout at Princess Margaret Boulevard.

5.5 STREET PROFILES

The street profiles have been designed to closely follow the existing topography. This is necessary to minimize the development's impact on the existing school site which is currently well below street grade. However, if street grades are kept to a minimum, a large area that includes lots 6, 7, 11, 12, 15, 16 and 21 will be below the 3.2m (CGVD2013) / 3.8m (CGVD28) minimum elevation for residential development. It should be noted that Collector 'A' cannot directly connect to Hudson Way due to the significant elevation differences between the two streets. Instead Collector 'B' makes the connection to Hudson Way but even here there will a steep grade transition to connect the two streets. See Drawing 11 in Appendix A.

5.6 CN RAIL CROSSING

Phase 1 will require a crossing of the CNR Dartmouth Subdivision main track. We have assumed that this would require a fully signalized crossing with gates similar to those on Wright Avenue and Akerley Boulevard. The Traffic Study addresses the rail crossings.

6 ELECTRICAL SERVICING

6.1 SCHEMATIC ELECTRICAL DESIGN

This development proposes the installation of underground electrical and communication lines. As noted in our 2016 report Nova Scotia Power Inc. (NSPI) and Bell-Aliant have standard specifications and requirements associated with the supply of underground primary and secondary servicing. The schematic design shown in Figure 6.1 is based on the PDCP and the municipal servicing schematics.

This design provided for a 100A, 240V, single phase service to each unit within each proposed building, with additional provisions for commercial spaces where applicable. Using demand load calculations as per the Canadian Electrical Code, a typical estimated service size to each building was determined, based on the provided number of units. Depending on the number of units, the planned service to each building varied between 400A, 600V, 3-phase up to 1000A, 600V, 3-phase.

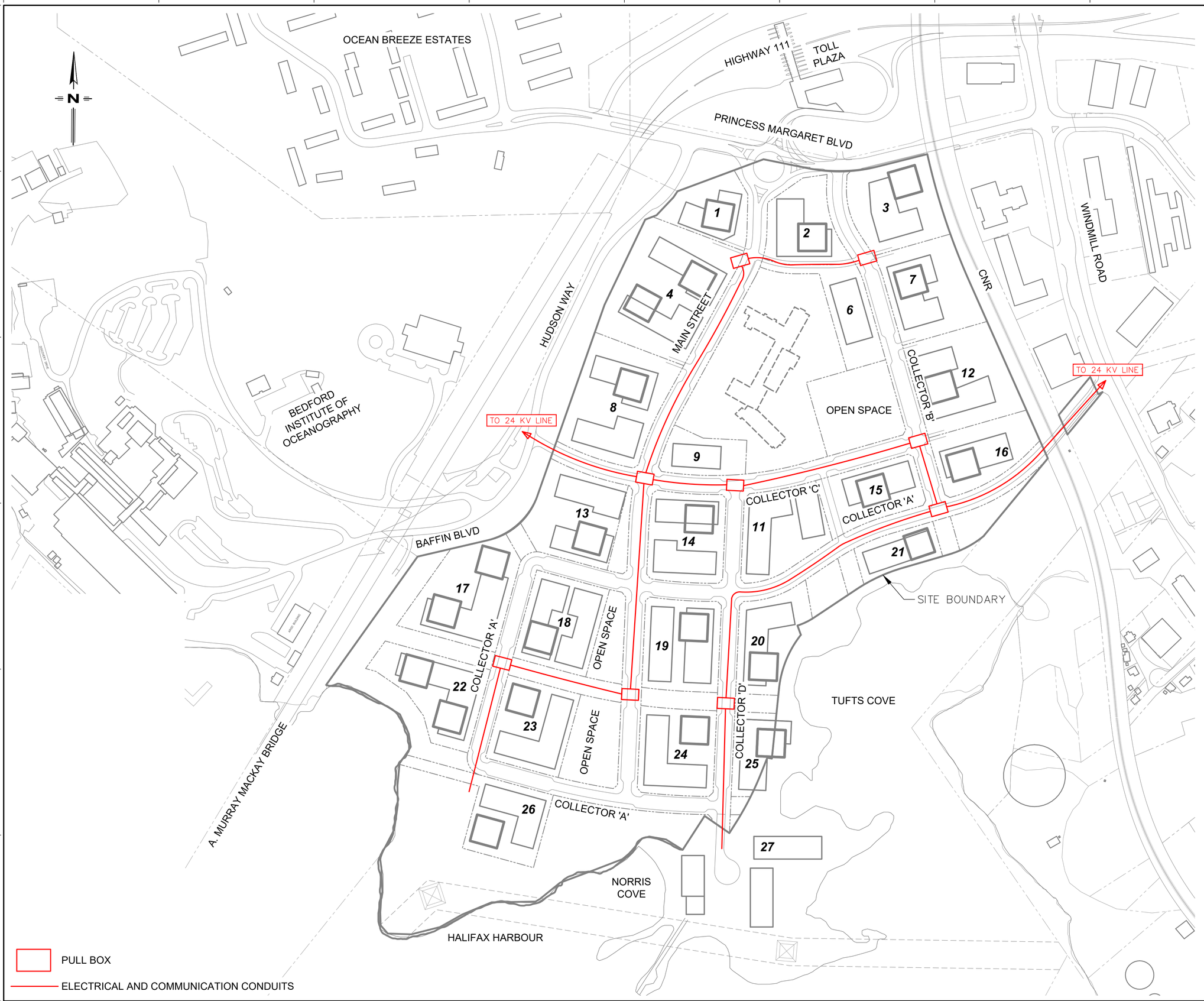
Whereas the above numbers are representative of a typical lot service, a single pad-mounted transformer fed underground to each lot should be sufficient. An electrical manhole with a primary splitter can typically feed 2 lots. Typically, Nova Scotia Power requires 2 primary conduits from the primary feed (manhole) to each transformer pad, and 4 to 6 100-125 mm conduits between each manhole, with concrete encasement under any roadway or driveway.

6.2 COMMUNICATIONS

For underground communications servicing, a single utility manhole can typically serve multiple buildings. Therefore, we believe that approximately 6 manholes are required for the entire site, with a pull box at each lot, 4 x 100 mm conduits between each manhole and 2 x 100 mm conduits from each pull box to its respective manhole. Similar to the power conduits, concrete encasement will be required where the conduits are located under roadways, and the communications conduits could be run in the same trench as the power supply where it is possible to do so.

6.3 NOVA SCOTIA POWER REQUIREMENTS

Typically, NSPI requires the developer to install all underground infrastructure as part of the street construction contract. NSPI would then supply and pull the wires at the Developer's cost. Our preliminary discussions with NSPI indicate there is sufficient capacity in the area to service the proposed development. There may be some capital contributions required if power reallocations are needed as the development progresses, however, these would have to be negotiated with NSPI at that time.



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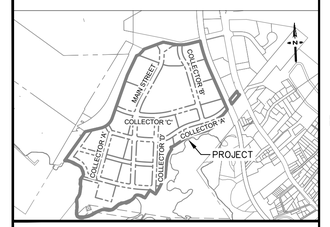

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CLIENT REF. #:

PROJECT:
SHANNON PARK PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

TITLE:
ELECTRICAL DISTRIBUTION

SHEET NUMBER: FIG 6.1

ISSUE: ISSUED FOR REPORT
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XREFS: x201-04925-Base.dwg x151-03999-101-0.dwg x201-04925-TITBL.dwg
WSP REF. NO.: 201-04925 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-SERVICING.DWG FIG6.1 PRINTED: 4:25 PM 2020/09/23 BY: CRAIG.MUTCH

7 NATURAL GAS SERVICING

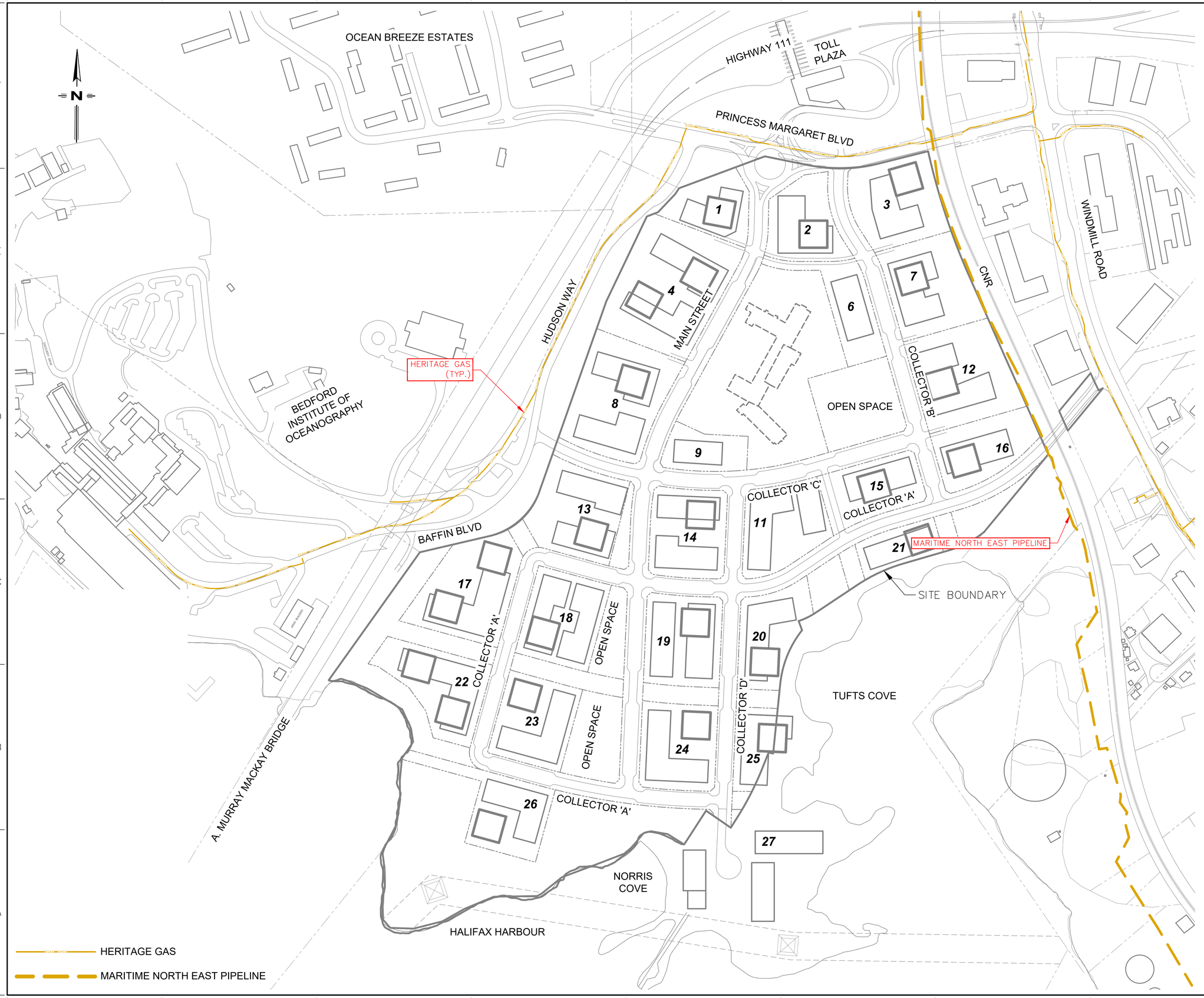
7.1 EXISTING NATURAL GAS SYSTEM

As noted in our 2016 report distribution rights for natural gas supply in Nova Scotia are currently held by Heritage Gas. Currently, Heritage Gas has a distribution line on Princess Margaret Boulevard and Hudson Way serving the BIO complex adjacent the Shannon Park lands (see Figure 7.1).

It is also important to note that Maritimes and Northeast Pipelines (M+NP) has a major feed line to Nova Scotia Power's Tufts Cove Power Generating facility located opposite the southeast boundary of Shannon Park. This line parallels the rail line and trunk wastewater main and is well marked in the field (see photo).

7.2 NATURAL GAS SERVICING REQUIREMENTS

Consultation with Heritage Gas was conducted as part of the 2016 preliminary design process. Heritage staff indicated that they have capacity in this area to accommodate a community of 7,000 people. Any off-site upgrades to Heritage Gas Infrastructure would be their responsibility. Heritage indicated they would require that the gas piping design be incorporated into the construction phase drawings. This is standard practice for all new developments serviced with natural gas.



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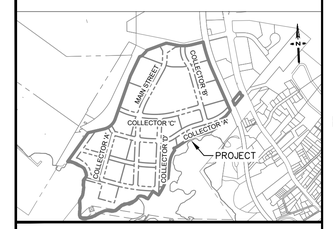

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PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

TITLE:
EXISTING NATURAL GAS INFRASTRUCTURE

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FIG 7.1

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8 SUMMARY

The proposed redevelopment of Shannon Park will create a modern residential community for some seven thousand residents at full build out. The site will greatly benefit from its close proximity to the Dartmouth trunk sewer, Halifax Harbour, natural gas distribution lines and the large diameter water lines serving BIO. No off-site infrastructure capacity issues attributable to the redevelopment of the CLC lands were identified in preparing this report.

The trunk wastewater main parallels the rail line along the site's eastern border. The pipe presently has capacity as observed dry weather flows during the late afternoon peak were estimated at less than 10% of pipe capacity. Halifax Water has indicated that there is no plan to construct a wastewater detention facility on at Shannon Park as their focus is now on infiltration and inflow reduction in their overall system. The need to maintain the existing school site with its poor siting relative to the two streets it currently fronts on is a grading and drainage challenge that will be further addressed at the detailed design stage. New street grades will need to be kept as low as possible to minimize the effect of the school site being left in a hole as development proceeds on the remaining two sides of the property.

