Tribute Rondeau Partnership Limited

Cobourg Trails External Servicing Functional Servicing Report

Monday, January 31, 2022

C14-0454

CIMA+

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Tribute Rondeau Limited Partnership

Cobourg Trails External Servicing
Functional Servicing Report

Project no C14-0454

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1 Introduction

1.1 Background

CIMA+ Canada Inc. (CIMA) was engaged by Tribute Rondeau Limited Partnership (Tribute) to undertake the design of external water and wastewater servicing required to support planned development of the Cobourg Trails community on lands owned by Tribute Rondeau Partnership Limited (Tribute) in the Town of Cobourg (the Town). This infrastructure will also support future development of other lands in the Cobourg East Community Secondary Plan Area (Cobourg East). In this regard, it has been designed to support the full build-out needs of Cobourg East in conjunction with other projects that will further extend water and wastewater systems.

As outlined in the 2018 Planning Justification Report and Urban Design Report prepared for Rondeau (Cobourg) Ltd. by the Planning Partnership (TPP) in April 2018, the Cobourg Trails community (the subject lands) consists of 107.3 Ha of land expected to yield 1,604 to 1,926 residential units (depending on the ultimate unit mix). **Figure 1.1**, excerpted from TPP's April 2018 report, indicates the location of the subject lands relative to the larger existing community. As noted above, these lands are now commonly referred to as Cobourg Trails.

Figure 1.1: Cobourg Trails Location within Larger Community

These lands are further anticipated to support a population of approximately 5,200 people. The development is planned to occur over seven (7) phases which have been under review in various forms for a number of years. Detailed engineering design for Phase 1 of the development is currently in progress by D.G. Biddle & Associates Limited (Biddle).

It is expected that Phase 1 of the planned development will require servicing in 2022 (internal and external designed by Biddle), followed by Phase 2 and Phase 3 in 2024 and 2025, respectively. Currently, the Town's water and wastewater networks do not have the reach to service all phases of the planned development and must be extended (as discussed herein) to provide connectivity to the appropriate treatment facilities. In general, it is understood that:

- While current Town of Cobourg studies have indicated that reserve capacity is available to service all Phases of Cobourg Trails, Water Pollution Control Plant #2 will have to be expanded in a timely manner to allow for the uninterrupted build-out of the entire Cobourg East Community.
- There is sufficient water treatment capacity available at the Cobourg Water Treatment Plant (WTP) to meet the long-term build-out needs of the community based on the 2021 Cobourg Water Master Plan.
- That there will be Pressure Zone 2 pumping upgrades required to eventually service all Phases of the Cobourg Trails development.

1.1.1 Report Purpose

The purpose of this report is to consolidate background, design calculations and design details to support the following objectives:

1. Advance initial conceptual designs prepared by Biddle in 2020 (see **Section 1.3.2**) to develop a functional design for the provision of a trunk sanitary sewer external to Tribute's Cobourg Trails lands that will service those lands by providing a connection to Water Pollution Control Plant #2 (WPCP #2).
2. Identify for the Town of Cobourg the extent to which such an external trunk sewer traversing most of the Cobourg East Community at considerable depth (i.e., 7 to 10 m) can potentially service other developable lands in the secondary plan area (see **Section 1.2.5**) conveying flows to WPCP #2 consistent with the concept originally put forward by KMK Consultants Limited (KMK) in 2004 (see **Section 1.3.1**).
3. Advance the design of several trunk and sub-trunk watermain projects identified in the 2021 Cobourg Waster Master Plan (see **Section 1.3.3**) from a concept

level of detail to a functional design level of detail and confirm that the watermain network as proposed is adequate.

1.1.2 Overview of Wastewater Servicing

To allow development to progress, an interim solution to accommodate wastewater flows from Phase 1 has been approved by the Town. This interim solution involves extending a sanitary sewer westerly from future Street A in Phase 1 of the Cobourg Trails community to connect to the existing sanitary sewers on Elgin Street East at Conger Avenue. Under this interim solution these flows will be conveyed to Cobourg Water Pollution Control Plant #1 (WPCP #1). It is understood that WPCP #1 does not have sufficient capacity to support all seven (7) phases of the Cobourg Trails development. As such, Tribute must design and construct a trunk sanitary sewer sufficient in size and depth to service the remaining phases of their development as well as additional undeveloped external land in Cobourg East that can logically be accommodated.

The ultimate servicing approach, as indicated by the Town, is to direct all wastewater flows from the subject lands and additional external development in Cobourg East, southeasterly via a network of sub-trunk and trunk sanitary sewer systems to Cobourg WPCP #2 located in the Lucas Point Industrial Park.

1.1.3 Overview of Water Servicing

To provide water infrastructure to service the Cobourg Trails Community, Tribute is required to design and construct a portion of the trunk watermain network for Cobourg East. This trunk watermain network has been planned and conceptually designed by Lakefront Utility Services Inc. (LUSI) through the Cobourg Drinking Water System Master Plan completed in 2021.

1.2 Study Area

The Study Area is located in the northeast quadrant of the Town of Cobourg and in general encompasses the entirety of Cobourg East as defined by the Cobourg East Community Secondary Plan Area Community Framework Plan (see **Section 1.2.5**), published by the Town of Cobourg in 2004 with boundaries as follows:

- North: Highway 401
- South: Canadian National (CN)/Canadian Pacific (CP) Railway Corridor
- East: Stanton Road North
- West: 400m West of Brook Road North

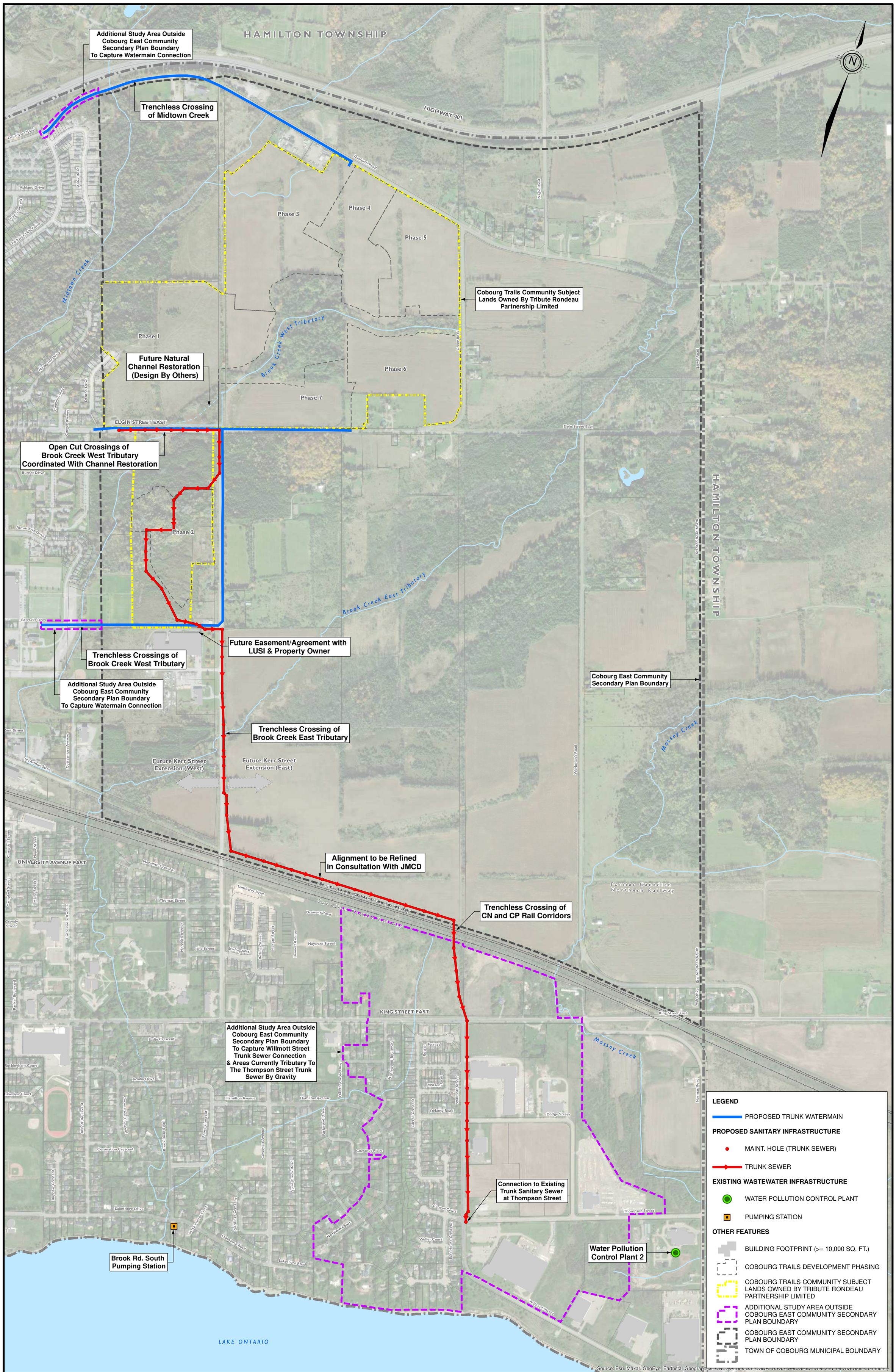
The Study Area also extends:

- South of the CN/CP rail corridor along the Willmott Street right-of-way to facilitate the connection of proposed trunk sewer to existing trunk sewer infrastructure in the southeast quadrant of the Town of Cobourg and evaluate the capacity of the existing trunk sewer downstream of the connection point.
- West of the Cobourg East Community Secondary Plan Area along Densmore Road to Parkview Hills Drive to facilitate a sub-trunk watermain connection.
- West of the Cobourg East Community Secondary Plan Area along the south side of the existing soccer pitches that are located east of the Cobourg Community Centre to facilitate a trunk watermain connection.

The Cobourg East Community Secondary Plan Area, the Cobourg Trails community development lands, and extensions of the Study Area are shown on **Figure 1.2.** This figure also provides an overview of the anticipated external trunk servicing infrastructure and the location of the seven (7) planned phases of Cobourg Trails development relative to the rest of the external servicing area.

Development in the eastern portion of the Town of Cobourg is split by the CN/CP rail corridor that passes through the Town approximately 1,450 m south of Elgin Street East at Brook Road North. North of the rail corridor and within the Study Area, lands are for the most part undeveloped. In addition to lands owned by Tribute in the northwest portion of the Study Area, the land immediately north of the rail corridor (along the east side of Brook Road) is actively being planned for development by Mistral Land Developments Inc.

Future development of the remaining lands within the Study Area are expected to be as shown in the Town of Cobourg's Land Use Schedule X1: Cobourg East Schedule Land Use Plan and in accordance with policies as outlined in the Town of Cobourg's, Cobourg East Community Secondary Plan. Details with respect to the Cobourg East Community Secondary Plan and the expectations set out by the Plan for future development in Cobourg East are included in **Section 1.2.5**.



CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters
1:6,000

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **OVERVIEW OF PROPOSED EXTERNAL SERVICING**

PROJECT No: C14-0454		CLIENT FILE No: ---
DRAFTER: S. ELLIOTT	DESIGNER: ---	FIGURE No: 1.2
APPROVER: D. CAMPBELL	APPROVER: ---	
DATE: 1/26/2022		SHEET No: 1 of 1

1.2.1 Existing Road Network

The Study Area includes a network of existing local and arterial roads that connect Cobourg East to developed areas within the Town. Brook Road North is under the jurisdiction of Northumberland County (the County) and runs north-south in the western portion of the Study Area, connecting the future Cobourg Trails Community to the southeastern portion of the Town.

Between Elgin Street East and the southern limit of Cobourg East, Brook Road North provides entrance to seven (7) residential properties and two (2) industrial properties and is made up of a number of rolling hills, some of which are quite steep. Brook Road North is generally bound by agricultural fields and densely vegetated areas. Approximately 1,050 m south of Elgin Street East, the East tributary of Brook Creek crosses Brook Road North through an approximately 1.8 m high, 4.3 m wide, 27 m long concrete box culvert.

Elgin Street East (west of Brook Road North) is also under the jurisdiction of the County as County Road 20 and runs east-west in the northern portion of the Study Area, connecting the Cobourg Trails community to the central-northern portion of the Town. Existing development on Elgin Street East is fairly limited within the Study Area and is mainly gathered around intersections east of Brook Road North. Approximately 215 m west of Brook Road North, the West tributary of Brook Creek crosses Elgin Street East through a 1.0 m diameter CSP culvert. The Brook Creek East tributary also crosses Elgin Street East in the area of Workman Road. Future Street A, one of the main entrances to the Cobourg Trails community will be located on Elgin Street East between Conger Avenue and the Brook Creek West tributary crossing.