The CLC lands can be serviced conventionally using a wastewater pumping station to minimize the amount of infilling required. A large portion of Phase 4 could be serviced with gravity sewer to the HW trunk sewer, avoiding the need for pumping. Servicing of the Millbrook lands located below the proposed CLC street grade will require a wastewater pumping station with a force main to connect to the CLC infrastructure.
The existing water system in the Burnside Low Pressure Zone has a high hydraulic grade line, and with the CLC lands at elevations close to sea level, the static pressures on the CLC lands will be in the 700 kPa (100 psi) range. The water model shows that design flows for the overall redevelopment can be met today. This is mostly because the high static pressure compensates for system head losses at higher flows. HW has indicated that the 300 mm diameter watermain on Windmill Road is already identified for upgrading to a 600 mm diameter pipe. With that upgrade, long-term supply to the CLC lands is assured. We are proposing two connections to existing mains at Windmill Road and Hudson Way. Conventional water system design in accordance with HW's standards and specifications should be easily achieved. Stormwater from the CLC lands will discharge to Halifax Harbour at two locations, Tufts Cove and Norris Point. Therefore, no off-site upgrading of storm sewer infrastructure is required. The discharge of piped flow from the Windmill Road area onto CLC lands creates some concern. No easement seems to exist permitting the discharge piping. The piping is not identified on HW infrastructure mapping. As well, no visible route for surface flow could be found which would accommodate the major drain from Windmill Road crossing the rail line. Responsibility for the off-site minor and major drain flows needs to be determined prior to detailed design. We would recommend that discussion take place with HW at the detailed design stage on issues relating to pipe material selection, flood proofing infrastructure and existing stormwater drainage piping. HW has also recently indicated that they would like to see the stormwater outlets to operate during hightide and sea level rise (2.23m CGVD2013). This is not achievable with our current street design which had been driven by the need to minimize the impact on the existing school property.

While typically no controls for stormwater runoff are required by NSE when discharging to large water bodies, HW's Design and Construction Specifications require each individual site to match pre-and post-development flows.

The proposed street cross sections developed in the Planning Stage need to be approved by HRM if CLC wishes to proceed with them as they are not standard HRM typical cross sections. However, we have shown that the two proposed street cross sections are capable of accommodating all necessary street infrastructure above and below

grade. The concept plan street layout was used as the basis for the TIS prepared by Design Point/Harbourside Engineering.

The CLC lands sit adjacent to NSPI's Tufts Cove Generating Station. They have indicated that they can supply adequate power to the site. The development will use underground primary and secondary electrical servicing. Therefore, the conduits, pull boxes and transformer vaults would be installed by CLC. NSPI would then be retained to supply and install the wiring and any main line transformers. Each building site would have its own individual transformer installed as part of the building construction phase. Communication conduits will parallel the underground power lines.

The site sits adjacent to a MNE gas line feeding the NSPI Tufts Cove Generating Station and the Heritage Gas line feeding BIO. Natural Gas, a clean-burning, efficient fuel source is intended to be part of this development. Heritage Gas will supply and install the piping as part of the street development process. This has become standard practise in areas with natural gas within Metro Halifax.

Centreline street profiles are provided for each street in the development. These profiles were used to identify how to conceptually service the site. By keeping the street grades as close to original grade as possible, especially around the school site, some lots will be at elevations below the 3.2m CGVD2013 coastal area elevation identified in the Regional Centre Plan Land Use By-Law (Package A) and 3.8m (CGVD28) required for residential uses identified in the Regional Plan. However, none of these will directly abut the coast of the Atlantic Ocean.

It should be remembered that the site was originally a multi-family housing development with institutional, commercial and recreational uses included. Technically those same uses are what forms the current redevelopment plan. The CLC lands were previously serviced with water, wastewater and stormwater, power and communication systems. Only natural gas service is being added to the mix. While the density is being increased and therefore demands can be assumed to be higher, no impediments to servicing the redevelopment of Shannon Park were identified. Construction of underground infrastructure should be able to be completed in accordance with existing standards and specifications, however, the street cross sections and flood risk elevations are non-standard and therefore require acceptance during the subdivision approval process with HRM.

APPENDIX

A PRELIMINARY ROAD PROFILES

SHANNON PARK PROPOSED REDEVELOPMENT

PRELIMINARY ROAD PROFILES FOR SERVICING

DARTMOUTH, NOVA SCOTIA

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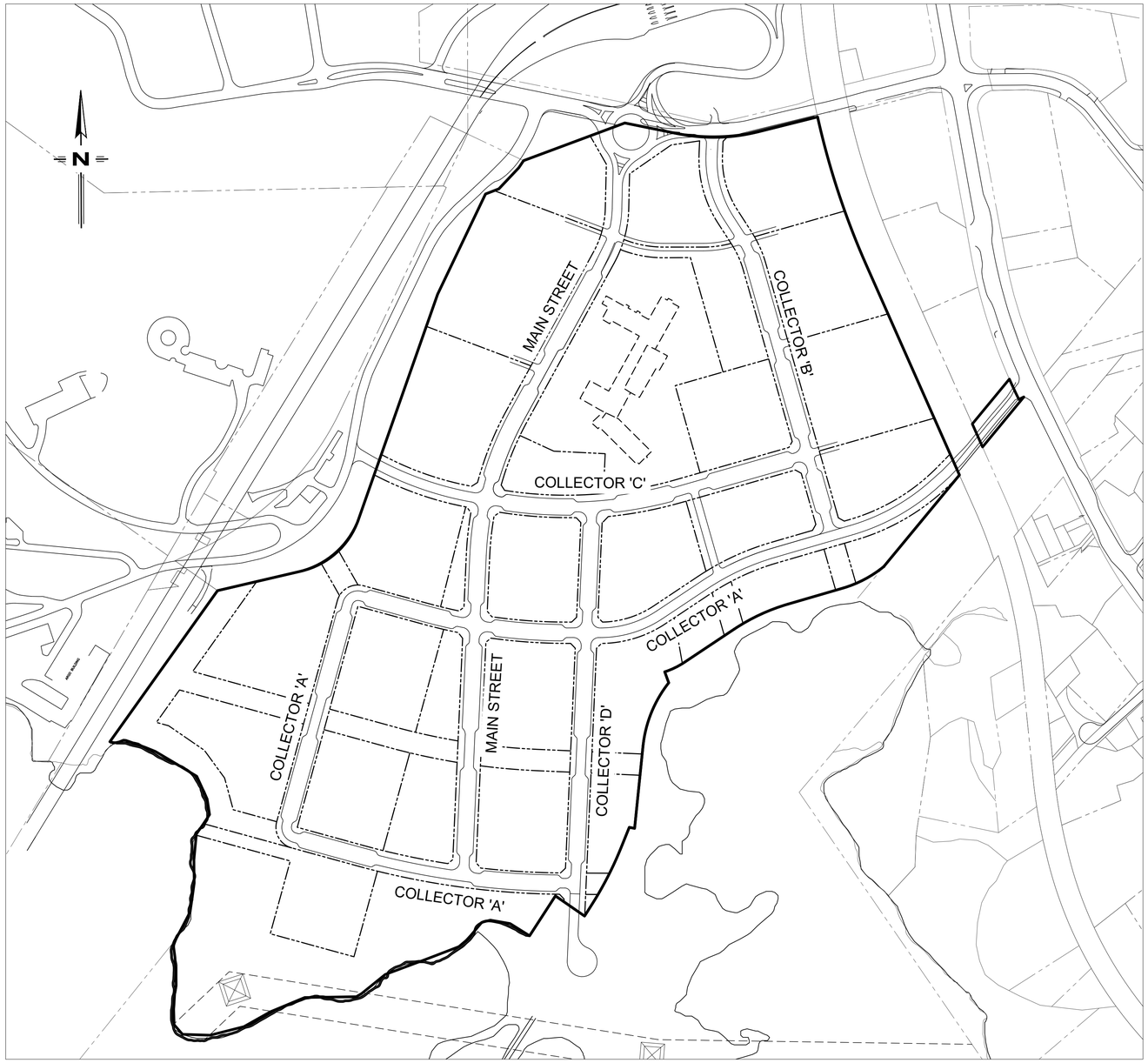

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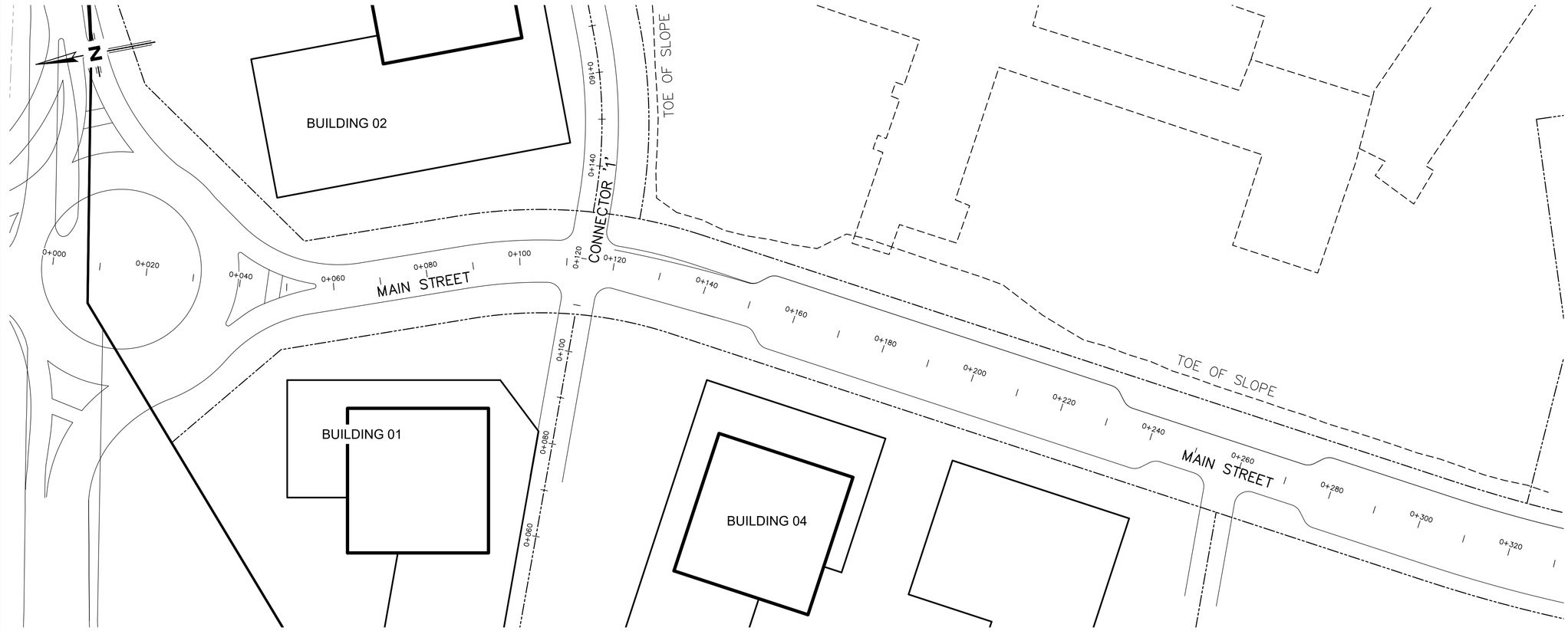

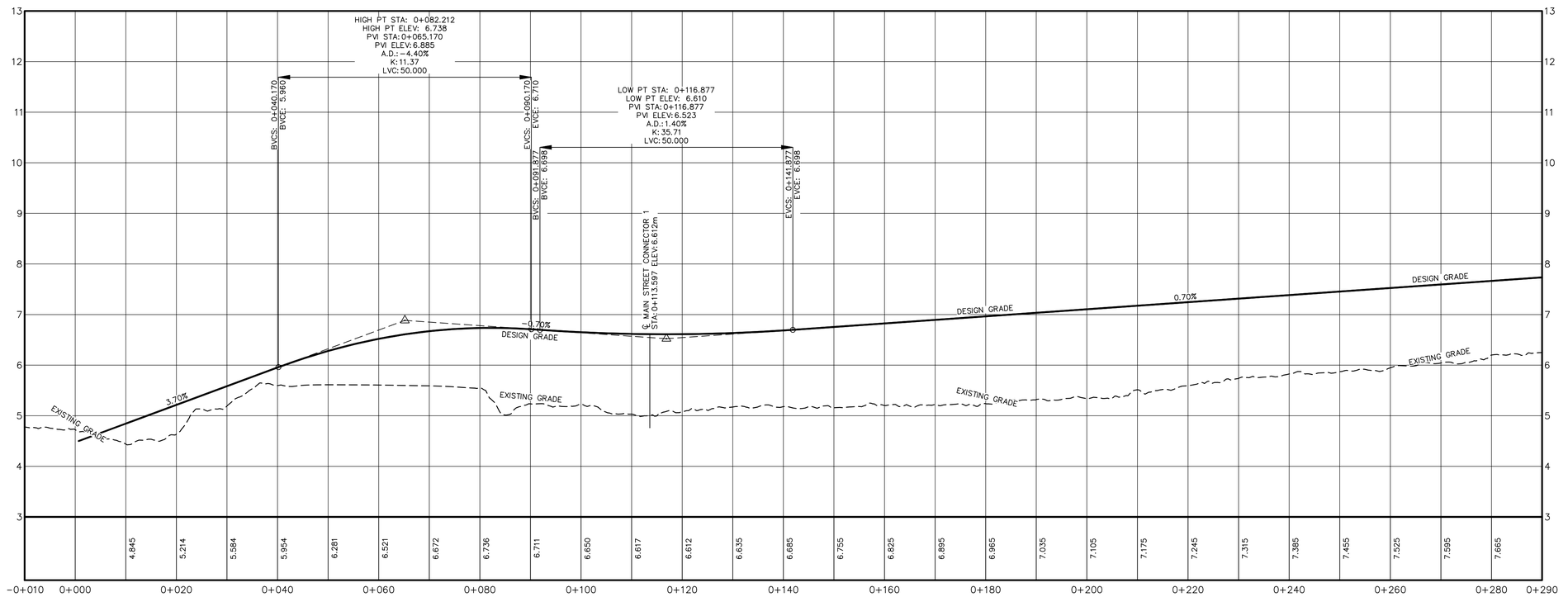

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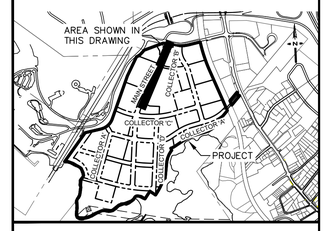