North of Tribute's planned development, Densmore/Danforth Road runs east-west just south of Highway 401. The road is currently a rural, two-lane route that services a small number of residential and industrial properties as well as provides a link for properties in the northern portion of Cobourg East to the Highway 401 interchange at Division Street. Densmore/Danforth Road is expected in time to be urbanized and provide an entrance to the Cobourg Trails community and an east-west link to the future Nagle Road Highway 401 interchange.

1.2.2 Existing Wastewater Infrastructure

The Town of Cobourg is currently serviced by two (2) wastewater treatment facilities, Water Pollution Control Plant (WPCP) #1 which mainly services the western and northern portions of the Town and WPCP #2 which mainly services the eastern and southern portions of the Town.

The entirety of the Study Area, as defined in **Section 1.2** herein, is contained within the WPCP #2 catchment. This is in-line with the Town's previously stated preferred wastewater servicing strategy which involves draining the entirety of wastewater flows from Cobourg East to WPCP #2. WPCP #2 is located in the east end of Cobourg within the Lucas Point industrial park at the intersection of Thompson Street and Normar Road. Under existing conditions, WPCP #2 receives flows from two (2) sewer systems:

- Willmott Street local sewer which services existing industrial and institutional lands on the east side of Willmott Street as shown in **Figure 2.2**; and
- 1,200 mm dia. Thompson Street sewer which drains Cooper Court and Willmott Street west side residential properties as well as captures and conveys flows from a forcemain that services the Brook Road Sewage Pumping Station (SPS) and McGill Street SPS located further west in the Town of Cobourg.

Prior planning completed for WPCP #2 had identified the need to ultimately expand the treatment facility to double its rated capacity to meet long-term wastewater treatment needs of development within the WPCP #2 catchment area. The Town is aware of the need to expand the capacity of WPCP #2 to be able to fulfill the preferred servicing strategy for Cobourg East.

Figure 1.3 provides an annotated version of the existing Town of Cobourg wastewater collection (sanitary sewer) system in the context of the Study Area described above. The following sections outline key elements of the existing wastewater system relative to the Study Area for this report.

HAMILTON TOWNSHIP

HIGHWAY 401

WPCP No. 1 Sewershed

WPCP No. 2 Sewershed

ELGIN STREET WEST

ELGIN STREET EAST

BURNHAM STREET

ONTARIO STREET

DIVISION STREET

NAGLE ROAD

BROOK ROAD NORTH

DARCY STREET

WILLIAM STREET

Midtown Creek

Cobourg Creek

Brook Creek West Tributary

Brook Creek East Tributary

Brook Creek

Moisey Creek

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

Existing Sewer to be Extended to Provide Interim Connection for Cobourg Trails Phase 1

Connection Point for Existing Flows From 701 Brook Rd. North Industrial Property

Existing Sanitary Sewer Under Railway & Tributary to Brook Road SPS

Canadian National Railway

Canadian Pacific Railway

UNIVERSITY AVENUE EAST

UNIVERSITY AVENUE WEST

KING STREET WEST

KING STREET EAST

WPCP #1 Water Pollution Control Plant

King St. West (Monk's Cove) Pumping Station

Forth St. Pumping Station

McGill St. Pumping Station

Brook Rd. South Pumping Station

McGill St. SPS & Brook Rd. SPS Forcemain Discharge

Existing Thompson St. Trunk Sewer

WPCP #2 Water Pollution Control Plant

WPCP No. 1 Sewershed

WPCP No. 2 Sewershed

LAKE ONTARIO

LEGEND

EXISTING WASTEWATER INFRASTRUCTURE

- WATER POLLUTION CONTROL PLANT
- PUMPING STATION
- MAINTENANCE HOLE

SEWER

- 150 MM AND
- 200 MM - 250 MM
- 300 MM - 400 MM
- 450 MM - 600 MM
- 675 MM - 750 MM
- 900 MM AND

LAND USE

- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN

OTHER FEATURES

- CONTOUR (5M INTERVAL)
- CATCHMENT AREA 1 & 2
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- COBOURG TRAILS COMMUNITY SUBJECT LANDS OWNED BY TRIBUTE RONDEAU PARTNERSHIP LIMITED
- ADDITIONAL STUDY AREA OUTSIDE COBOURG EAST COMMUNITY SECONDARY PLAN BOUNDARY
- COBOURG EAST COMMUNITY SECONDARY PLAN BOUNDARY
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CIMA+

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME: COBOURG TRAILS EXTERNAL SERVICING

SHEET TITLE: OVERALL PLAN OF EXISTING WASTEWATER COLLECTION SYSTEM

SCALE: 100 50 0 100 200 300 400 500 meters 1:20,000

PROJECT No: C14-0454		CLIENT FILE No: ---	
DRAFTER: S. ELLIOTT	DESIGNER ---	FIGURE No: 1.3	
APPROVER D. CAMPBELL	APPROVER ---		
DATE: 12/9/2021			

1.2.2.1 North of the CN / CP Rail Corridor

Within the Cobourg East Community Secondary Plan Area portion of the Study Area, there is limited existing wastewater infrastructure. The Town's existing sanitary sewer system extends into or near the Secondary Plan area as follows:

- On Brook Road North a 375 mm dia. Sanitary sewer extends under the CN/CP rail corridor to a maintenance hole located just north of the CN tracks. This sanitary sewer is considered to have limited capacity to support future development as it ultimately flows to the Brook Road Sewage Pumping Station, which experiences operational issues during wet weather events and has some future development areas south of the CN/CP rail corridor in its catchment area.
- An existing sewer flows west towards D'Arcy Street from the north-end of Cottsmore Avenue (i.e., just south of the Legion Fields baseball fields). It is understood that some wastewater from the existing industrial development at 701 Brook Road North flows through private sewers to connect at this location. Given that this sewer ultimately flows to Cobourg WPCP #1 it is not considered to have capacity to support future development at flow rate in excess of what it currently receives from the existing development.
- Just west of the Secondary Plan area, an existing sanitary sewer extends east along Elgin Street to Conger Avenue where a local sewer extends along Denton Drive. The existing sewer on Elgin Street East will be extended easterly to future Street A to provide an interim solution for conveying flows from Phase 1 of the Cobourg Trails development to WPCP #1. Ultimately, the flows from Phase 1 must be redirected to flow to towards Cobourg WPCP #2.

1.2.2.2 South of the CN / CP Rail Corridor

Given the foregoing and the Town's prior planning for wastewater flows from all lands within the Cobourg East Community Secondary Plan Area to ultimately drain to WPCP #2, additional trunk sewers are required to convey flows from the Study Area in a southeasterly direction towards the CN/CP rail corridor. As outlined in **Section 1.1.1** and further discussed in **Section 1.3.2**, the general arrangement of such a trunk sewer flowing southeasterly and crossing the Brook Creek West Tributary, Brook Creek East Tributary watersheds and entering the Massey Creek watershed was previously explored by Biddle in 2020.

A trunk sewer of this nature is expected to connect to the existing municipal infrastructure in the southeast quadrant of the Town via the unopened Willmott Street right-of-way, where an opportunity exists to cross the CN/CP rail corridor.

South of King Street East, Willmott Street development is a mix of residential, industrial, and commercial. Willmott Street is a two-lane urban collector road with water, wastewater, and stormwater infrastructure as well as private utilities such as underground gas and communications infrastructure, and overhead hydro. There is an

existing 375 mm dia. Local sanitary sewer along the east side of Willmott Street that flows south connecting to an existing 1,200 mm dia. Trunk sanitary sewer on Thompson Street.

The existing 1,200 mm dia. Trunk sanitary sewer on Thompson Street flows east along Thompson Street for approximately 700 m where it outlets to Cobourg WPCP #2. In addition to flows from the existing Willmott Street developments, the existing Thompson Street trunk sewer also receives all flows from areas further west in the WPCP #2 catchment area. This includes:

- Flows pumped from the existing Brook Road SPS and the McGill Street SPS that discharge separately at the same location on Hamilton Court and flow east via trunk sewers on Hamilton Court/Avenue, an easement between Hamilton Avenue and Cooper Court and then along Cooper Court towards Thompson Street.
- Flows from existing and future residential development in the area west of Willmott Street that flow southerly towards the above noted trunk sewer on Hamilton Avenue and Cooper Court and then east towards Thompson Street.

1.2.3 Existing Water Infrastructure

Figure 1.4 provides an overall illustration of the Cobourg Drinking Water System. Relevant components of the Cobourg Drinking Water System are described in the following sections.

1.2.3.1 Cobourg Drinking Water System Overview

Water is supplied to the Cobourg water distribution system by the Cobourg Water Treatment Plant (WTP), which draws raw water from Lake Ontario. Treated water is discharged from the Cobourg WTP into Pressure Zone 1 (Zone 1) of the water distribution system. Zone 1 services the southern portion of the Town including lands up to an elevation of ±98 m. In the Cobourg East area, the northern boundary of Zone 1 roughly equates to the CN/CP rail corridor. Currently, treated water storage in Zone 1 is provided by the Victoria Street Elevated Tank (ET), which has a total volume of 1,360 m^3 and a top water level of 132.0 m. LUSI has plans to replace the existing storage facility with a larger ET (5,000m^3 capacity) in the next 1-3 years.

Most of the lands in the Coburg East area are located within Pressure Zone 2, which services lands up to an elevation of ±120 m. This includes the lands within Phases 1, 2, 3, 4 and 7 of the Cobourg Trails development, which are illustrated in the following sections.

Water is supplied to Zone 2 from Zone 1 by the Ewart Street Booster Pumping Station (BPS) located near the intersection of Ewart Street and Division Street. The Ewart Street BPS is equipped with three (3) pumps each rated for 76 L/s at 48.8 m of Total

Dynamic Head (TDH) and a firm rated pumping capacity of 152 L/s with two (2) pumps in service. Treated water storage in Zone 2 is provided by the Strathy Road Elevated Tank (ET), which has a total volume of 3,734 m^3 and a top water level of 158.40 m.

Lands in the very northeastern portion of the Cobourg East area are located at elevations above ±120 m. As a result, the servicing of these lands from a water supply perspective will require the creation of a new pressure zone (Zone 3) to be serviced by a new BPS. The lands within Phases 5 and 6 of the Cobourg Trails development are located within Zone 3 at elevations ranging between ±120 m and ±135 m.