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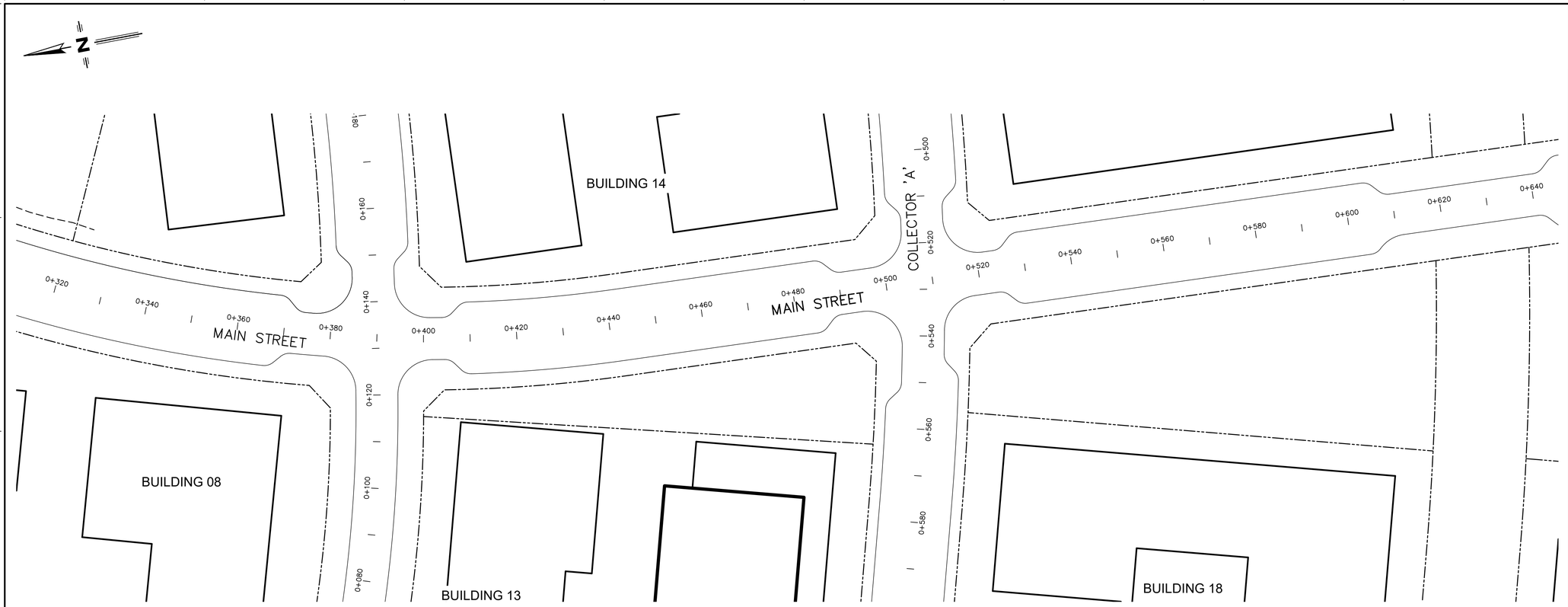

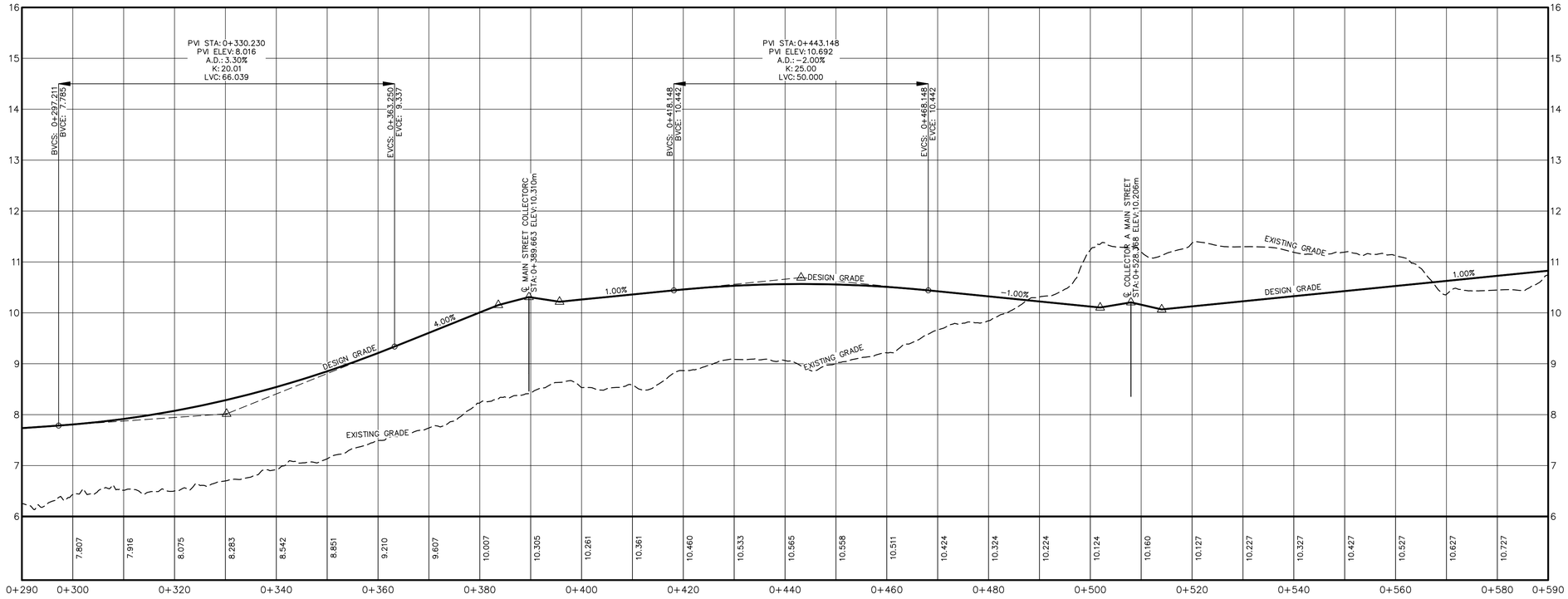

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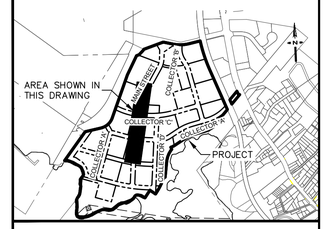

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DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

MAIN STREET

0+290 to 0+590

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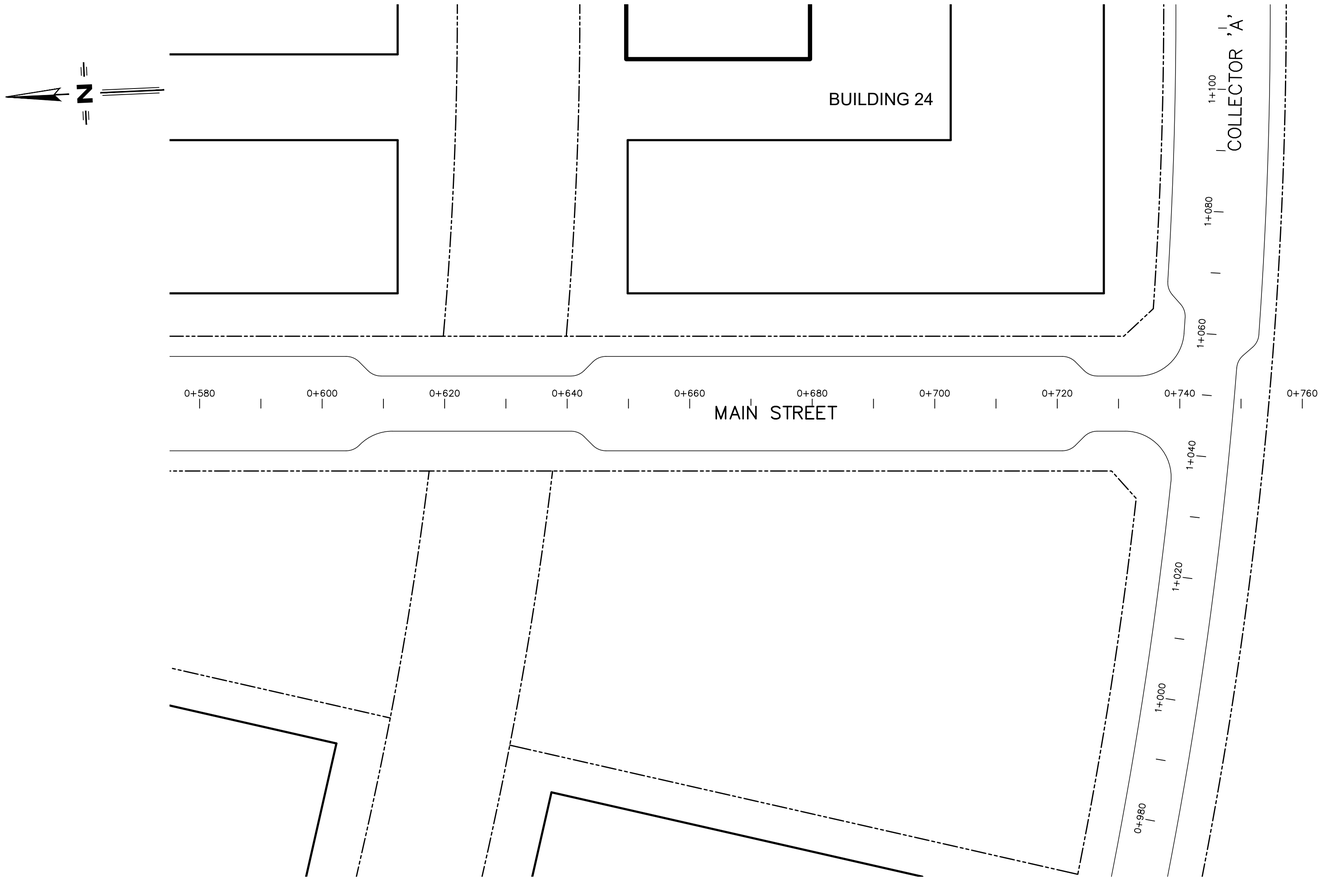

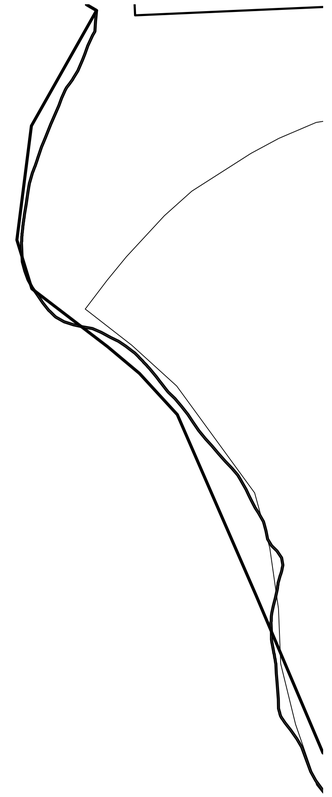

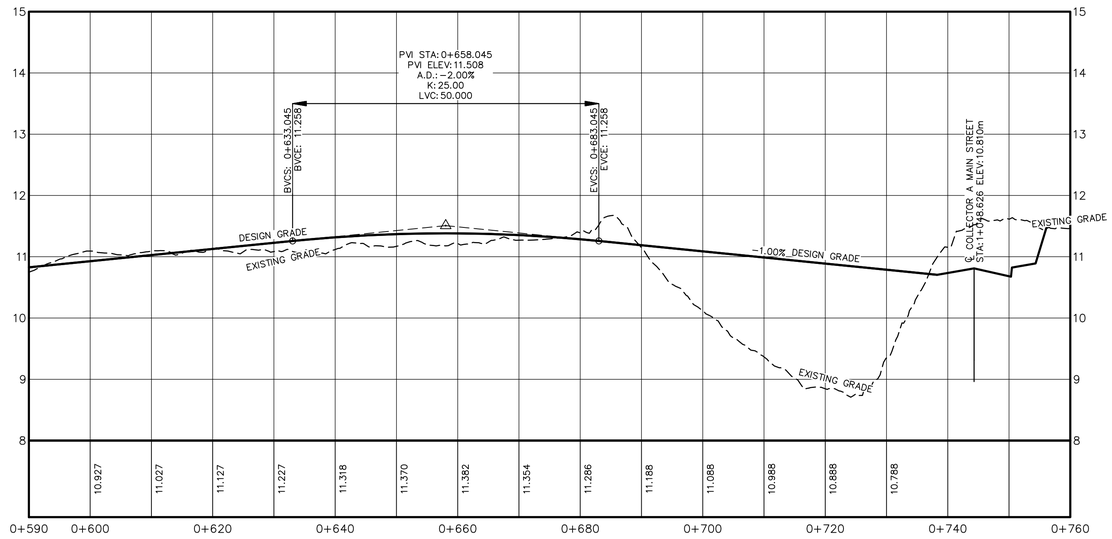

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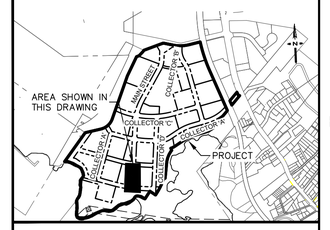