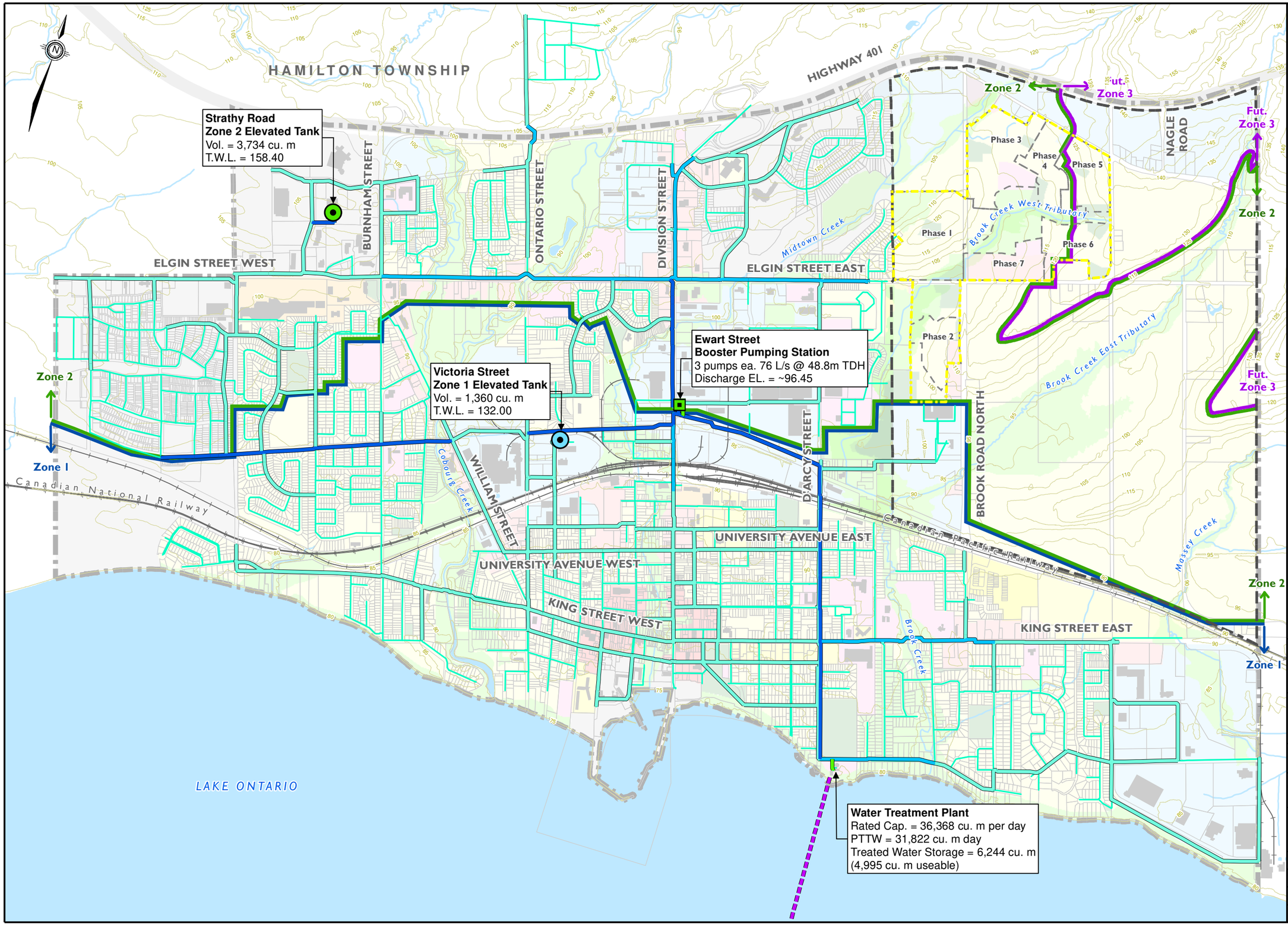
1.2.3.2 Existing Watermains

Water distribution infrastructure within the Cobourg East area is limited. A single 300 mm dia. (Zone 1) watermain that extends east from D'Arcy Street along Kent Street to service the private watermains located at 701 Brook Road North is the only existing watermain within the Cobourg East area. Given that the site at 701 Brook Road North is partially at elevations above 98 m, it would be more appropriately serviced from Zone 2 in the future. As such, the exiting Zone 1 watermains servicing that site are of limited value to supporting future development in Cobourg East.

To the west of Cobourg East, several existing Zone 2 watermains are available to facilitate extension of the Cobourg water distribution system into the Cobourg East Community Secondary Plan Area. These include the following trunk and sub-trunk watermains:

- A 400 mm dia. trunk watermain on Elgin Street East that currently terminates at Conger Avenue and is planned to be extended to future Street A of the Cobourg Trails development in the near term.
- A 300 mm dia. sub-trunk watermain on Densmore Road that currently terminates at Parkview Hills Drive.

Both of these watermains are identified for easterly extensions in the Cobourg Drinking Water System Master Plan.



LEGEND

- ELEVATED TANK (ZONE 1)
- ELEVATED TANK (ZONE 2)
- BOOSTER PUMPING STATION (ZONE 2)

EXISTING WATERMAIN

- LESS THAN 300MM
- 300MM
- 400MM
- 450MM
- 600MM
- RAW INTAKE PIPE

LAND USE

- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN

OTHER FEATURES

- PRESSURE ZONE 1/ZONE 2 BOUNDARY
- PRESSURE ZONE 2/FUTURE ZONE 3 BOUNDARY
- CONTOUR (5M INTERVAL)
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- COBOURG TRAILS COMMUNITY SUBJECT LANDS OWNED BY TRIBUTE RONDEAU PARTNERSHIP LIMITED
- COBOURG EAST COMMUNITY SECONDARY PLAN BOUNDARY
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CIMA+

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **OVERALL PLAN OF EXISTING COBOURG WATER DISTRIBUTION SYSTEM**

SCALE: 100 50 0 100 200 300 400 500 meters
1:20,000

PROJECT No: C14-0454		CLIENT FILE No: ---
DRAFTER: S. ELLIOTT	DESIGNER ---	FIGURE No: 1.4
APPROVER D. CAMPBELL	APPROVER ---	
DATE: 1/11/2022		

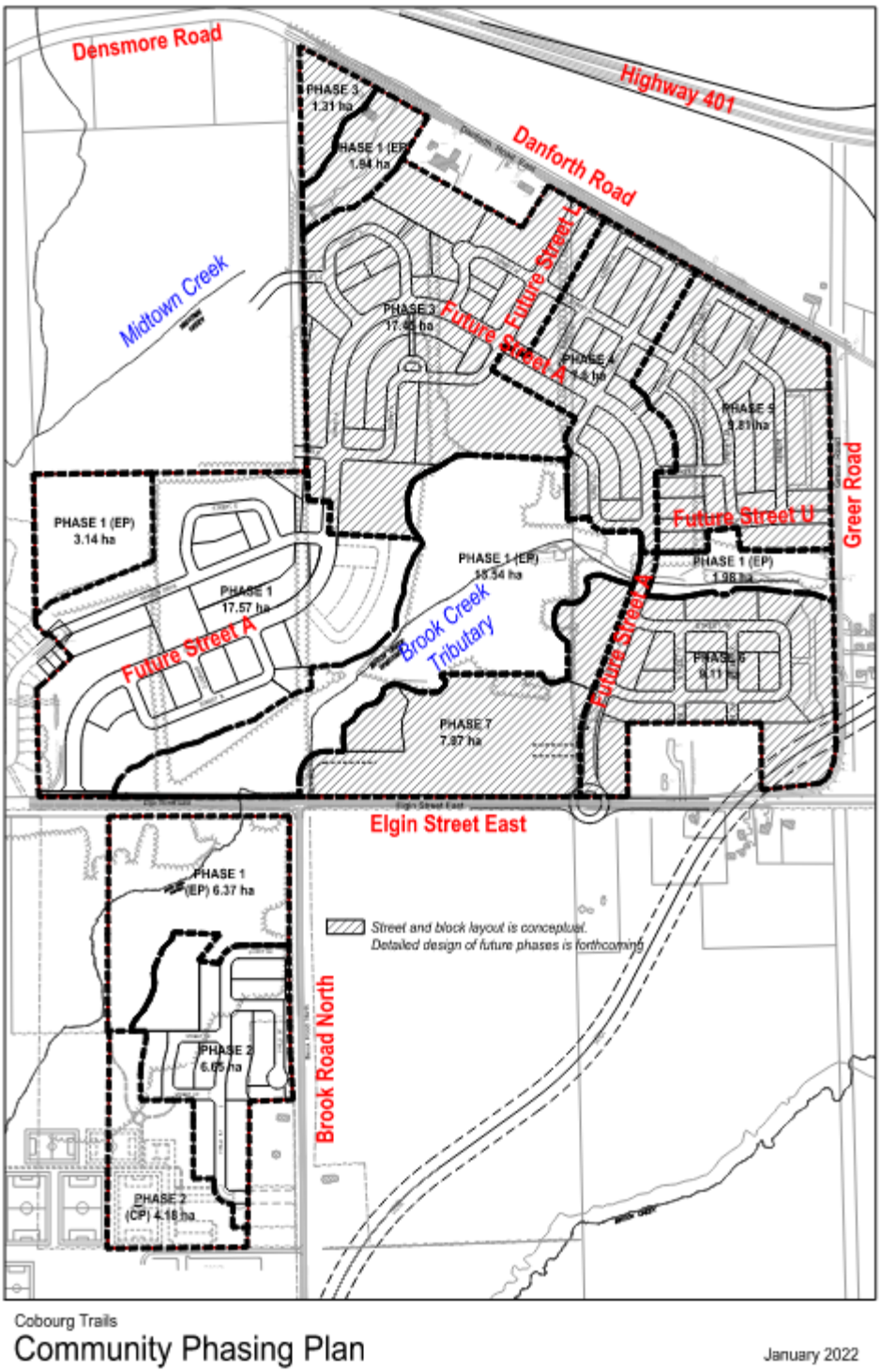
1.2.4 Cobourg Trails Community

As mentioned in **Section 1.2**, the Cobourg Trails community development lands owned by Tribute are located in the northwest portion of the Study Area, northeast of existing developed areas within the Town, and encompass approximately 21% of the land area in Cobourg East that may ultimately contribute to the proposed trunk sanitary sewer.

The site of the Cobourg Trails community is currently characterized by steep slopes and high elevations (due to its location within a drumlinized sand plain), major woodlots and agricultural fields. Tributaries of two (2) creeks in the Town of Cobourg pass through the development which are, the west tributary of Brook Creek through the center of the subject lands and a tributary of Midtown Creek through the northwestern portion of the subject lands.

Development of the Cobourg Trails community lands has been organized into seven (7) phases as illustrated in **Figure 1.5** and described below:

- Phase 1 is located east of Denton Drive and north of Elgin Street East. A part of Phase 1 exists south of Elgin Street East surrounding the Phase 2 lands; development is not planned for this area as a portion of it is environmentally protected and the remainder is committed to parkland.
- Phases 3 – 7 are located east of Phase 1, generally being north of Elgin Street East and east of the north projection of the Brook Road North right-of-way.
- Phase 2 is not contiguous with the other six (6) Phases and is located approximately 400 m south of Elgin Street East on the west side of Brook Road North.



Cobourg Trails

Community Phasing Plan

January 2022

Figure 1.5: Cobourg Trails Phasing Plan

The following Sections provide further detail on the current understanding of planned development within each of the proposed construction Phases.

1.2.4.1 Proposed Phase 1 Development

As proposed, development Phase 1 encompasses 44.50 Ha of the Cobourg Trails land area (inclusive of major woodlots and environmental protection lands within the overall development). Approximately 17.57 Ha of this land will be developed into a mix of single-family and semi-detached dwellings and townhomes; of 181 units planned for construction, 149 will be single-family homes and 32 will be townhouses. Using the Town's design criteria, it is estimated that at completion, the development in Phase 1 will have a population of approximately 570 people.

Phase 1 development is also planned to include an elementary school located to the east of the north projection of Brook Road North on a 2.63 Ha site, a 0.58 Ha Village Square located between Denton Drive and future Street A, a 1.33 Ha neighbourhood park, and a 1.10 Ha stormwater management facility block at the northeast corner of Elgin Street East and future Street A. Planned development within Phase 1 is illustrated on Biddle's Phase 1 General Servicing Plan included in **Appendix E**.

Phase 1 will be connected to the rest of Cobourg East through an extension of Denton Drive and a proposed intersection of future Street A with Elgin Street East between Conger Avenue and Brook Road North.

Future Street A is considered an internal collector ring road that will ultimately service all development Phases north of Elgin Street East (Phases 3 – 7) and connect to arterial collector roads that surround the neighbourhood either directly (Elgin Street East) or by side streets (Danforth Road East and Greer Road). Future Street A is planned to be designed with a 24.5m right-of-way that will allow for the inclusion of bicycle paths and sidewalk on both sides of the street. Other internal roads (future streets B, C and E) are proposed as crescents connecting to the above noted local roads.

Tribute's consultant, Biddle, is completing the detailed design of water, storm and sanitary infrastructure internal to the development as well as external connections to existing Town of Cobourg water, storm and sanitary (temporary) infrastructure to service Phase 1.

1.2.4.2 Proposed Phase 2 Development

As currently proposed, Phase 2 is located in the southern portion of the development lands to the west of Brook Road North centered approximately 400 m south of Elgin Street East. Phase 2 encompasses 17.13 Ha of the Cobourg Trails community, 5.30 Ha of which is planned for development.

At this time, it is expected that development in Phase 2 will be a mix of single detached homes and townhouses totaling 99 units spread over eleven (11) blocks. Assuming a

population per unit of 3.23 and 2.68 persons for single-family dwellings and townhouses respectively, Phase 2 is expected to house approximately 300 people.

In addition to the proposed residential development, Phase 2 will contain a 1.14 Ha stormwater management facility block at the northwest limit of the site. The southern portion of Phase 2 development is bound to the rear by land planned to be developed into an extension of outdoor recreational facilities belonging to the Cobourg Community Centre.

Proposed Street BB will connect Phase 2 to the existing road network at an intersection with Brook Road North at the north end of the site. Other internal roads (future streets CC and DD) are proposed as crescents connecting to future Street BB.

Planned development within Phase 2 is illustrated in the Draft Plan drawing prepared by The Planning Partnership and included in **Appendix F**.

1.2.4.3 Development Phases 3-7

For Phases 3 – 7 of the development, preliminary alignment of internal roads has been established however, the exact number and arrangement of residential units has not yet been confirmed. It is currently estimated that Phases 3 – 7 will generate a residential population of approximately 4,010 people and include residential units, village squares, stormwater management facilities, and a site set-aside for water treatment infrastructure. The detailed planning for Phase 3 is more advanced than other phases.

As per the Planning Justification and Urban Design Report prepared for the area by TPP in April 2018, Phase 7 will be developed into a mixed-use center providing residential, institutional and commercial uses to support the Cobourg Trails community. Phase 7 is strategically located to be within a reasonable walking distance of surrounding neighbourhoods developed through Phases 1 – 6 and adjacent the intersection of Brook Road North and Elgin Street East, which is considered to be the community's gateway.

It is currently estimated that the entirety of the Cobourg Trails development area will provide 1,604 – 1,926 units of combined residential and mixed-use development over the seven (7) phases. The exact number of units and number of people that the Cobourg Trails development will ultimately service is dependent on the unit mix that is decided on for each Phase. Tribute's development is following a Block Plan approach which allows for flexibility in determining the location and quantity of housing types which is intended to allow for appropriate response to changes in market demand, consumer preference and economic condition.

1.2.5 Cobourg East Community Secondary Plan Area

In May 2005, the Town of Cobourg published the Cobourg East Community Secondary Plan Area (Cobourg East) Community Framework Plan with the intent of establishing a basis for development in the Cobourg East Community. The Secondary Plan established policies that would act as a baseline for use when considering development applications for areas within Cobourg East, ultimately with the purpose of developing a diverse community in a way that would have the greatest positive impact on the quality of life in Cobourg. The proposed Cobourg Trails community is located entirely within the boundary of what is considered Cobourg East.

Policies developed under the Secondary Plan gave particular focus to ensuring a balanced mix of development types would exist within the Cobourg East area. The following table provides a breakdown of land use distribution set out for Cobourg East in the Secondary Plan.

Table 1.1: Cobourg East Secondary Plan Area Land Use Breakdown (2005)

LAND USE	HECTARES	PERCENTAGE OF TOTAL
Residential	241	42.2
Employment	96	16.81
Service Commercial	5	0.88
Mixed Use	4	0.7
Elementary Schools	18	3.15
High School	5	0.88
Places of Worship	5	0.88
Environmental Protection	159	27.85
Parkland	38	6.65
TOTAL:	571	100

Excerpted from Secondary Plan

In developing the land use breakdown, it was assumed that given the attractiveness of the area, Cobourg East would likely become increasingly more appealing in terms of a place to live as the Greater Toronto Area continued to expand.

As shown in **Table 1.1**, residential development was estimated to encompass approximately 42% of the Cobourg East area. The Secondary Plan specified a 65% low density / 35% medium density split of the residential area. Residential populations were estimated in the Secondary Plan for Cobourg East based on set unit densities and household sizes for low and medium density residential units as follows:

- Low Density - 20 – 25 units per hectare and 2.93 people per unit
- Medium Density - 40 units per hectare and 1.83 people per unit

As such, the Secondary Plan estimated the residential population of Cobourg East at full build-out to be approximately 16,500 people housed in approximately 6,500 dwellings. This number could be slightly inflated to a population in excess of 17,000 people if limited high density residential development occurred in some areas.

Additionally, policies within the Secondary Plan were developed with the understanding that the ability of Cobourg East to attract employment would be a key driver to success of the area as a whole. As shown in **Table 1.1** it was estimated that employment development in Cobourg East would encompass 96 Ha of land. At an estimated employment density of 37.5 employees per hectare, the Secondary Plan area could support a working population of approximately 3,600 employees.

The Secondary Plan excluded approximately 159 Ha of land in Cobourg East from development due to environmental constraints and/or the lands importance from a natural heritage perspective. Cobourg East contains an abundance of natural heritage features and a significant portion of environmentally protected land. The Secondary Plan aimed to establish a land use framework that would link natural heritage features and create an open-space system that would provide the greatest benefit to community residents.

1.3 Prior Planning

In addition to planning reports developed to set a framework for unit mix and density, road networks, parkland distribution, etc. for the Cobourg Trails community, Municipal servicing reports have been written to preliminarily establish infrastructure requirements for servicing Cobourg East and evaluate the feasibility of phasing the construction of infrastructure to achieve those requirements.

1.3.1 Cobourg East Community Municipal Servicing Summary Report, KMK Consultants Limited

In November 2004 KMK Consultants Limited (KMK), as part of a team hired by the Town of Cobourg to develop the Secondary Plan for the Cobourg East Community, was tasked with analyzing water, wastewater and stormwater servicing requirements for Cobourg East.

The report evaluated existing distribution and collection systems, Town of Cobourg design criteria, and estimated future demands to develop servicing alternatives that would provide sufficient capacities to service the Cobourg East area at full build-out.

The preferred water servicing strategy for treatment and distribution was to construct a new reservoir and pumping facility within Zone 3 that would provide pumped storage for

Zones 2 and 3 and address storage deficits in Zone 1, and construction of an elevated water tank to service Zone 3.

The preferred wastewater servicing strategy was to direct wastewater flows from the entirety of Cobourg East southeasterly toward Water Pollution Control Plant (WPCP) #2 in the Town of Cobourg with a connection to the existing sewer network south of the CN/CP rail corridor (or the southern limit of Cobourg East) at Wilmott Street and County Road 2 (King Street East).

1.3.2 Trunk Sanitary Sewer Servicing Alternatives Brief, D.G. Biddle & Associates Limited

In December 2020 Biddle was engaged by Tribute to further investigate alternatives for the conveyance of wastewater flows from Tribute's proposed development in the northern portion of Cobourg East to WPCP #2. As presented in **Section 1.3.1**, the direction of wastewater flows from the Cobourg East area toward WPCP #2 was identified as the preferred solution in KMK's Municipal Servicing Summary Report.

Common to all investigated alternative alignments in Biddle's report was the alignment of sewer north of the south end of Tribute's planned Phase 2 development, which included draining Phases 1, 3-7 through a common internal sub-trunk that would outlet the development lands at Elgin Street East, flow east by gravity to Brook Road North, and south on Brook Road North. Phase 2 would be drained by an internal sub-trunk tied into the trunk sewer at the south end of the development on Brook Road North.

Three (3) servicing alternatives were evaluated for trunk sanitary sewer south of Phase 2. Option 2 and 3, as presented in Biddle's Trunk Sanitary Sewer Servicing Alternatives Design Brief, are summarized below:

> *Option 2: Gravity sewer south from Phase 2 on Brook Road North, crossing under the CN/CP rail corridor in the Brook Road North right-of-way to King Street East, east by gravity on King Street East to Willmott Street and continued south on Willmott Street to the existing 1,200mm dia. trunk sanitary sewer on Thompson Street.*
>
> *Option 3: Gravity sewer south from Phase 2 on Brook Road North to a Brook Road North pumping station at the CN/CP rail corridor, pumped sewage under the CN/CP tracks to King Street East and along King Street East via forcemain to a point where gravity sewer was again feasible (approximately Willmott Street) and continued south on Willmott Street to the existing 1,200mm dia. trunk sanitary sewer on Thompson Street.*

The Town of Cobourg's preferred trunk sanitary sewer alternative was Option 1 which services the area using only gravity sewer (no pumping station is required).

> *Option 1: Gravity sewer south from Phase 2 on Brook Road North to the CN/CP tracks, east on the north side of the CN/CP tracks to the unopened Willmott Street right-of-way, tunneled under the rail tracks southerly within the Willmott Street right-of-way and continued south to the existing 1,200mm dia. trunk sanitary sewer on Thompson Street.*

The design prepared for external wastewater servicing of Cobourg East by CIMA and presented herein was developed following the Option 1 alignment and gravity sewer concept.

1.3.3 Cobourg Drinking Water System Master Plan, CIMA+

In July 2021 CIMA, on behalf of LUSI, concluded the Cobourg Drinking Water System Master Plan process and published a series of five (5) technical memoranda and one (1) supplemental technical memorandum evaluating the Town of Cobourg drinking water system (DWS) demands; current and future, and infrastructure; existing and required. While all conclusions and recommendations identified through the Master Plan process are important to the functionality of the Cobourg DWS long-term, the following conclusions/recommendations have affected the design for servicing of the Cobourg Trails development.

Technical Memorandum #2 & 3 – Treated Water Storage Requirements, identified major deficiencies and operational constraints in treated water storage and pumping infrastructure within the Cobourg DWS and identified upgrading requirements and a preliminary preferred solution to address long-term treated water pumping and storage needs for the Town of Cobourg. The preliminary preferred alternative for satisfying treated water pumping and storage requirements in the Town of Cobourg, and the alternative that LUSI has chosen to proceed with following public consultation completed as part of the Master Plan process, includes:

- A new Zone 1 Elevated Tank and co-located Zone 2 Booster Pumping Station to address treated water storage and pumping needs;
- New Zone 2 twin, at-grade tanks to accommodate future Zone 2 growth; and
- New Zone 3 Booster Pumping Station to service growth in Zone 3.

Technical Memorandum #2 & 3B – Evaluation of Potential Storage and Pumping Facility Site Locations, identified a preferred site for a combined Zone 1 Elevated Tank and Zone 2 Booster Pumping Station, determined in TM 2 & 3 to be the preferred alternative for satisfying short-term treated water pumping and storage needs. The preferred site

for a combined Zone 1 Elevated Tank and Zone 2 Booster Pumping Station is at the rear of Buildings 18 and 19 of the Northam Industrial Park on property owned by the Town of Cobourg, ± 560 m north of the existing rail corridor and ± 230 m east of D'Arcy Street. LUSI is currently in the process of moving forward with preliminary investigations and assessment processes to confirm the suitability of the site for construction.

Technical Memorandum #5 – Water Distribution System Assessment, provided a general description of the existing distribution system and identified system expansion requirements to support future growth. Conceptual alignments for future trunk and sub-trunk watermains in Cobourg East were identified through the Master Plan process. These alignments have been used as a basis for preliminary trunk watermain design included as part of this Functional Servicing Report (FSR).

1.3.4 Water Servicing Analysis for the Villages of Central Park Residential Subdivision, CIMA+

In January 2021, CIMA was retained by LUSI to complete an evaluation of required watermain distribution infrastructure for servicing Phase 1 of the Cobourg Trails (formerly Villages of Central Park) development. The report studied the current capacity of the Cobourg Drinking Water System, in terms of treatment, storage, and pumping, as well as the development's demands and provided conclusions with regard to pumping, storage and distribution infrastructure requirements.

The general servicing plan prepared by Biddle on behalf of Tribute for Phase 1 included for:

- Replacement of 200 mm dia. watermain on Elgin Street East between Conger Avenue and the most easterly access to the Northumberland Community Housing development with 400 mm dia. watermain, extended along Elgin Street East to just east of the proposed entrance to the site;
- 300 mm dia. sub-trunk watermain internal to the Phase 1 development; and
- 200 mm dia. watermain on local streets internal to the Phase 1 development.

The report concluded that while existing Zone 2 pumping capacity was sufficient to support proposed development Phase 1, additional Zone 2 pumping capacity would be required to support subsequent phases of development (2 – 7). The ability to support the earlier phases (i.e., Phase 2) in advance of the provision of additional Zone 2 pumping capacity can potentially be determined based on the following with consideration for the timeline of the new Zone 2 BPS entering service:

- LUSI's comfort in operating the Ewart Street BPS at levels exceeding 80% of capacity; and

- The progress of other developments in Zone 2 (in addition to Tribute's) and the actual resultant increase in Zone 2 water demand.

Additionally, the report concluded that regardless of Tribute's planned development there was already an existing treated water storage shortfall in the Town of Cobourg that LUSI must address. LUSI currently plans to address the shortfall with construction of a Zone 1 Elevated Tank and is in the process of moving forward with preliminary investigations and assessment processes to confirm the suitability of the preferred site for tank construction.

Biddle's proposed watermain network would provide system pressures within the acceptable range of pressures as specified by the MOE (MECP). The report recommended that properties near the south end of the Phase 1 development, in the area of future Street A and Elgin Street East, be considered as candidates for pressure reducing valves (PRVs) as nodes within the distribution network in the area measured pressures in excess of 80 psi (potentially damaging high pressure in occupied spaces).