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DARTMOUTH, NOVA SCOTIA

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PLAN AND PROFILE

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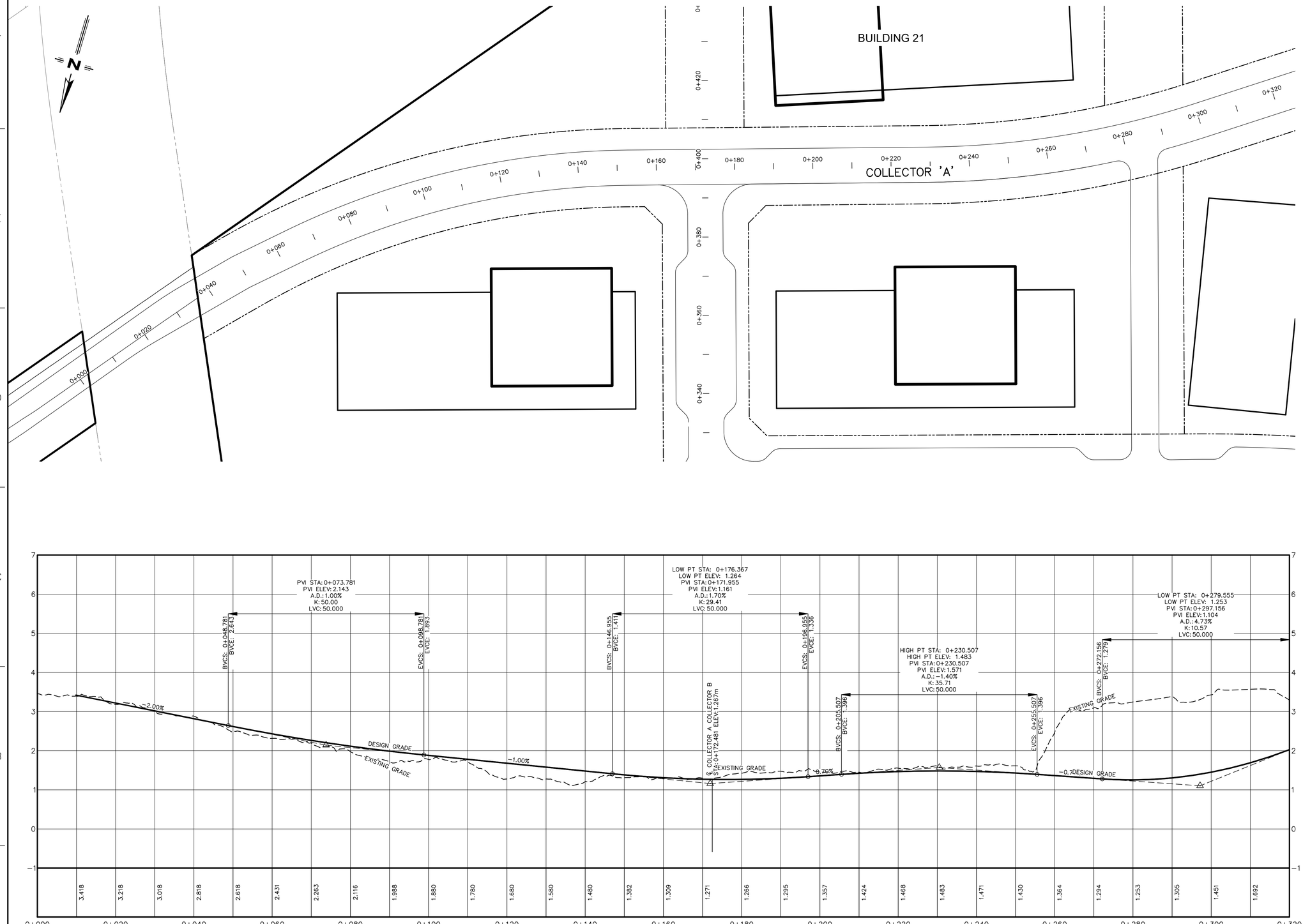

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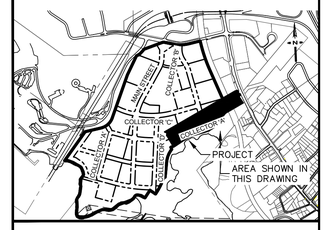

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DARTMOUTH, NOVA SCOTIA

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PLAN AND PROFILE

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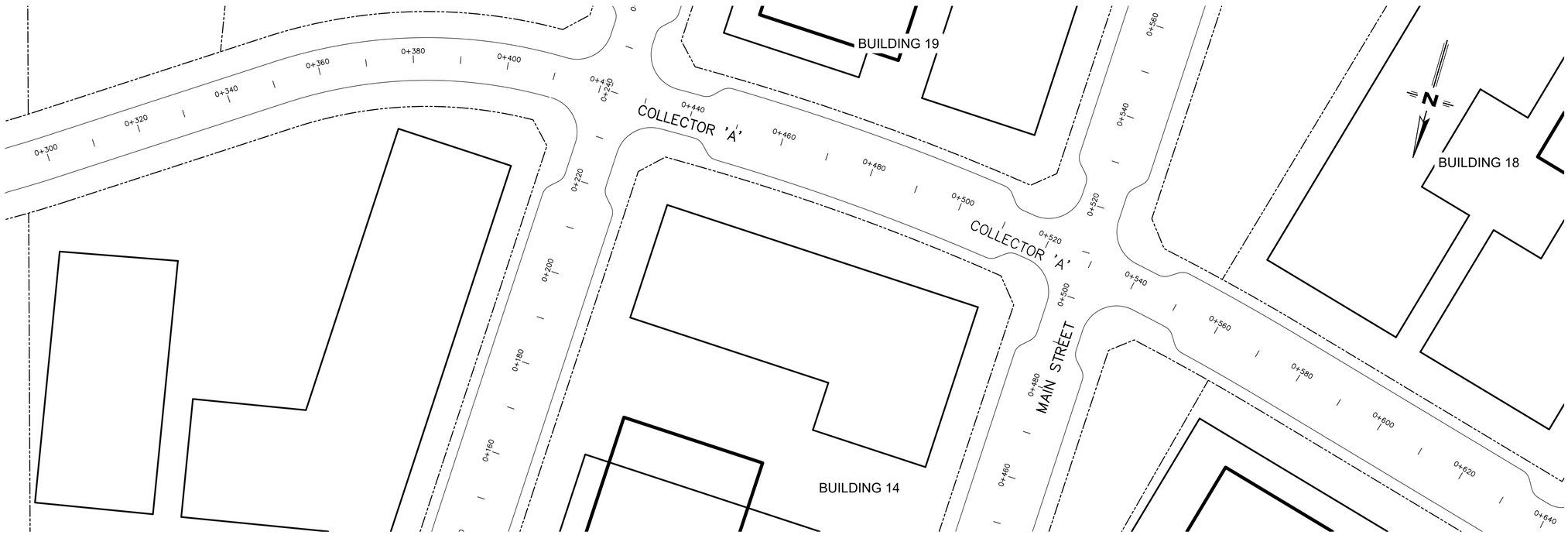

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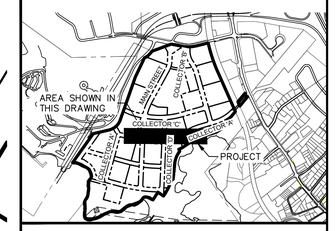

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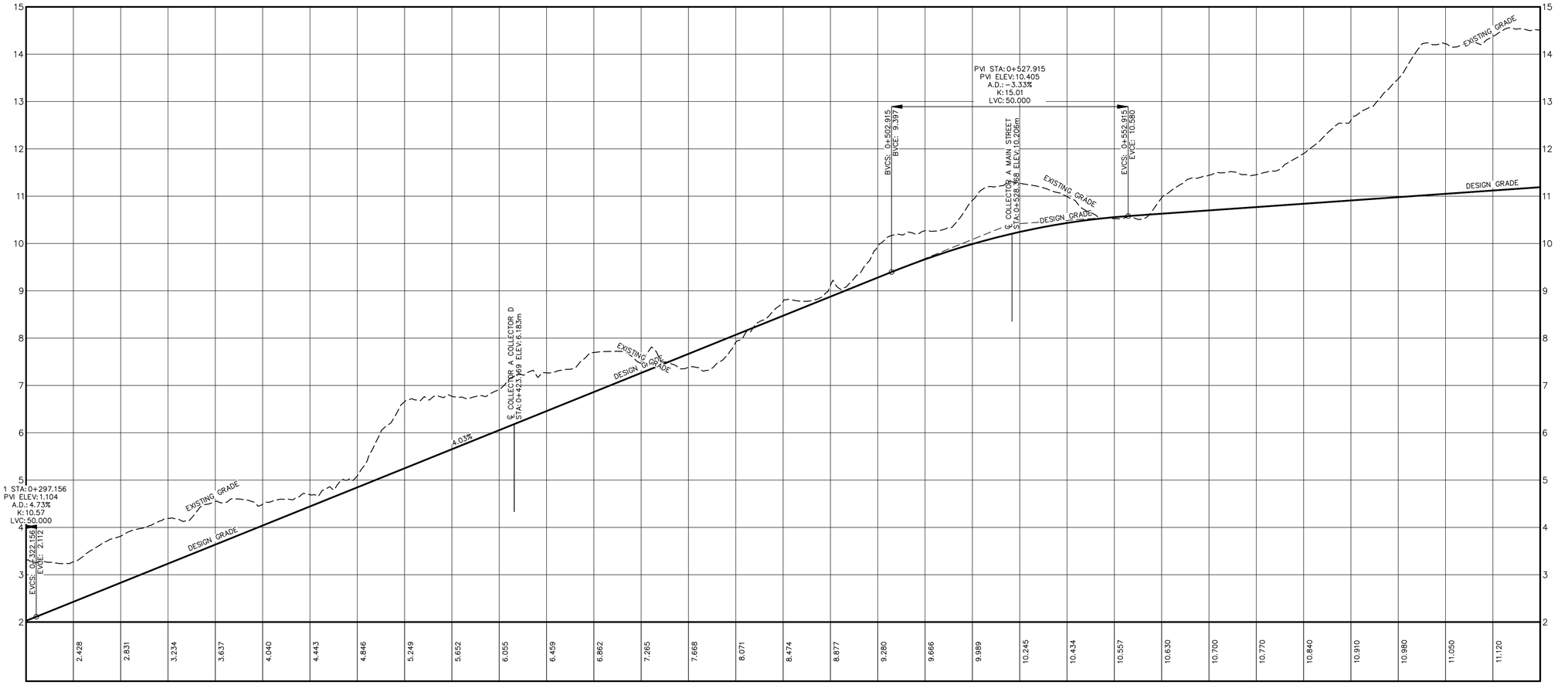
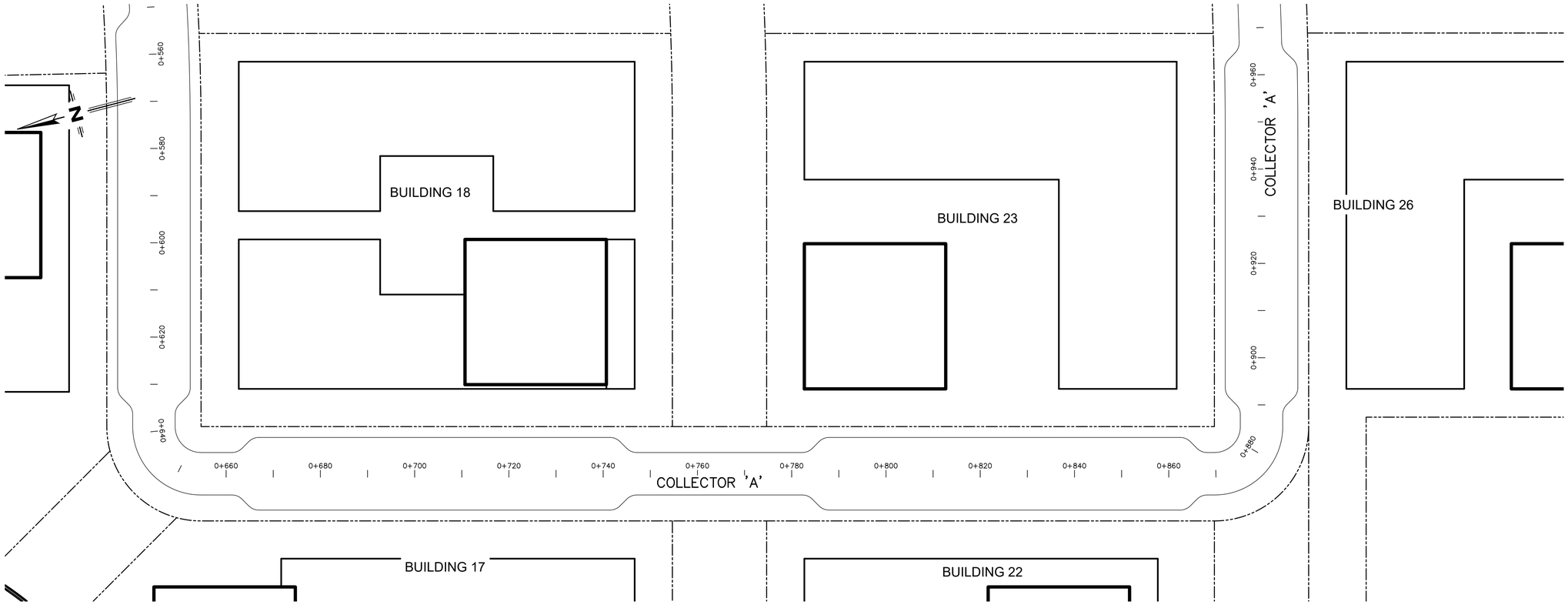
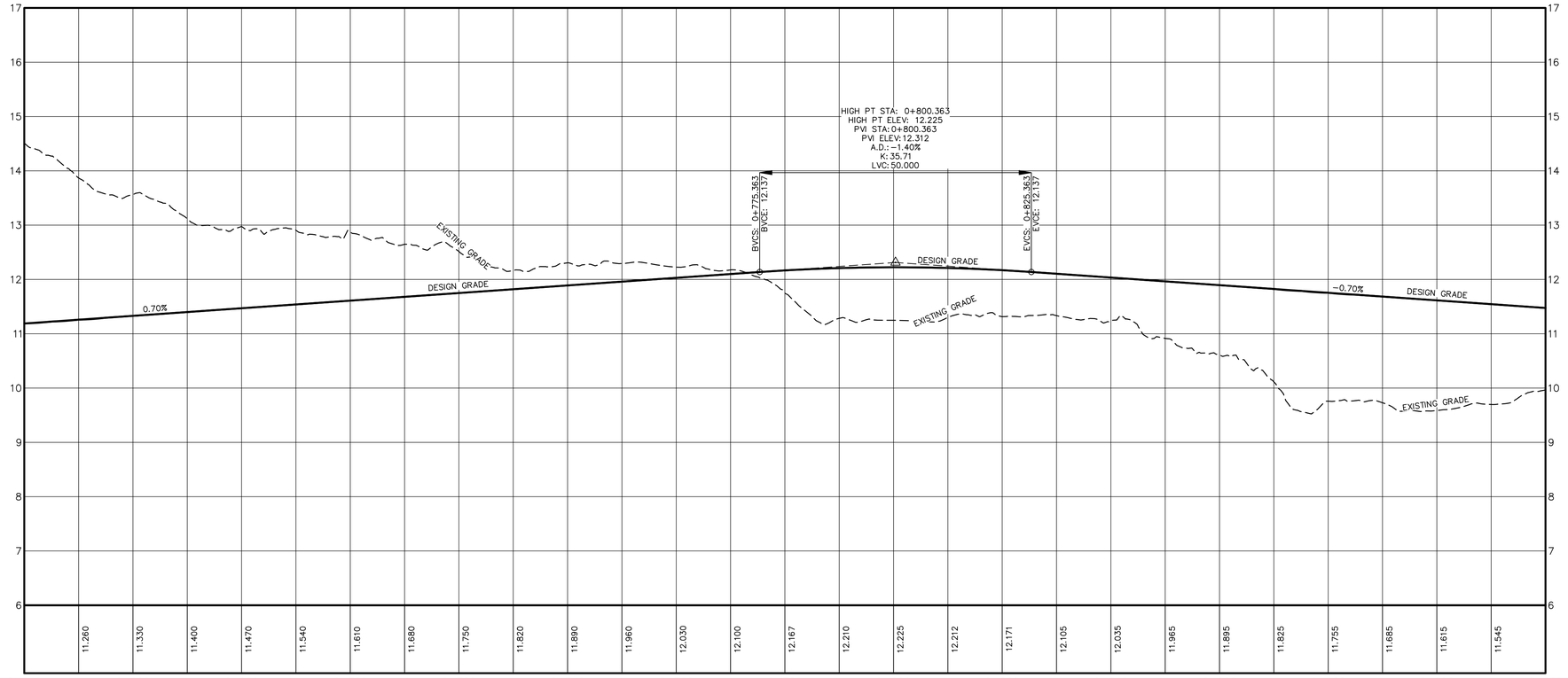
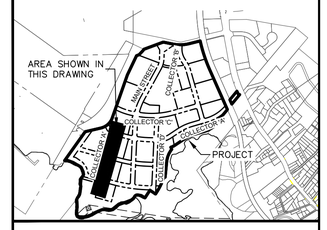