2 Wastewater Servicing

2.1 Applicable Design Criteria and Standards

The following resources were used to progress the preferred wastewater servicing alternative from a conceptual design stage (as developed by Biddle and presented in **Section 1.3.2**) to a preliminary functional design stage:

- The latest revision of Town of Cobourg Design Guidelines, revised April 2015;
- The Town of Cobourg Official Plan, Schedule X1: Cobourg East Schedule Land Use Plan
- Engineering design standards for rail crossings as published by the Canadian National Railway (CN) and Canadian Pacific Railway (CP):
    - CN Sanitary Pipeline Crossing Application (September 2007) and accompanying guidelines
    - Canadian Pacific Utility Specification and Application Process (No Date)
    - Canadian Pacific Geotechnical Protocol for Pipeline and Utility Crossing(s) under Railway Tracks (February 25, 2020)
    - Canadian Pacific Railway (CPR) Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way in Canada (April 23, 2007)

- Design Guidelines for Sewage Works as published by the Ministry of the Environment (MOE), revised 2008.

2.2 Wastewater Flow Estimates

As defined by the selected preferred alternative for wastewater servicing of Cobourg East, the proposed trunk sanitary sewer is expected to drain wastewater by gravity from the entirety of the Cobourg East development area toward WPCP #2 at the east end of the Town of Cobourg. As such, the overall catchment area has been defined by a combination of three (3) features:

- The north, south, east, and west limits of the Cobourg East area as defined in **Section 1.2.5**;
- The natural topography of Cobourg East; and
- The limits and extents of Environmental Protection areas.

The total flow contributing to the external trunk sanitary sewer system can be generally described as a combination of the following:

1. Flow from future development land in Cobourg East
2. Flow from existing serviced areas in the southeastern portion of the Town

The following sections provide a summary of assumptions and estimates made to determine flows contributing to the system.

2.2.1 Cobourg East Community - Future Development Land

Based on the Town's latest Official Plan, Schedule X1: Land Use Plan Cobourg East Community, the area in hectares (Ha) associated with each land use type was determined for the purposes of calculating contributing wastewater flows. Areas for each land use type were determined by overlaying a GIS layer of the land use shown on Schedule X1 with the sub-catchments for the proposed trunk sanitary sewer. **Table 2.1** below provides a summary of the outputs.

It should be noted that land use within the Cobourg Trails community Phases 1, 3-7 are reflective of more detailed planning work for this area which has been integrated into sanitary sewer design calculations provided by Biddle as part of their ultimate sanitary sewer condition design sheet used to determine sizing of internal sewers servicing the development, which has been included in **Appendix E**. It is agreed that Biddle has an understanding of the proposed development internal to Cobourg Trails at a greater level of detail than what is provided in the Town's land use plan and therefore would have a more accurate estimate of land use types and population associated with the area.

Similarly, land use within the Mistral Land Developments Inc. property is reflective of planning work completed by Monument Geomatics for the area to a conceptual level.

Table 2.1: Cobourg East Land Use Breakdown Considered for Flow Estimates

Land Use Type	Land Area (Ha)
Residential and Institutional	289
Commercial	6
Employment (Industrial)	77
Environmental Protection	123

The outputs provided in the Table above were generated based on a defined overall wastewater catchment area which excludes 71 Ha of environmental protection lands within Cobourg East that are not contributing to the trunk/sub-trunk drainage area. The lands excluded from consideration are lands that will not be developed based on their proximity to the east Tributary of Brook Creek and location within areas designated Environmental Protection per the Town of Cobourg's Official Plan, Schedule X1.

2.2.1.1 Forecasted Wastewater Flow Criteria

Residential Flows

To estimate residential wastewater flows for external lands contributing to the proposed trunk sanitary sewer system from planned future development in Cobourg East the following parameters for unit density and unit mix were applied in accordance with Town of Cobourg Design Guidelines:

Table 2.2: Town of Cobourg Design Guidelines - Unit Density and Unit Mix

	Population Per Unit (PPU)	Units Per Hectare
Single-Family Dwelling (SFD) and Semi-Detached	3.23	20
Townhouse	2.68	50
Apartment (Medium Density)	1.62	100

A 65% / 35% mix of low density / medium density residential development in accordance with the range of housing specified in the Secondary Plan (as discussed in **Section 1.2.5**) was assumed for the purposes of evaluating future estimated flows. The 35% medium density portion of residential development is assumed to be comprised of 30% townhomes and 5% apartments based on the current understanding of residential development historically in the Town of Cobourg. As such, where areas have been designated Residential Use under the Town's Official Plan Schedule X1, the associated population per hectare is estimated to be 90.29 persons/hectare as shown in **Table 2.3** below.

Table 2.3: Residential Density

Residential Unit Mix		PPU	Units/Ha	Ppl/Ha
SFD	65%	3.23	20	41.99
Towns	30%	2.68	50	40.2
Apartments (Med. Density)	5%	1.62	100	8.1
			Total	**90.29**

Dry weather and wet weather flows associated with residential land use were assumed in accordance with Town of Cobourg Design Guidelines.

Table 2.4: Town of Cobourg Design Guidelines – Wastewater Flow Rates

Land Use Type	Flow
Residential	364 L/person/day
Infiltration	22.5 m^3/gross ha/day

At 364 L/person/day, the flow per hectare contributing to the trunk sanitary sewer system from residential developments is estimated to be 32.87 m^3/ha/day.

While it is recognized that unit densities/population densities for the Cobourg East area were set out in the Secondary Plan to estimate a population for the Town of Cobourg at full build-out (see **Section 1.2.5**), the unit densities from the Town of Cobourg Design Guidelines have been applied for the purposes of conservatively estimating wastewater flow rates herein. The application of these criteria yields a larger overall population for Cobourg East of 24,800 people compared to the 17,000 included in the Secondary Plan.

Peaking of average flows based on population estimates was accounted for using the Harmon peaking factor in accordance with Town of Cobourg Design Guidelines.

Non-Residential Flows

To estimate non-residential wastewater flows for external lands contributing to the proposed trunk sanitary sewer system from planned future development in Cobourg East, the following flow rates based on land use type were applied in accordance with the Town of Cobourg Design Guidelines:

Table 2.5: Town of Cobourg Design Guidelines – Non-Residential Wastewater Flow Rates

Land Use Type	Flow	Floor Space Index
Commercial	180 m^3/gross ha/day [1]	50%
Industrial (Trunk) [2]	180 m^3/gross ha/day [1]	100%

Notes:

1. As specified in the Town of Cobourg Design Guidelines, flow rates as listed in **Table 2.5** are inclusive of infiltration and peaking effect.
2. The Town's Design Guidelines provide for the reduction of industrial flow rates for the design of trunk sewers to 90m^3/gross ha/day at the Town's discretion. This approach has not been applied to the estimation of ultimate wastewater flows for the proposed trunk sewer based on preliminary discussions with the Town and concerns that the potential conversion of employment lands to residential uses could result in flow rates that would significantly exceed the reduced industrial flow rate.

Environmental Protection Area Flows

It was assumed, in accordance with Town of Cobourg Design Guidelines and as mentioned above, that all residential areas would contribute infiltration flow of 22.5 m^3/gross ha/day. Infiltration contributing to the trunk sanitary sewer system from environmental protection areas was considered as well. Consideration was given to the natural topography of environmental protection areas and where contours depicted surface flows in opposing directions to sub-trunk or trunk sewer systems, these areas were excluded from infiltration estimates. Alternatively, where current contour mapping showed a condition where surface drainage within environmental protection areas flowed towards sub-trunk or trunk sewers, an infiltration flow attributable to those areas was included. The infiltration flow contributing to the proposed trunk sewer from environmental areas was estimated assuming a flow rate of 22.5 m^3/gross ha/day (0.26 L/s/ha). **Figure 2.1** depicts the areas used to estimate environmental infiltration flows in the design sheet.

WPCP No. 1 Sewershed

WPCP No. 2 Sewershed

HAMILTON TOWNSHIP

HIGHWAY 401

A 33.6 | 13.57

D 12.11 | 12.11

C 19.21 | 19.21

G 1.54 | 1.54

F1 80.45 | 55.41

B 11.66 | 11.66

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

To Internal Sub-Trunk

To Internal Sub-Trunk

Future Natural Channel Restoration (Design By Others)

Connection to Trunk Sewer at Street A

F2 8.37 | 6.98

E 2.28 | 2.28

K 72 | 56.26

0.37 ha

3.02 ha

I 8.149 | 5.13

H 6.65 | 6.55

0.1 ha

3.3 ha

0.25 ha

11.81 ha

L1 66.44 | 50.13

1.64 ha

J 17.13 | 5.30

11.28 ha

N 18.93 | 16.97

2.51 ha

Future Kerr Street Extension (East)

Future Kerr Street Extension (West)

L2 16.06 | 16.06

M2 1.00 | 1.00

O 6.03 | 5.36

M1 24.21 | 24.21

18.97 ha

Q 60.54 | 40.51

0.26 ha

1.56 ha

P 21.13 | 20.37

Y 11.88 | 11.88

R 6.28 | 5.4

Proposed Trunk Sewer Replaces Existing 375mm Dia. Sewer Downstream of King Street

S 3.96 | 3.96

T 4.63 | 4.63

U 6.03 | 5.71

W 1.24 | 1.53

V 2.72 | 2.72

Z 3.93 | 3.93

X 35.15 | 35.15

AA 24.61 | 24.08

SA-0451 SA-0681 SA-0682 SA-0683 SA-1467 SA-0684 SA-0685

Water Pollution Control Plant 2

Brook Rd. South Pumping Station

81 L/s From Brook Road SPS (Peak Flow = 2x Pumps at 40.5 L/s)
246 L/s From McGill Street SPS (Peak Flow = 2x Pumps at 123 L/s)

LAKE ONTARIO

Densmore Road, Alder Road, Ashland Drive, Ivey Crescent, Parkview Hills Drive, Midtown Creek, Nicherson Drive, Conniger Court, Denton Drive, Burnet Drive, Alexandria Drive, Barracks Drive, Kent Street, McArthur Street, Cottesmore Avenue, Campbell Street, Major Street, Gravely Street, Rankin Boulevard, Eadie Crescent, Orchard Avenue, Rockingham Court, Acadia Drive, Lakeview Court, Abbott Boulevard, Coronation Crescent, Bayview Crescent, Brook Road South, Lakeshore Drive, St. Lawrence Place, Gardiner Crescent, Springbrook Road, Coverdale Avenue, Foote Crescent, Parkwood Drive, Hawthorne Avenue, Meredith Crescent, Thomas Street, Lonsberry Drive, Meredith Avenue, Jane Street, Stirling Way, Rollings Street, Morgan Street, Bennett Avenue, Drewery Road, Hayward Street, Canadian National Railway, Canadian Pacific Railway, Former Canadian Northern Railway, Massey Creek, Brook Creek West Tributary, Brook Creek East Tributary, Danforth Road, Elgin Street East, Green Road, Nagle Road, Jarvis Road, Stanton Road North, Stanton Road South, Workman's Road, Normar Road, Ash Drive, King Street East, Thompson Street, Dodge Street, Delanty Road, Wilson Road, Willmott Street, Terrace, Ruttan, Maplewood Boulevard, Carroll Crescent, East House Crescent, Cooper Court, Weller Court, Chestnut Place, Hamilton Court, Hamilton Avenue, Lakeshore Road, Brook Road North, Elgin Street, Future Natural Channel Restoration (Design By Others), Connection to Trunk Sewer at Street A, Future Kerr Street Extension (East), Future Kerr Street Extension (West), UNIVERSITY AVENUE EAST, KING STREET EAST, ELGIN STREET EAST, BROOK ROAD NORTH, HAMILTON TOWNSHIP

LEGEND

PROPOSED SANITARY INFRASTRUCTURE

- MAINT. HOLE (TRUNK SEWER)
- TRUNK SEWER

FUTURE SUB-TRUNK SANITARY SEWER INFRASTRUCTURE

- MAINT. HOLE
- SUB-TRUNK SEWER

EXISTING WASTEWATER INFRASTRUCTURE

- MAINT. HOLE
- WATER POLLUTION CONTROL PLANT
- PUMPING STATION

SEWER

- 150 MM AND LESS
- 200 MM - 250 MM
- 300 MM - 400 MM
- 450 MM - 600 MM
- 675 MM - 750 MM
- 900 MM AND GREATER
- FORCEMAIN

SANITARY CATCHMENT AREA

- ENVIRONMENTAL PROTECTION AREAS CONTRIBUTING WET WEATHER FLOW
- GRAVITY TO PROPOSED TRUNK SEWER
- PUMPED TO PROPOSED TRUNK SEWER
- EXISTING SERVICE AREA CATCHMENT
- A (CATCHMENT ID) / 33.6 | 13.6 (FUTURE DEVELOPED AREA (HA) / GROSS AREA (HA))

LAND USE

- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL AREA
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN AREA

OTHER FEATURES

- CONTOUR (2M INTERVAL)
- WPCP CATCHMENT AREA BOUNDARY
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters — 1:6,000

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **FUTURE COBOURG EAST SANITARY SEWER SERVICING SCHEME - ENVIRONMENTAL PROTECTION AREAS CONTRIBUTING WET WEATHER FLOW**

PROJECT No: C14-0454		CLIENT FILE No: ---	
DRAFTER: S. ELLIOTT	DESIGNER: ---	FIGURE No:	2.1
APPROVER: D. CAMPBELL	APPROVER: ---		
DATE: 1/26/2022		SHEET No:	1 of 1

2.2.2 Sub-Catchments and Forecasted Wastewater Flows

The overall catchment area is broken into sub-catchments based on the natural topography (as understood by available contour mapping at 2 m intervals derived from the Northumberland Digital Elevation Model (NDEM)) and land use for future development in Cobourg East. It is anticipated that these sub-catchments will drain via future sub-trunk sewers toward the proposed trunk sanitary sewer. The conceptual alignment of sub-trunk sewers within the sub-catchments have been established based on the natural topography of the areas and more specifically aligned through the low points of the areas. Additionally, when establishing a conceptual alignment for sub-trunk sewers some consideration was given to future road alignments as represented in the Town of Cobourg Official Plan, Schedule X1.

Sub-catchments are as shown in **Figure 2.2**. Catchment IDs used to label the land area contributing to each sub-trunk in **Figure 2.2** are listed in **Table 2.6** with the corresponding sub-catchment details. **Table 2.6** provides a summary of the gross area (Ha) contributing to the trunk sanitary sewer through each sub-catchment. **Figure 2.2** shows the overall sanitary drainage area and sub-catchments for the proposed trunk sewer.

Detailed evaluation of the sub-catchment sewer networks in terms of their exact pipe size, alignment, and profiles (i.e., beyond confirming from available contour mapping and Town of Cobourg design criteria that the trunk sanitary sewer is set at a depth suitable to service the sub-catchment) is beyond the scope of this external servicing assignment. Further discussion of the conceptual sub-trunk sewers for sub-catchments not connecting directly to the proposed trunk sewer is provided in **Section 2.6**.

WPCP No. 1 Sewershed

WPCP No. 2 Sewershed

HAMILTON TOWNSHIP

HIGHWAY 401

A 33.6 | 13.57

D 12.11 | 12.11

C 19.21 | 19.21

G 1.54 | 1.54

F1 80.45 | 55.41

B 11.66 | 11.66

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

To Internal Sub-Trunk

To Internal Sub-Trunk

Future Natural Channel Restoration (Design By Others)

Connection to Trunk Sewer at Street A

F2 8.37 | 6.98

E 2.28 | 2.28

K 72 | 56.26

I 8.149 | 5.13

H 6.65 | 6.55

J 17.13 | 5.30

L1 66.44 | 50.19

N 18.93 | 16.97

L2 16.06 | 16.06

O 6.03 | 5.36

M2 1.00 | 1.00

M1 24.21 | 24.21

Q 60.54 | 40.51

P 21.13 | 20.37

Y 11.88 | 11.88

R 6.28 | 5.4

S 3.96 | 3.96

T 4.63 | 4.63

U 6.03 | 5.71

W 1.24 | 1.53

V 2.72 | 2.72

Z 3.93 | 3.93

X 35.15 | 35.15

AA 24.61 | 24.08

Proposed Trunk Sewer Replaces Existing 375mm Dia. Sewer Downstream of King Street

Water Pollution Control Plant 2

Brook Rd. South Pumping Station

81 L/s From Brook Road SPS (Peak Flow = 2x Pumps at 40.5 L/s)
246 L/s From McGill Street SPS (Peak Flow = 2x Pumps at 123 L/s)

SA-0682 SA-1467 SA-0685 SA-0451 SA-0681 SA-0683 SA-0684

Future Kerr Street Extension (East)

Future Kerr Street Extension (West)

ELGIN STREET EAST

KING STREET EAST

UNIVERSITY AVENUE EAST

BROOK ROAD NORTH

HAMILTON TOWNSHIP

LAKE ONTARIO

Midtown Creek

Brook Creek West Tributary

Brook Creek East Tributary

Massey Creek

Former Canadian Northern Railway

Canadian National Railway

Canadian Pacific Railway

Densmore Road, Alder Road, Ashland Drive, Ivey Crescent, Parkview Hills Drive, Nickerson Drive, Conniger Avenue, Conniger Court, Denton Drive, Burnet Drive, Alexandria Drive, Barracks Drive, Danforth Road, Nagle Road, Green Road, Jarvis Road, Stanton Road North, Elgin Street East, Kent Street, McArthur Street, Cottesmore Avenue, Campbell Street, Major Street, Gravely Street, Meredith Crescent, Thomas Street, Lonsberry Drive, Drewery Road, Hayward Street, Jane Street, Stirling Way, Rollings Street, Morgan Street, Bennett Avenue, Meredith Avenue, Rankin Boulevard, Eadie Crescent, Orchard Avenue, Rockingham Court, Acadia Drive, Lakeview Court, Abbott Boulevard, Coronation Crescent, Hamilton Avenue, Foote Crescent, Coverdale Avenue, Springbrook Road, Parkwood Drive, Hawthornie Avenue, Maplewood Boulevard, Ruttan Terrace, Wilson Road, Willmott Street, Carroll Crescent, Delanty Road, Chestnut Place, Dodge Street, Normar Road, Workman's Road, Ash Drive, Thompson Street, King Street East, Cooper Court, Hamilton Court, Weller Court, East House Crescent, Bayview Crescent, Brook Road South, St. Lawrence Place, Gardiner Crescent, Lakeshore Drive, Lakeshore Road

LEGEND

PROPOSED SANITARY INFRASTRUCTURE

- MAINT. HOLE (TRUNK SEWER)
- TRUNK SEWER

FUTURE SUB-TRUNK SANITARY SEWER INFRASTRUCTURE

- MAINT. HOLE
- SUB-TRUNK SEWER

EXISTING WASTEWATER INFRASTRUCTURE

- MAINT. HOLE
- WATER POLLUTION CONTROL PLANT
- PUMPING STATION

SEWER

- 150 MM AND LESS
- 200 MM - 250 MM
- 300 MM - 400 MM
- 450 MM - 600 MM
- 675 MM - 750 MM
- 900 MM AND GREATER
- FORCEMAIN

SANITARY CATCHMENT AREA

- GRAVITY TO PROPOSED TRUNK SEWER
- PUMPED TO PROPOSED TRUNK SEWER
- EXISTING SERVICE AREA CATCHMENT
- A (CATCHMENT ID); 33.6 | 13.6 (FUTURE DEVELOPED AREA (HA) | GROSS AREA (HA))

LAND USE

- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL AREA
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN AREA

OTHER FEATURES

- CONTOUR (2M INTERVAL)
- WPCP CATCHMENT AREA BOUNDARY
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters — 1:6,000

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **FUTURE COBOURG EAST SANITARY SEWER SERVICING SCHEME**

PROJECT No: C14-0454		CLIENT FILE No: ---	
DRAFTER: S. ELLIOTT	DESIGNER: ---	FIGURE No:	2.2
APPROVER: D. CAMPBELL	APPROVER: ---		
DATE: 1/26/2022		SHEET No:	1 of 1

Table 2.6: Summary of Sub-Catchments and Associated Land Use Areas

ID	Description	Gross Area (Ha)	Residential Area (Ha)	Non-Residential Area (Ha)	Environmental Protection Area / Greenspace (Ha)
A	Midtown Creek SPS Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	33.60	4.66	8.91	20.03
B	East External Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	11.66	11.66	0	0
C	Northeast External Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	19.21	0	19.21	0
D	North External Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	12.11	2.52	9.59	0
E	South External Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	2.28	2.27	0.01	0
G	West External Through Cobourg Trails Ph 1, 3-7 Sub-Trunk	1.54	1.54	0	0
F1	Cobourg Trails Internal Sub-Trunk (Ph 1, 3-6)	80.45	52.78	3.58	24.09
F2	Cobourg Trails Phase 7 Sub-Trunk	8.37	6.98	0	1.39
H	Brook Road East Side Direct to Trunk	6.65	6.55	0	0.10
I	Elgin Street Sub-Trunk	8.15	5.13	0	3.02
J	Cobourg Trails Phase 2 Direct to Trunk	17.13	5.30	0	11.83

ID	Description	Gross Area (Ha)	Residential Area (Ha)	Non-Residential Area (Ha)	Environmental Protection Area / Greenspace (Ha)
K	Brook Creek East Tributary North Sub-Trunk	72.00	47.60	8.66	15.74
L1	Brook Creek East Tributary South Sub-Trunk	66.44	50.19	0	22.02
L2	East Village North – Northern Portion	16.06	16.06	0	0
M1	East Village North – Southern Portion	24.86	19.71	5.15	0
M2	Allowance for Potential Non-Residential Flows from Sub-Catchment M1 / M2	1	0	1	0
O	Future Kerr Street Sub-Trunk	6.03	0.04	5.33	0.67
N	Brook Road West Side Sub-Trunk	18.92	0	16.97	1.96
P	Railway Sub-Trunk	21.13	9.78	10.59	0.76
Q	Massey Creek Sub-Trunk	60.54	38.88	1.63	20.03

The majority of sub-catchments as listed in the table above contribute to the proposed trunk sewer via a single future sub-trunk connection that services the internal sub-catchment lands and ties into the trunk sewer at a point throughout its length. There are however five (5) sub-catchments that are expected to be serviced by the Cobourg Trails Ph 1, 3-6 internal sanitary sewer network prior to joining with the proposed external trunk sewer. Based on the topography in the northern portion of Cobourg East, it is expected that the following sub-catchment areas will ultimately convey flows to the trunk sanitary sewer at the upper-end of the system via the internal Phase 1, 3 – 6 sub-trunk sanitary sewer:

- Midtown Creek SPS – A
- East External Through Tribute – B
- Northeast External Through Tribute – C
- North External Through Tribute – D

- South External Through Tribute – E
- West External Through Tribute - G

Biddle has been engaged by Tribute to complete the design of internal servicing for all phases of Cobourg Trails. Biddle has therefore evaluated with a greater level of certainty the land use within Cobourg Trails Ph 1, 3-7 (F) and the area's contributing wastewater flows as well as external areas that contribute to the proposed trunk sanitary sewer through the Cobourg Trails development (sub-catchments A, B, C, D, E, G). As such, with agreeance that Biddle has an understanding of the proposed development internal to Cobourg Trails at a greater level of detail than what is provided in the Town's land use plan, the residential and non-residential area included in **Table 2.6** for Cobourg Trails Phase 1, 3-7 is based on the ultimate sanitary condition design sheet completed by Biddle for sizing of the Phase 1, 3-6 internal sub-trunk sewers. Similarly, land use within the Mistral Land Developments Inc. property is reflective of planning work completed by Monument Geomatics for the area to a conceptual level. The remainder of sub-catchment land use areas are generated based on Schedule X1 of the Town of Cobourg's Official Plan as they remain in a planning stage.

2.2.3 **Existing Service Area**

South of the CN/CP rail corridor, existing industrial developments east of Willmott Street are serviced by a 375 mm dia. sanitary sewer flowing south on Willmott Street between King Street East and Thompson Street. At Thompson Street, the 375 mm dia. sewer connects to a 1,200 mm dia. trunk sanitary sewer flowing easterly along Thompson Street to outlet to WCPC #2. The existing trunk sewer on Thompson Street also conveys flows from existing residential developments west of Willmott Street and pumped wastewater flows from the Town's McGill Street Sewage Pumping Station (SPS) and Brook Road SPS via forcemains that discharge to the upstream end of the existing trunk at Hamilton Court.