KEY PLAN: Scale 1:15,000



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REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
ORIGINAL SCALE: HORIZONTAL: 1:500 VERTICAL: 1:50	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DESIGNED BY: R. HILTZ, P.ENG	DRAWN BY: C. MUTCH, P.ENG
CHECKED BY: R. HILTZ, P.ENG	APPROVED BY:

WSP Canada Inc.
1 Spectacle Lake Drive
Dartmouth, Nova Scotia, Canada B3B 1X7
T 902-835-9955 F 902-835-1645 www.wspgroup.com

CLIENT:

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

COLLECTOR 'A'

0+640 to 0+920

SHEET NUMBER: 07

SHEET #: 07 OF 15

ISSUE:	REV #
ISSUED FOR REPORT	0
DATE OF: 2020/09/23	

XREFS: x201-04925-Base.dwg; 151-03999-101-0.dwg; 5m_Contours.DWG; 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg; 151-03999-Option1.dwg; 191-08637-Align.dwg; 151-03999-Option2.dwg;

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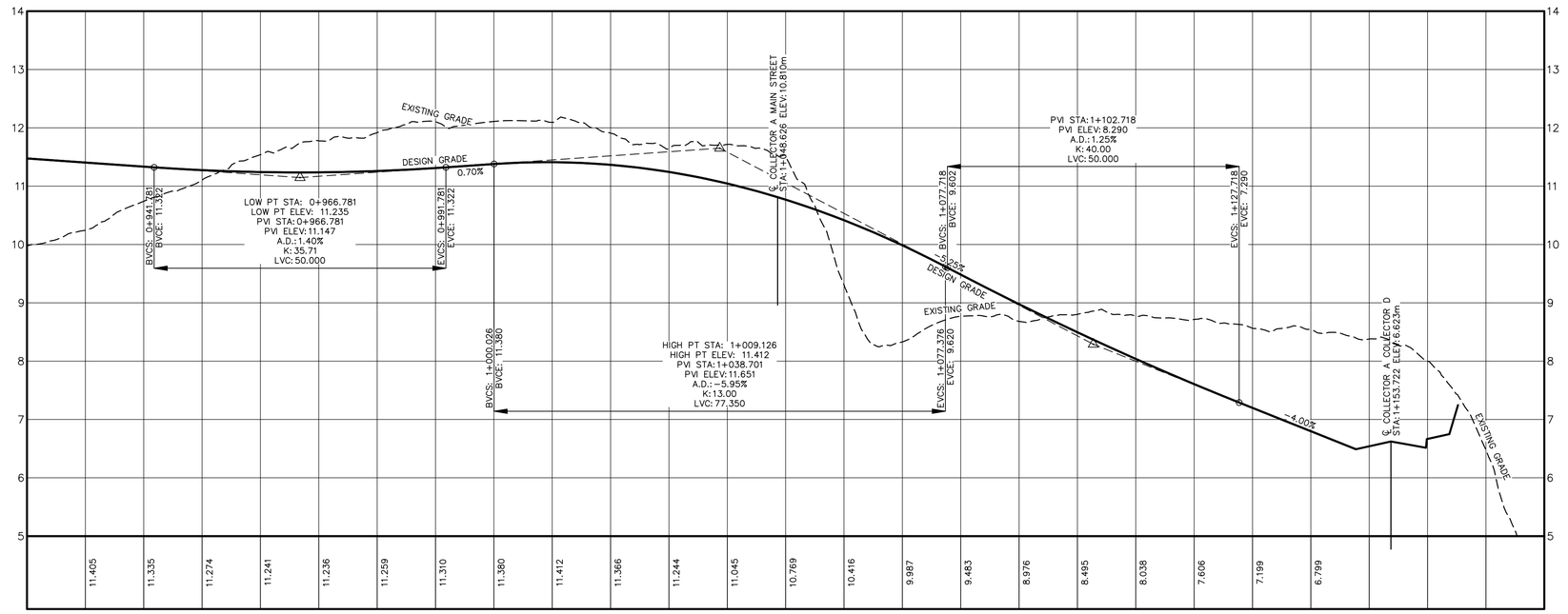
WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_JDA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\X201-04925-PPDRAWINGS.DWG 007



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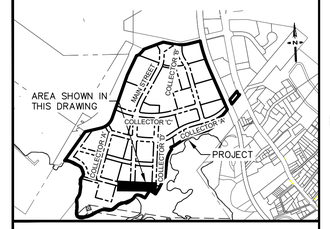

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REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
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PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
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CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

COLLECTOR 'A'

0+920 to 1+180

SHEET NUMBER: 08

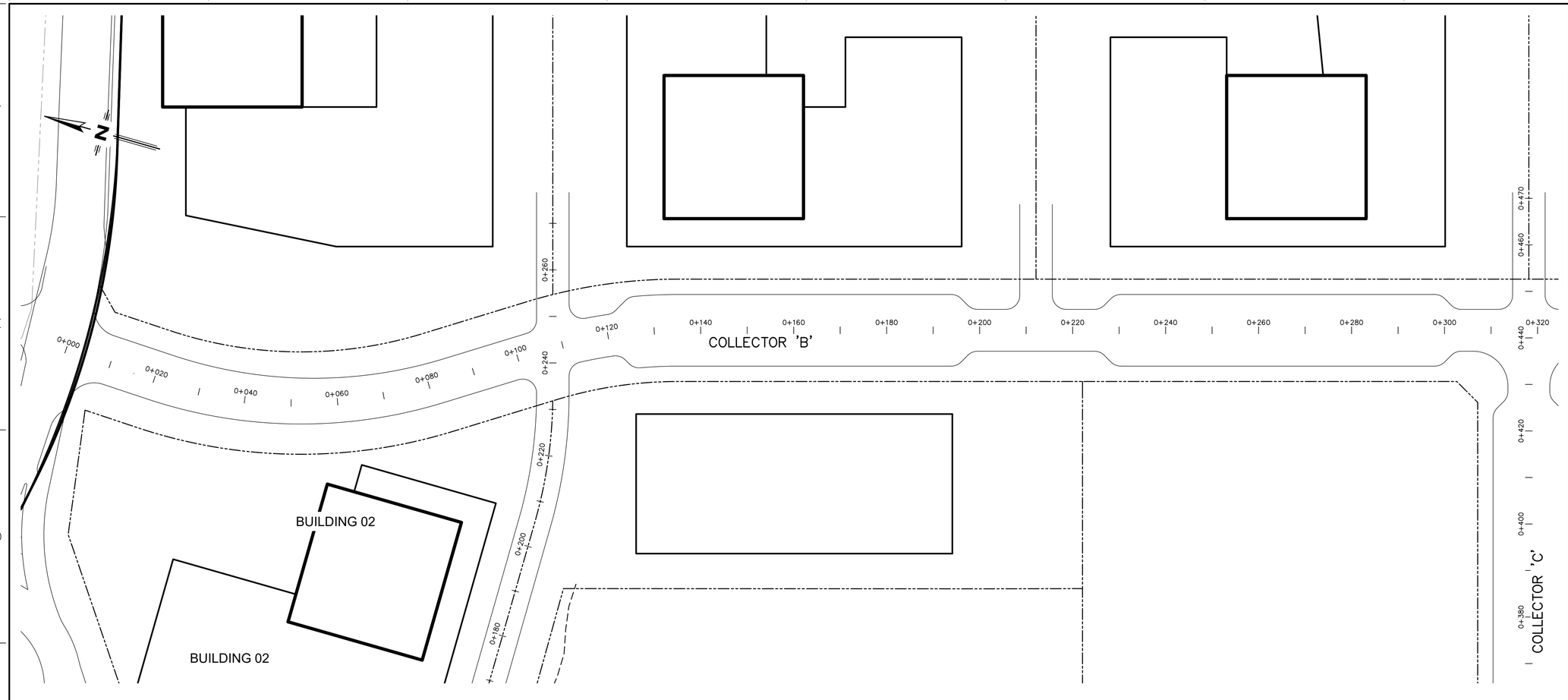
SHEET #: 08 OF 15

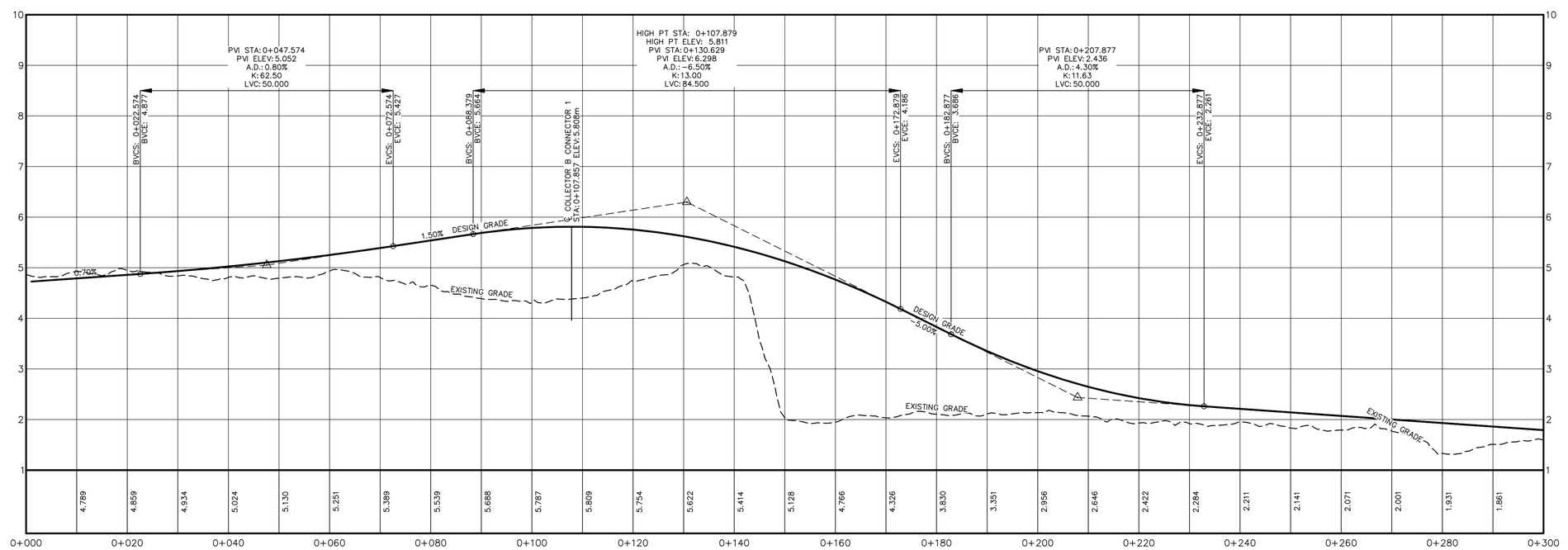
ISSUE: ISSUED FOR REPORT

DATE OF: 2020/09/23

REV #: 0

XREFS: x201-04925-Base.dwg, 151-03999-101-0.dwg, 5m_Contours.DWG, 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg, 151-03999-Option1.dwg, 191-08637-Align.dwg, 151-03999-Option2.dwg, x201-0
WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-PPDRAWINGS.DWG 008 PRINTED: 4:29 PM 2020/09/23 BY: CRAIG.MUTCH





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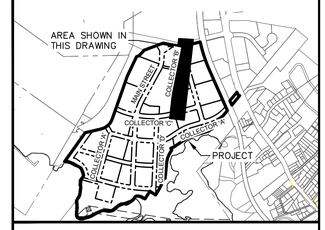

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REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
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CLIENT:

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE
COLLECTOR 'B'
0+000 to 0+300

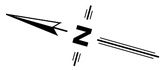
SHEET NUMBER: 09

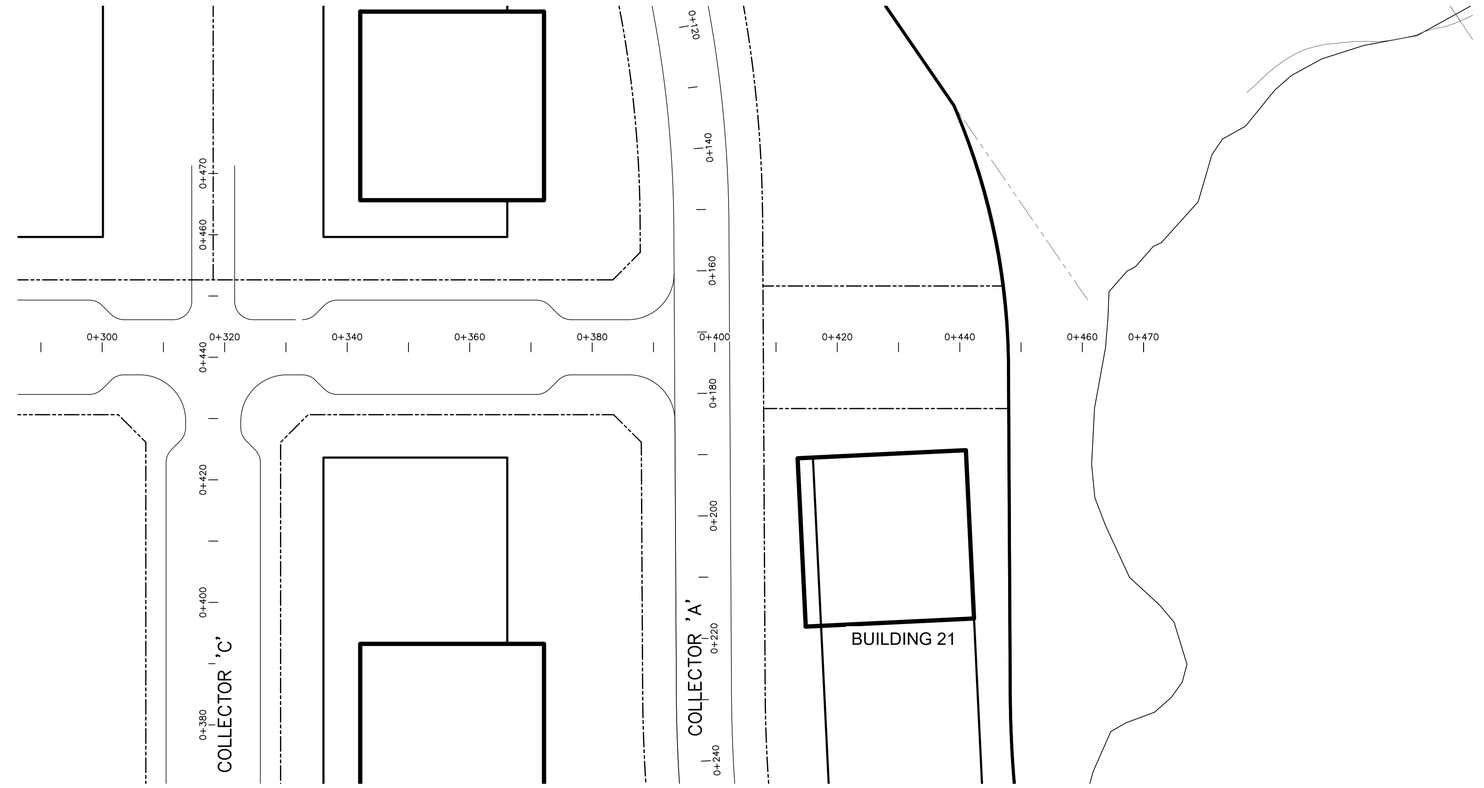
SHEET #: 09 OF 15

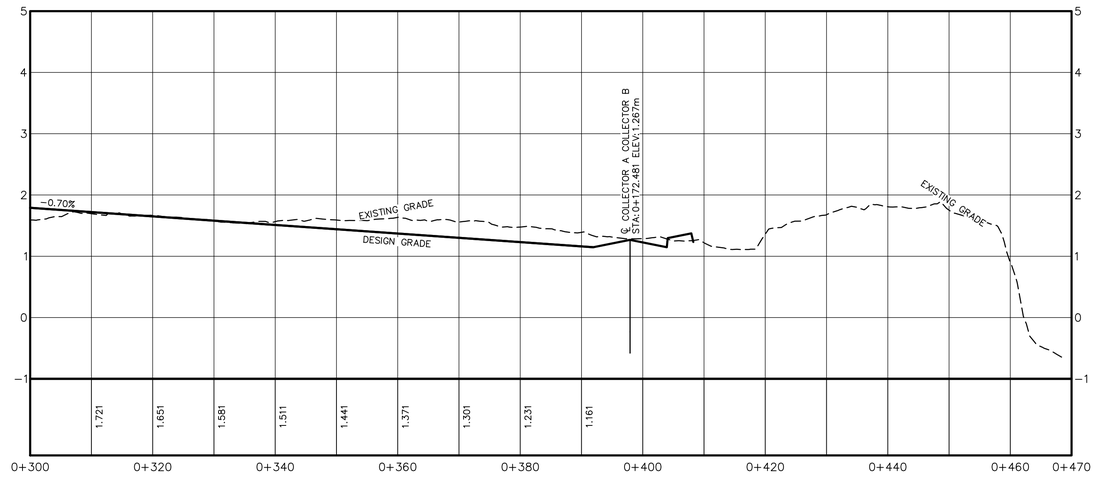
ISSUE:	REV #
ISSUED FOR REPORT	0
DATE OF: 2020/09/23	

XREFS: x201-04925-Base.dwg 151-03999-101-0.dwg 5m_Contours.DWG 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg 151-03999-Option1.dwg 191-08637-Align.dwg 151-03999-Option2.dwg x201-04925-TTBL.dwg

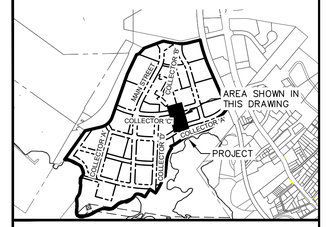
WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-PRDRAWINGS.DWG 009 PRINTED: 4:29 PM 2020/09/23 BY: CRAIG.MUTCH







KEY PLAN: Scale 1:15,000



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CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE
COLLECTOR 'B'
0+300 to 0+470

SHEET NUMBER: 10

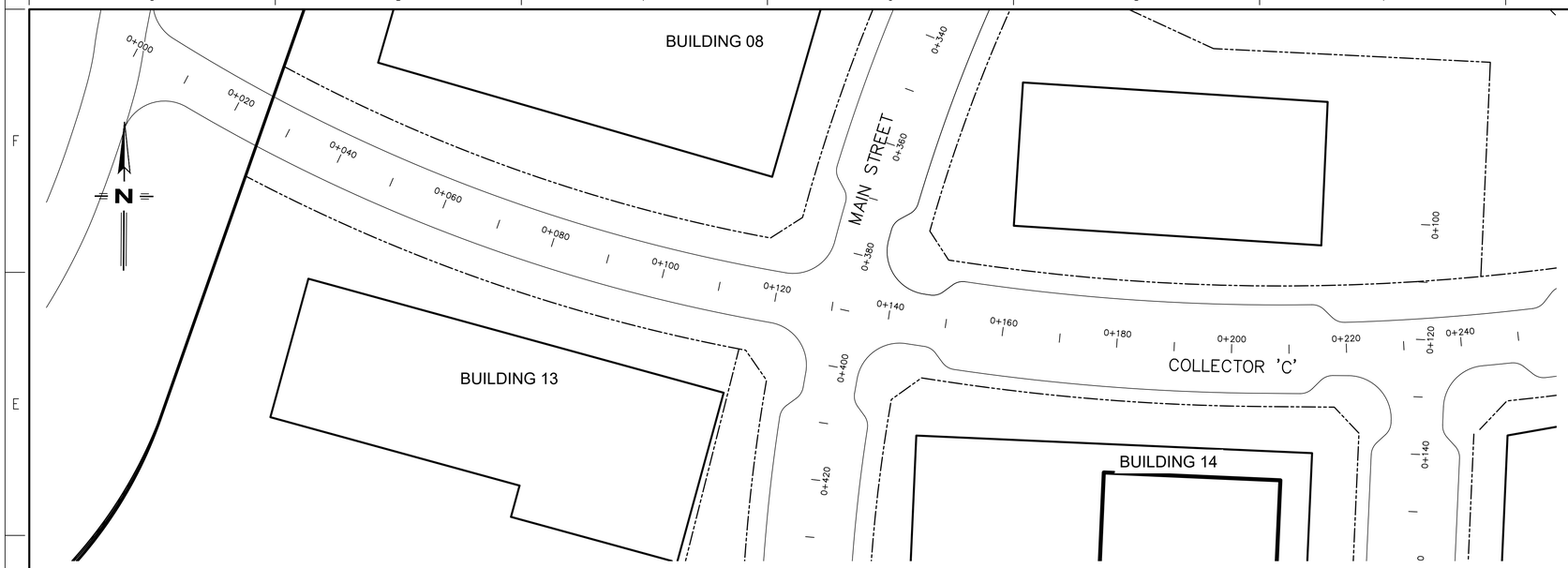
SHEET #: 10 OF 15

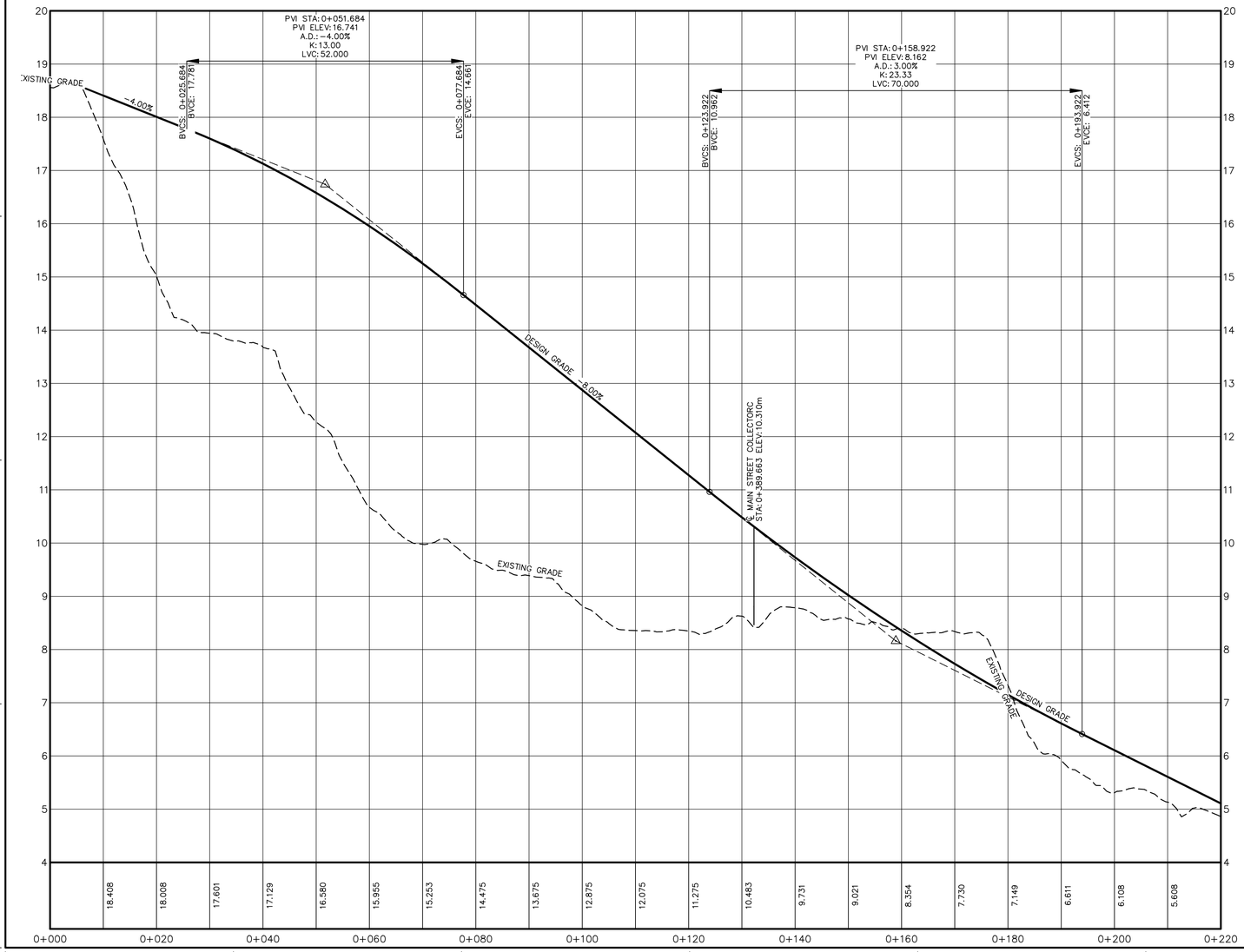
ISSUE: ISSUED FOR REPORT
DATE OF: 2020/09/23

REV. #: 0

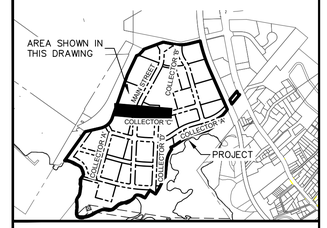
XREFS: x201-04925-Base.dwg, 151-03999-10ft-0.dwg, 5m_Contours.DWG, 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg, 151-03999-Option1.dwg, 191-08637-Align.dwg, 151-03999-Option2.dwg, x201-04925-TTBL.dwg

WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-PPSHOWINGS.DWG PRINTED: 4:29 PM 2020/09/23 BY: CRAIG.MUTCH





KEY PLAN: Scale 1:15,000



SEAL:

REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
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CHECKED BY: R. HILTZ, P.ENG	APPROVED BY:

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CLIENT:

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

COLLECTOR 'C'