It is proposed that the external trunk sanitary sewer will ultimately replace the existing 375 mm dia. sanitary sewer on Willmott Street. Based on CIMA's understanding of existing municipal infrastructure and private utilities within the Willmott Street right-of-way, as well as existing residential development lining the west side of the street, the east side of the right-of-way is considered the preferred location for the trunk sanitary sewer alignment. Trench widths to facilitate the construction of a relatively deep, 825 mm dia. trunk sanitary sewer on the west side of the right-of-way would potentially impact existing developments and private utility infrastructure. The existing 375 mm dia. sewer on Willmott Street is within the preferred trunk sewer alignment and therefore, will

be replaced. This will also limit the overall quantity of sewer ultimately owned and maintained by the Town.

Given the above, flows from existing industrial properties and future infill of developable land east of Willmott Street were considered in evaluating the capacity of the proposed trunk sanitary sewer. To estimate flows, flow rates were applied as specified in the Town of Cobourg Design Guidelines to both the developed and undeveloped areas within the catchment area.

Capacity of the existing 1,200 mm dia. trunk sewer on Thompson Street was also evaluated to confirm that the existing sewer was of sufficient size to capture and convey flows from the full build-out of Cobourg East.

Engage Engineering Ltd. (Engage) evaluated the capacity of the Thompson Street trunk sanitary sewer in 2019 through a FSR written for JMCD Holdings Inc. (now referred to as Mistral Land Developments Inc.) to support their planned development of East Village Phase 5 located at the northwest corner of Willmott Street and King Street East. The same residential population estimates used by Engage in 2019 to estimate flows for residential development west of Willmott Street have been considered in this report.

Flows contributing to the Thompson Street trunk sanitary sewer from the McGill Street SPS and Brook Road SPS were taken as the firm rated capacity of the pumping stations. Based on a Sanitary Sewer System and Plant Capacity Utilization Study prepared by Totten Sims Hubicki Associates for the Town of Cobourg, McGill Street SPS operates with three (3) Smart Turner Hayward Model 6JVS non-clog sewage pumps each rated at 123 L/s at a TDH of 31 meters and the Brook Road SPS operates with three (3) Smart Turner Model 6WJFS non-clog sewage pumps each rated at 40.5 L/s at a TDH of 12.8 meters. The firm rated capacities of the Mill Street SPS and Brook Road SPS are 246 L/s and 81 L/s, respectively.

2.3 Sewer Sizing

In determining sewer sizing for the proposed external trunk sewer, a maximum 80% capacity utilization of the sewer's full flow capacity has been targeted in accordance with commonly accepted industry standards set to accommodate gas emissions and provide air space in the pipe.

Additionally, consideration was given to maintaining actual and design velocities in the range of 0.6 m/s and 3.0 m/s as set by the Town of Cobourg Design Guidelines.

Appendix D provides sanitary sewer design sheets with detailed design calculations for the proposed trunk sewer.

2.4 Alignment and Profile Design

Preliminary alignment and profile of the proposed trunk sanitary sewer for external servicing of Cobourg East was established based on Town of Cobourg Design Guidelines and criteria as summarized in the *Summary of Design Criteria Used for External Servicing Design* table included in **Appendix C**.

The proposed trunk sanitary sewer is approximately 3,940 m in length with pipe diameters ranging from 525 mm to 825 mm, drained by gravity. The trunk sewer preliminary alignment can be found in **Figure 2.3** below. The scope of work is summarized in the Table below.

Table 2.7: Scope of Work for Proposed Trunk Sanitary Sewer

Street Name	Design Elements
Elgin Street East From: Cobourg Trails Phase 1 To: Brook Road North	525 mm Dia. 3.0 m – 5.5 m Depth 61% - 63% Capacity Used 1.32 – 1.35 m/s
Brook Road North From: Elgin Street East To: Cobourg Trails Phase 2	600 mm Dia. 5.6 m – 8.1 m Depth 62% - 63% Capacity Used 1.24 – 1.25 m/s
Cobourg Trails Phase 2 Area	600 mm Dia. 3.6 m – 8.4 m Depth 62% - 66% Capacity Used 1.23 – 1.27 m/s
Brook Road North From: Cobourg Trails Phase 2 To: Brook Creek East Tributary Crossing	600/675 mm Dia. 5.6 m – 8.2 m Depth 63% - 65% Capacity Used 1.25 – 1.35 m/s

Street Name	Design Elements
Brook Creek East Tributary Crossing	900 mm Dia. 6.2 m – 7.0 m Depth 33% Capacity Used 1.36 m/s
Brook Road North From: Brook Creek East Tributary Crossing To: Mistral Land Developments Inc.	750 mm Dia. 7.7 m – 9.8 m Depth 51% - 74% Capacity Used 1.48 – 1.85 m/s
Mistral Land Developments Inc. From: Brook Road North To: CN/CP Rail Corridor Crossing	750 mm Dia. 7.8 m – 10.6 m Depth* 73% Capacity Used 1.51 m/s
CN/CP Rail Corridor Crossing	900 mm Dia. 6.9 m – 7.8 m Depth 53% Capacity Used 1.58 m/s
Unopened Willmott Street Right-of-Way From: CN/CP Rail Corridor To: King Street East	825 mm Dia. 4.1 m – 5.7 m Depth 67% – 68% Capacity Used 1.56 -1.57 m/s
Willmott Street From: King Street East To: Thompson Street	825 mm Dia. 3.4 m – 4.8 m Depth 41% - 77% Capacity Used 1.55 -2.44 m/s

*Depths provided for trunk sewer segments within Mistral Land Developments Inc. East Village North are based on latest grading plans provided. Further discussion related to these depths and the potential to reduce them is provided in **Section 2.5.6.4**.

WPCP No. 1 Sewershed

WPCP No. 2 Sewershed

HAMILTON TOWNSHIP

HIGHWAY 401

Densmore Road

Ashland Drive

Alder Road

Ivey Crescent

Parkview Hills Drive

Midtown Creek

Nicklerson Drive

Conger Court

Conger Avenue

Denton Drive

Phase 1

Phase 2

Phase 3

Phase 4

Phase 5

Phase 6

Phase 7

Danforth Road

Nagle Road

To Internal Sub-Trunk

To Internal Sub-Trunk

Brook Creek West Tributary

Greer Road

Jarvis Road

Future Natural Channel Restoration (Design By Others)

Connection to Trunk Sewer at Street A

ELGIN STREET EAST

Elgin Street East

Burnet Drive

Alexandria Drive

Barracks Drive

BROOK ROAD NORTH

Brook Creek East Tributary

Stanton Road North

HAMILTON TOWNSHIP

Future Kerr Street Extension (East)

Future Kerr Street Extension (West)

Kent Street

McArthur Street

Cottesmore Avenue

Campbell Street

Major Street

UNIVERSITY AVENUE EAST

Gravely Street

Meredith Crescent

Thomas Street

Lonsberry Drive

Drewery Road

Canadian National Railway

Canadian Pacific Railway

Former Canadian Northern Railway

Meredith Avenue

Jane Street

Stirling Way

Rollings Street

Morgan Street

Bennett Avenue

Hayward Street

Rankin Boulevard

KING STREET EAST

Massey Creek

Workman's Road

Ash Drive

King Street East

Eadie Crescent

Orchard Avenue

Rockingham Court

Acadia Drive

Lakeview Court

Abbott Boulevard

Coronation Crescent

Foote Crescent

Hamilton Avenue

Hawthorne Avenue

Maplewood Boulevard

Coverdale Avenue

Parkwood Drive

Springbrook Road

Chestnut Place

Ruttan Terrace

Wilson Road

Willmott Street

Carroll Crescent

Delanty Road

Dodge Street

Normar Road

Bayview Crescent

Brook Road South

Lakeshore Drive

St. Lawrence Place

Gardiner Crescent

Lakeshore Road

Hamilton Court

Cooper Court

Weller Court

East House Crescent

Thompson Street

Willmott Street

LAKE ONTARIO

Brook Rd. South Pumping Station

Water Pollution Control Plant 2

LEGEND

PROPOSED SANITARY INFRASTRUCTURE

- MAINT. HOLE (TRUNK SEWER)
- TRUNK SEWER

FUTURE SUB-TRUNK SANITARY SEWER INFRASTRUCTURE

- MAINT. HOLE
- SUB-TRUNK SEWER

EXISTING WASTEWATER INFRASTRUCTURE

- MAINT. HOLE
- WATER POLLUTION CONTROL PLANT
- PUMPING STATION

SEWER

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- 200 MM - 250 MM
- 300 MM - 400 MM
- 450 MM - 600 MM
- 675 MM - 750 MM
- 900 MM AND GREATER
- FORCEMAIN

LAND USE

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- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL AREA
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN AREA

OTHER FEATURES

- WPCP CATCHMENT AREA BOUNDARY
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters — 1:6,000

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **SANITARY EXTERNAL SERVICING PLAN**

PROJECT No: C14-0454		CLIENT FILE No: ---
DRAFTER: S. ELLIOTT	DESIGNER: ---	FIGURE No: 2.3
APPROVER: D. CAMPBELL	APPROVER: ---	
DATE: 1/26/2022		SHEET No: 1 of 1

The trunk sanitary sewer profile was mainly set by four (4) constraints within the study area:

1. Brook Creek East tributary crossing on Elgin Street East
2. Brook Creek West tributary crossing on Brook Road North
3. CN/CP rail corridor crossing within the unopened Willmott Street right-of-way
4. Depth of sub-trunk sanitary sewers servicing external development, particularly the Brook Creek North and South sub-trunks.

As the Town does not have specific design criteria set out for the depth of trunk sanitary sewers at stream/creek crossings, minimum depth requirements as set out by the MOE and listed below were used to set the trunk sanitary sewer profile crossing the Brook Creek West Tributary on Elgin Street East and the Brook Creek East Tributary on Brook Road North:

- 0.3 m (1 ft) depth of cover, where the sewer is located in rock
- 0.9 m (3 ft) depth of cover, where the sewer is not located in rock

Where the proposed trunk sanitary sewer is required to cross under the existing CN/CP rail corridor, design standards and criteria as set out by the rail companies was used to establish an acceptable alignment and profile. These standards have been summarized in the *Summary of Design Criteria Used for External Servicing Design* table included in **Appendix C**.

The depth of trunk sanitary sewer was also set throughout its length with regard for its ability to capture and convey wastewater flows from other undeveloped sub-catchment areas within Cobourg East in the fullness of time. An evaluation of potential sub-trunk invert elevations at approximate tie-in locations was completed to confirm that a gravity sewer network would be achievable with the set trunk sewer profile. Further discussion with respect to the alignment of sub-trunk sewers set through external sub-catchments is provided in **Section 2.2.2**.

2.5 Preliminary Design

2.5.1 Elgin Street East – Cobourg Trails Phase 1 to Brook Road North

2.5.1.1 Design Flows

The proposed trunk sanitary sewer begins at the southwestern limit of Tribute's planned Cobourg Trails Phase 1, 3-7 development area where future Street A, as currently proposed by Tribute, intersects Elgin Street East. At this intersection, sanitary Maintenance Hole (MH) SA-18 (Biddle's design) initiates the external trunk sewer

system collecting sanitary flows from Cobourg Trails Phase 1, 3-6 and external catchments A, B, C, D, E, and G drained through the Cobourg Trails development property (as discussed in **Section 2.2.2**).

A combined design flow (Q) of 171.36 L/s enters the first trunk sewer segment at MH SA-18. This flow rate is equivalent to the sum of design flows for sub-catchment areas A through F and is as determined by Biddle through their design of internal servicing for the Cobourg Trails Phase 1, 3-6 development.

2.5.1.2 Sewer Alignment

It is currently understood that the size of sub-trunk sanitary sewer that will exit the Cobourg Trails development through Phase 1 at future Street A and tie into the proposed trunk sanitary sewer at MH SA-18 is 450 mm diameter, as designed by Biddle. From MH SA-18, the proposed 525 mm diameter (dia.) trunk sanitary sewer runs easterly along Elgin Street East toward Brook Road North. Based on the design flows noted above, capacity in the 525 mm dia. sewer ranges between 61% and 63%.

In this segment, it is anticipated that the proposed trunk sanitary sewer will be aligned on the north side of Elgin Street East located in the middle of the westbound lane of the existing two-lane rural road. A proposed trunk watermain continuing east along Elgin Street East from Cobourg Trails would be located in the north shoulder (See **Section 3.6.2**). The location of the proposed trunk sewer within the cross-section will be further refined as information about existing utilities is confirmed, with the sewer alignment potentially shifted to avoid utility conflicts.