0+000 to 0+220

SHEET NUMBER: 11

SHEET #: 11 OF 15

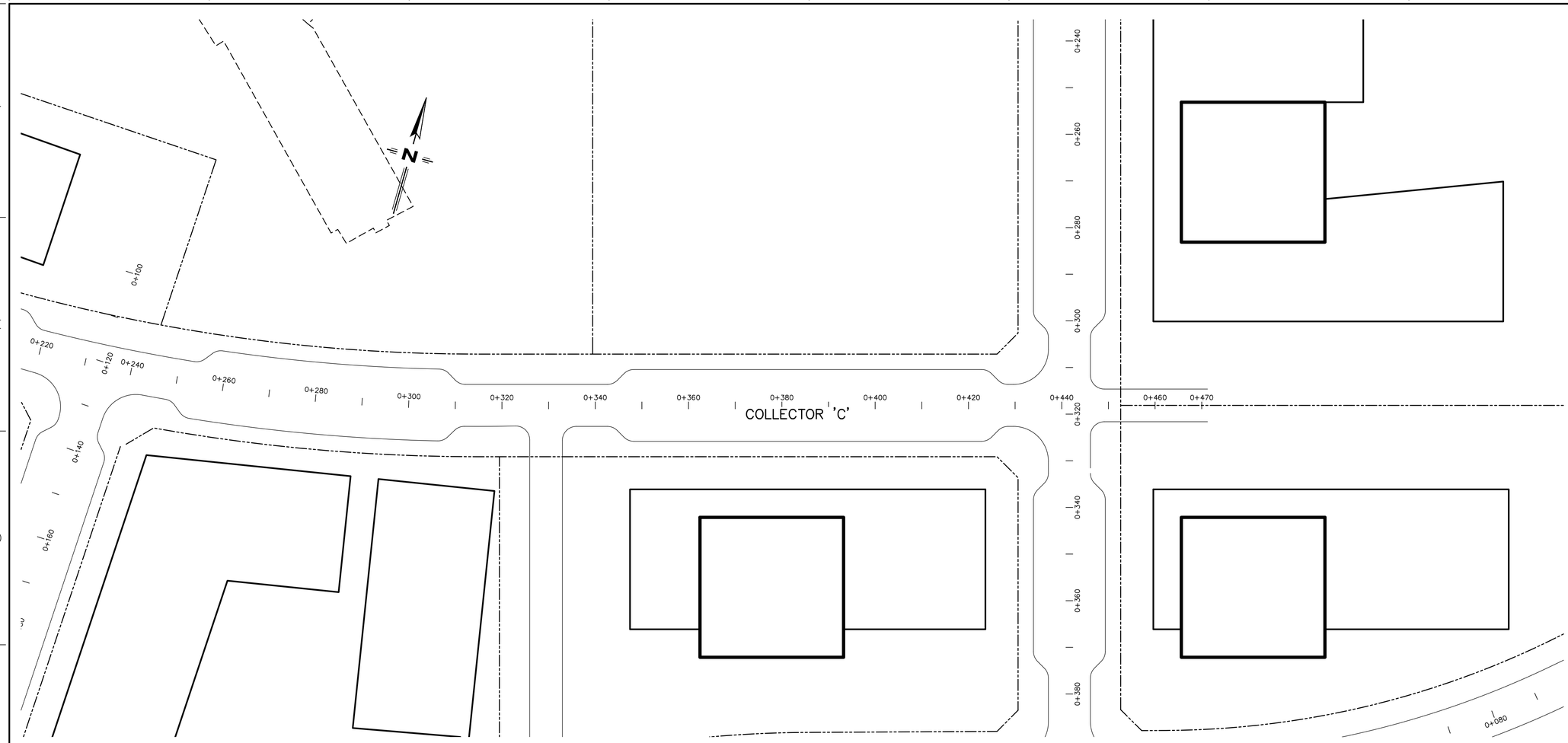
ISSUE: ISSUED FOR REPORT

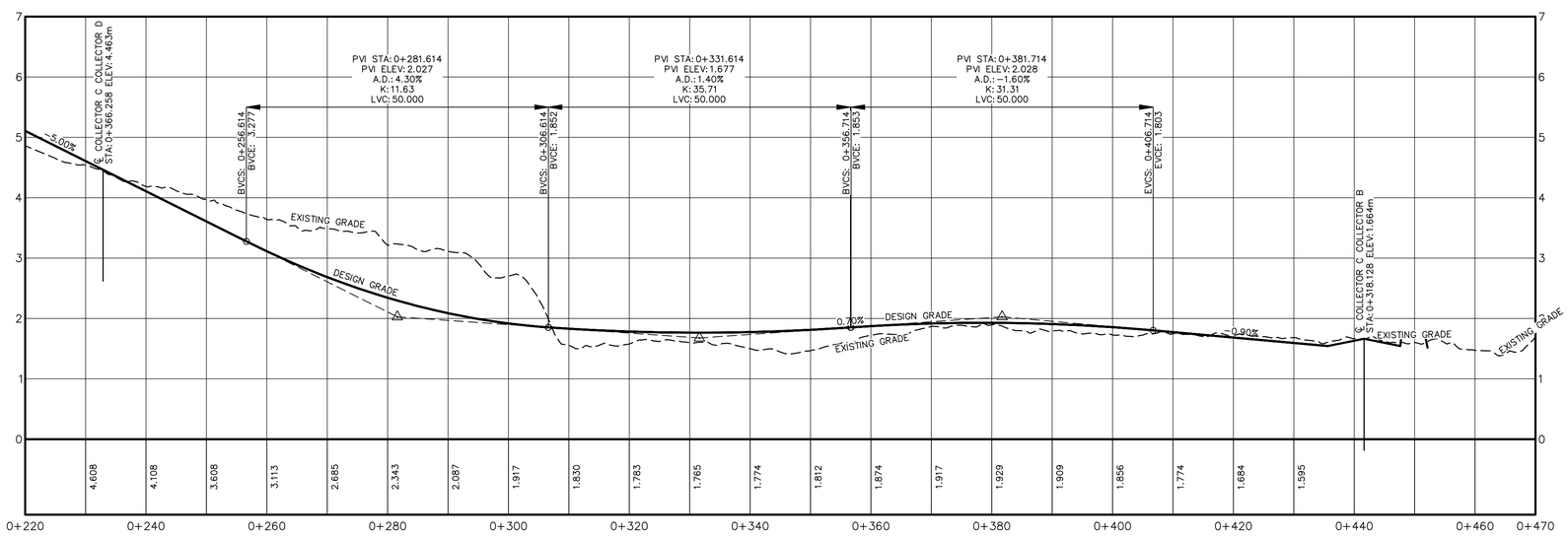
DATE OF: 2020/09/23

REV #: 0

XREFS: x201-04925-Base.dwg 151-03999-101-0.dwg 5m_Contours.DWG 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg 151-03999-Option1.dwg 191-08637-Align.dwg 151-03999-Option2.dwg x201-04925-TTBL.dwg

WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-PPDRAWINGS.DWG PRINTED: 4:30 PM 2020/09/23 BY: CRAIG.MUTCH





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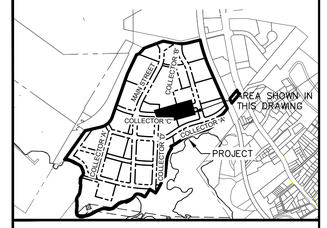

SEAL:

REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
ORIGINAL SCALE: HORIZONTAL: 1:500 VERTICAL: 1:50	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DESIGNED BY: R. HILTZ, P.ENG	DRAWN BY: C. MUTCH, P.ENG
CHECKED BY: R. HILTZ, P.ENG	APPROVED BY:

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1 Spectacle Lake Drive
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CLIENT:

CANADA LANDS COMPANY
SOCIÉTÉ IMMOBILIÈRE DU CANADA

CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

COLLECTOR 'C'

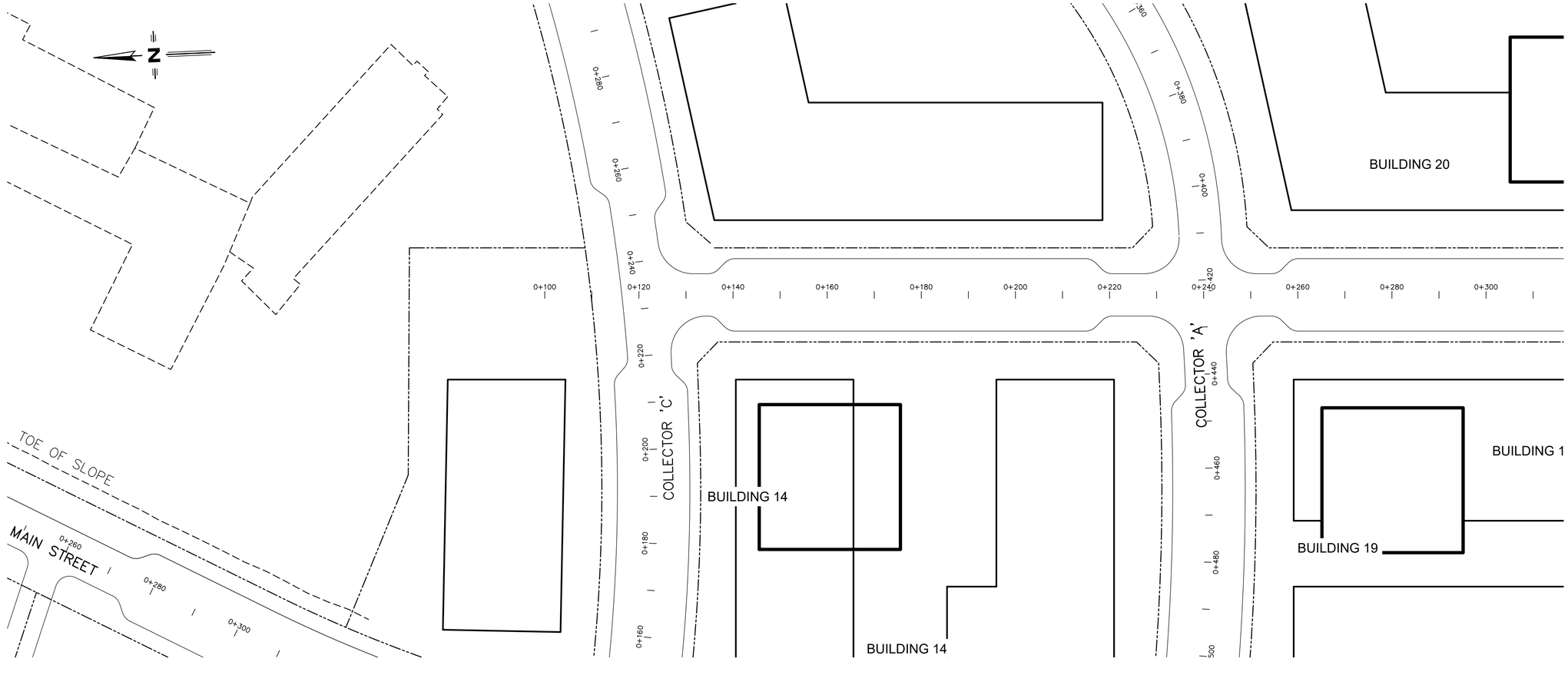
0+220 to 0+470

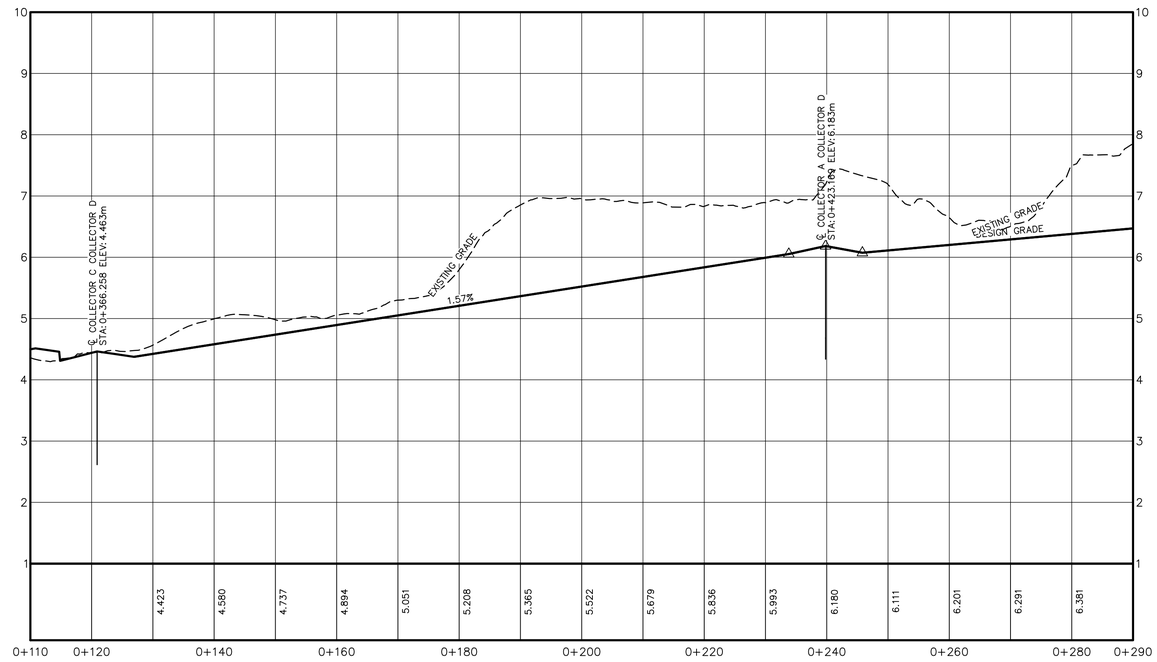
SHEET NUMBER: 12

SHEET #: 12 OF 15

ISSUE: ISSUED FOR REPORT
DATE OF: 2020/09/23

REV #: 0





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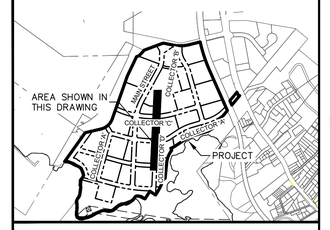

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PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
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CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

COLLECTOR 'D'

-0+010 to 0+290

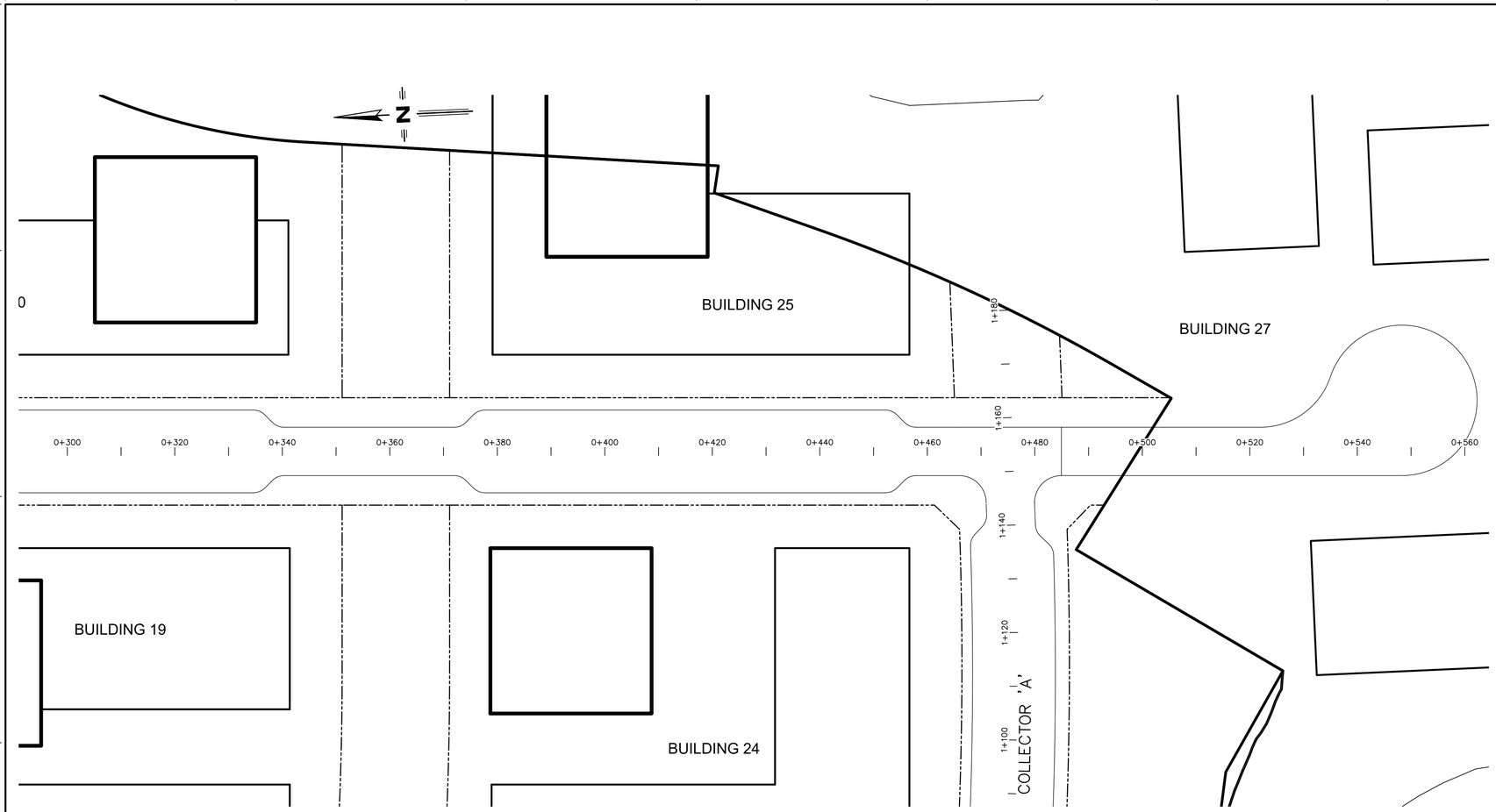
SHEET NUMBER: 13

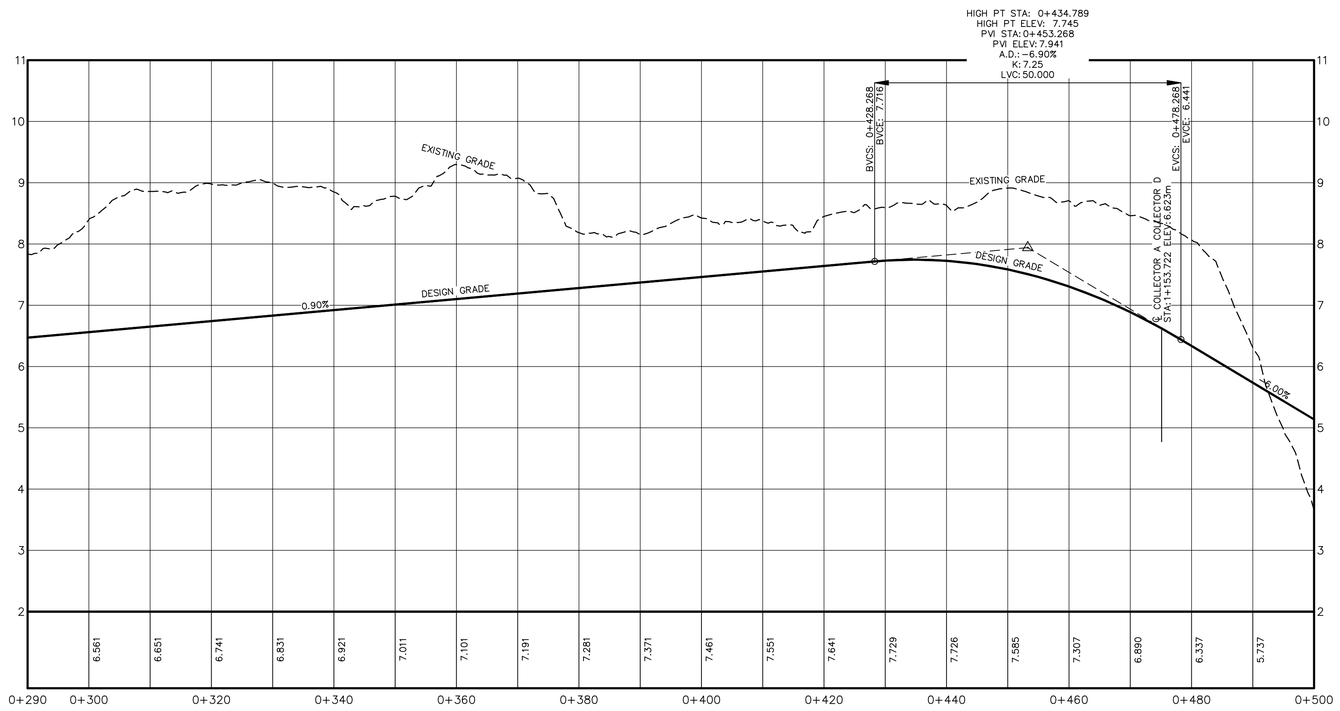
SHEET #: 13 OF 15

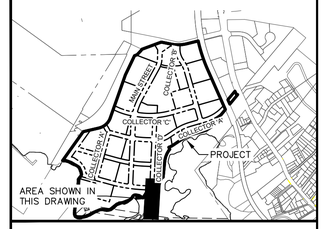
ISSUE:	REV #
ISSUED FOR REPORT	0
DATE OF: 2020/09/23	

XREFS: x201-04925-Base.dwg 151-03999-101-0.dwg 5m_Contours.DWG 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg 151-03999-Option1.dwg 191-08637-Align.dwg 151-03999-Option2.dwg

WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\201-04925-PPDRAWINGS.DWG 013 PRINTED: 4:31 PM 2020/09/23 BY: CRAIG.MUTCH







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NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925
DATE: (YYYY/MM/DD) 2020/09/23
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CHECKED BY: R. HILTZ, P.ENG
APPROVED BY:

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CLIENT REF. #:

PROJECT:
SHANNON PARK PROPOSED REDEVELOPMENT
DARTMOUTH, NOVA SCOTIA

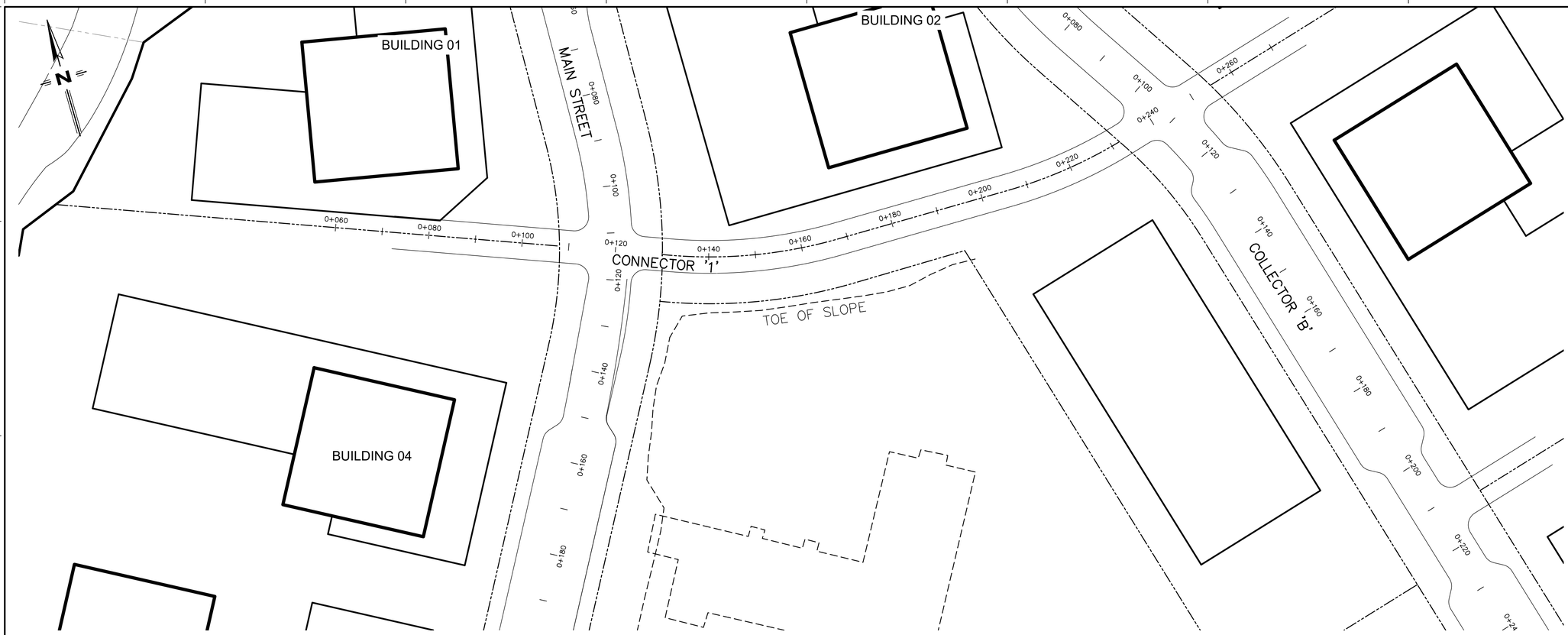
TITLE:
PLAN AND PROFILE
COLLECTOR 'D'
0+290 to 0+500

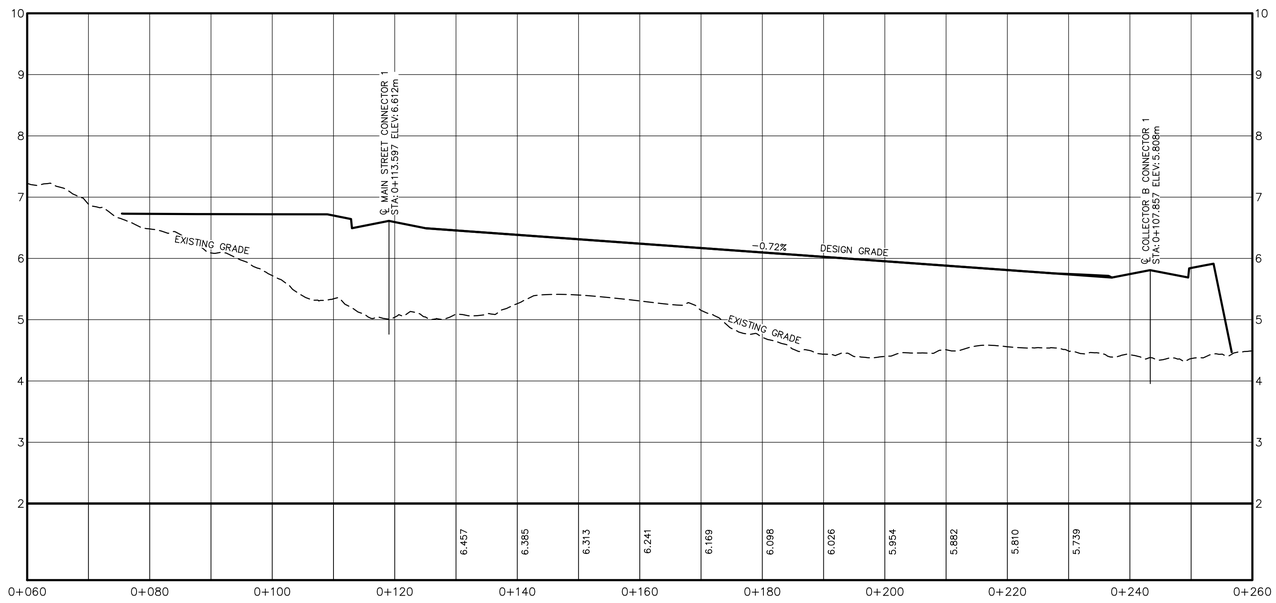
SHEET NUMBER: 14
SHEET #: 14 OF 15

ISSUE: ISSUED FOR REPORT
DATE OF: 2020/09/23
REV #: 0

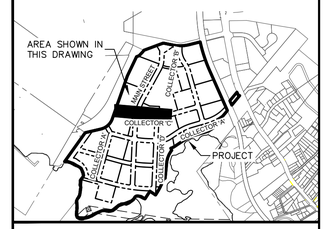
XREFS: x201-04925-Base.dwg; 151-03999-101-0.dwg; 5m_Contours.DWG; 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg; 151-03999-Option1.dwg; 191-08637-Align.dwg; 151-03999-Option2.dwg; x201-0

WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\201-04925-00_CANADA_LANDS_SHANNONPARK_JDA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\X201-04925-PPDRAWINGS.DWG PRINTED: 4:31 PM 2020/09/23 BY: CRAIG.MUTCH





KEY PLAN: Scale 1:15,000



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REVISION:

NO.	DATE YYYY/MM/DD	DESCRIPTION
0	2020/09/23	ISSUED FOR REPORT

PROJECT NUMBER: 201-04925	DATE: (YYYY/MM/DD) 2020/09/23
ORIGINAL SCALE: HORIZONTAL: 1:500 VERTICAL: 1:50	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE. 25mm
DESIGNED BY: R. HILTZ, P.ENG	DRAWN BY: C. MUTCH, P.ENG
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CLIENT REF. #:

PROJECT:

SHANNON PARK PROPOSED REDEVELOPMENT

DARTMOUTH, NOVA SCOTIA

TITLE:

PLAN AND PROFILE

CONNECTOR '1'

0+060 to 0+240

SHEET NUMBER: 15

SHEET #: 15 OF 15

ISSUE: ISSUED FOR REPORT — REV #: 0

DATE OF: 2020/09/23

XREFS: x201-04925-Base.dwg, 151-03999-101-0.dwg, 5m_Contours.DWG, 151-03999-Align-prelim_Option 2 Gravity Sept 1 2016.dwg, 151-03999-Option1.dwg, 191-08637-Align.dwg, 151-03999-Option2.dwg, x201-04925-TTBL.dwg

WSP REF. NO.: 191-08637 K:\DARTMOUTH\2020\x201-04925-00_CANADA_LANDS_SHANNONPARK_DA_SUPPORT\15-DWG\15.4-CIVIL\15.4.2-PRODUCTION_DWG\x201-04925-PPDRAWINGS.DWG 015 PRINTED: 4:31 PM 2020/09/23 BY: CRAIG.MUTCH