The Brook Creek West Tributary crosses Elgin Street East via an existing 1.0 m diameter CSP culvert approximately 1,275 m east of MH SA-18. East of the creek crossing the proposed trunk sanitary sewer continues to flow toward Brook Road North.

2.5.1.3 Brook Creek West Tributary Crossing

At the Brook Creek West Tributary crossing, the proposed trunk sewer is at a depth of approximately 3 m.

The existing culvert is shallow with the invert ±1.5 m below the road and less than 1.0 m of cover above the culvert. Through field inspection completed by Biddle/CIMA/Cambium, the existing culvert was found to be in poor condition and conveying limited flow under normal and moderately wet weather conditions.

Additionally, as part of the overall Cobourg Trails development, Tribute is currently working with Geo Morphix Ltd. on channel naturalization for the Brook Creek West Tributary through Tribute's lands north of Elgin Street East. Details from the channel naturalization plan can be found in **Appendix G**.

Based on the factors summarized above, an open-cut crossing of the Brook Creek West Tributary on Elgin Street East is considered to be the most appropriate approach for installing the proposed trunk sanitary sewer at this location. To implement an open-cut installation the following approach (as illustrated in **Figure 2.4**) is recommended:

- Install trunk sanitary sewer and watermain to a location just west of the existing culvert.
- Install a new culvert approximately 15 m west of the existing culvert above the trunk sanitary sewer and watermain.
- Extend the proposed natural channel works approximately 15m west to connect to the new culvert location.
- Reconfigure the watercourse at the new culvert outlet to integrate with the wetland area south of Elgin Street East.
- Divert flows to the new natural channel and culvert.
- Remove the existing culvert and continue trunk sanitary sewer and watermain easterly towards Brook Road North.

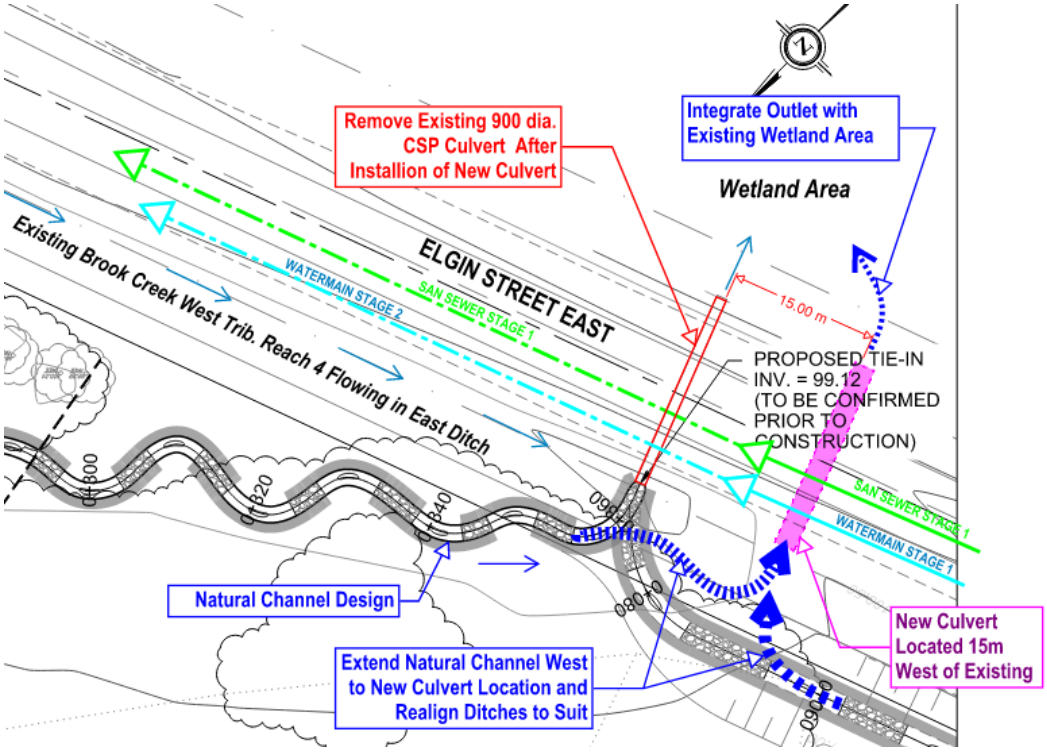


Figure 2.4: Elgin Street East Culvert Replacement Concept

It is recommended that watermain be installed in conjunction with open-cut installation of the proposed trunk sewer to minimize the effort of managing creek flows with bypassing during construction.

Before proceeding with the alternative as presented above, Fisheries and Oceans Canada (DFO) shall be engaged for Review and Notification of the planned works.

2.5.2 Brook Road North – Elgin Street East to Cobourg Trails Phase 2

2.5.2.1 Design Flows

At MH SA-E5 Elgin Street East intersects Brook Road North and the proposed trunk sanitary sewer turns to flow south (along Brook Road North). At the intersection the 171.36 L/s design flow (Q) that exits the Cobourg Trails development at future Street A combines with wastewater flows from the future Elgin Street Sub-Trunk (I), the future Cobourg Trails Phase 7 Sub-trunk and the future Brook Road East Side Direct to Trunk (H) sub-catchments. These flows are considered to join the proposed trunk sewer at MH SA-E5.

As listed in **Table 2.6**, the Elgin Street Sub-Trunk sub-catchment area consists of 5.13 Ha residential and 3.02 Ha environmental protection land. The Brook Road East Side Direct to Trunk sub-catchment consists of 6.55 Ha of residential land and 0.1 Ha of environmental protection land. These sub-catchments will contribute an additional 15.75 L/s of peak wastewater flow to the trunk system.

As discussed in **Section 1.2.4.3**, it is currently understood that Cobourg Trails development Phase 7 will ultimately become a mixed-use area that will include both residential development (most likely senior's housing) and commercial space. The exact nature and extent of commercial development within Phase 7 is currently unknown.

Prior planning by Tribute and its predecessors has estimated the number of residential, apartment type units in Phase 7 to be 600. Given that the residential units are expected to be apartment-type, it is likely that the average unit density would be in the range of two (2) people per unit. A population per unit (PPU) of 3.23 (unit density for single-family dwellings per TOC Design Guidelines) was used to conservatively estimate design flows from the development lands. Using a higher PPU of 3.23 would account for flows from the residential developments and provide for some estimate of flow that may ultimately be attributable to commercial space provided in the same area. The Cobourg Trails Phase 7 sub-catchment will contribute an additional 24.35 L/s of peak wastewater flow to the trunk system.

The combined additional peak wastewater flow discharged to MH SA-E5 will increase the sewer size required in the section downstream of Elgin Street East to 600 mm

diameter. Capacity in the 600 mm dia. sewers between Elgin Street East and Cobourg Trails Phase 2 range between 62% and 63%.

2.5.2.2 Sewer Alignment

The proposed trunk sanitary sewer is preliminarily aligned along the west edge of pavement on Brook Road North for approximately 150 m before reaching a point at MH SA-E7 where the trunk sewer alignment must either deviate southwesterly from Brook Road North and enter the Cobourg Trails Phase 2 lands or continue southerly along Brook Road North. The depth of the proposed trunk sewer in this section ranges from 5.5 m at Elgin Street East to 10.3 m at MH SA-E7 where the grade of Brook Road North is rising.

2.5.3 Cobourg Trails Phase 2 Area

2.5.3.1 Design Flows

To appropriately size the trunk sanitary sewer in the Cobourg Trails Phase 2 area, wastewater flows generated by the proposed development are assumed to enter the trunk sanitary sewer system at MH SA-E7. The Cobourg Trails Phase 2 sub-catchment will contribute an additional peak wastewater flow of 4.76 L/s based on a developed area of 5.30 Ha servicing 99 units. The 600 mm dia. trunk sewer is of sufficient size to accommodate the added flows while keeping capacities between 62% and 66%.

2.5.3.2 Brook Road North Drumlin Challenges

At the north-end of the Cobourg Trails Phase 2 development the most direct route is for the proposed trunk sanitary sewer to continue southerly on Brook Road North. However, over its length the elevation of Brook Road North varies significantly as illustrated in **Figure 2.5** below. This creates significant challenges relative to the depth of a proposed sewer directly following Brook Road North.

Figure 2.5: Schematic Profile of Brook Road North

The profile of Brook Road North can be characterized as follows (from south to north):

- From an elevation of ±93 m at the CN / CP rail corridor Brook Road North rises gently to the north for 300 m reaching an elevation of ±99 m before descending into the valley of the Brook Creek East Tributary where it crosses the creek at a road elevation of ±96.75 m with the creek itself at an elevation of ±93.0 m.
- North of the Brook Creek East Tributary the elevation of Brook Road North rises gently to the north for 350 m before beginning to ascend a drumlin in the vicinity of the LUSI electrical substation.
- Brook Road North rises up the south face of the drumlin at a slope of approximately 5.0% from an elevation of ±99.0 m to a crest elevation of ±113 m, which has been cut into the peak of the drumlin.
- North of the crest Brook Road North descends along the north face of the drumlin at a slope of 4.5% before returning to a gentler grade of 1.0% and tying-into Elgin Street East at an elevation of ±101.5 m.

The presence of the ±13 m high drumlin complicates the continuation of the trunk sewer alignment south along Brook Road North, parallel to the east side of Cobourg Trails Phase 2. From a transportation perspective it is understood that Brook Road North will likely be lowered by approximately 1.0 m to flatten the vertical curve at the crest of the drumlin and improve sight lines. This change in profile will have negligible impact on improving the feasibility of trunk sewer installation by open-cut methods as a proposed sewer would remain ±17 m below the lowered road grade at its crest.

2.5.3.3 Possible Trunk Sewer Alignment Options to Address Drumlin

Given challenges outlined in the preceding Section, various options for the proposed trunk sanitary sewer alignment in the area of the Cobourg Trails Phase 2 development lands focused on minimizing or accommodating excessive depths on Brook Road North have been explored.

Table 2.8: Preliminary Screening of Options

Option	Preliminary Screening
Gravity trunk sewer tunneled through the drumlin on Brook Road North with minor or no change in road grade.	Supports the Town's objective to locate major infrastructure along arterial roads and is considered technically achievable. **Carried Forward as Alternative 1**

Option	Preliminary Screening
Gravity trunk sewer tunneled through the drumlin on Brook Road North with major reduction in road grade.	Not considered feasible as a change in road grade significant enough to make the shafts associated with tunneled sewer installation more feasible would require 8-10 m of cut, which would have considerable property, utility and access impacts. **Not Carried Forward**
Gravity trunk sewer alignment internal to Cobourg Trails Phase 2 using internal streets and installed by open-cut with connection to Brook Road North through the Jankovich property.	Sewers following internal roads remain extremely deep and connection to Brook Road North is at a location requiring significant sewer depth (±10 m). Additionally, there has been limited cooperation from the adjacent property owner (Jankovich). **Not Carried Forward**
Gravity trunk sewer alignment internal to Cobourg Trails Phase 2 using green space, SWM block and parkland with connection onto Brook Road North through a combination of LUSI Electrical Substation and Markham Metals Property.	Reduces sewer depths to 3.5 to 7.0 m and, with reasonable cooperation from adjacent property owners, can be implemented. **Carried Forward as Alternative 2**
Sewage Pumping Station on Tribute development lands north of Phase 2 with a forcemain conveying flows over the drumlin along Brook Road North to a gravity sewer.	Technically viable within lands owned by Tribute and existing right-of-ways, although not ideal from a long-term operating perspective. **Carried Forward as Alternative 3**

2.5.3.4 Alternatives Evaluation

Based on the screening presented in **Table 2.8** the options considered feasible and carried forward as alternatives for further consideration include:

- **Alternative 1**: A gravity trunk sewer tunneled through the drumlin on Brook Road North.

- **Alternative 2**: A gravity sewer aligned through the Cobourg Trails Phase 2 lands to skirt around the drumlin on Brook Road North.
- **Alternative 3**: A sewage pumping station north of the drumlin on Brook Road North with a forcemain discharging over the drumlin and connecting to the gravity trunk sewer in the vicinity of the LUSI Electrical Substation property.

These alternatives are illustrated on **Figure 2.6** and summarized in the following sub-sections with the preliminary preferred alternative described in **Section 2.5.3.6**.

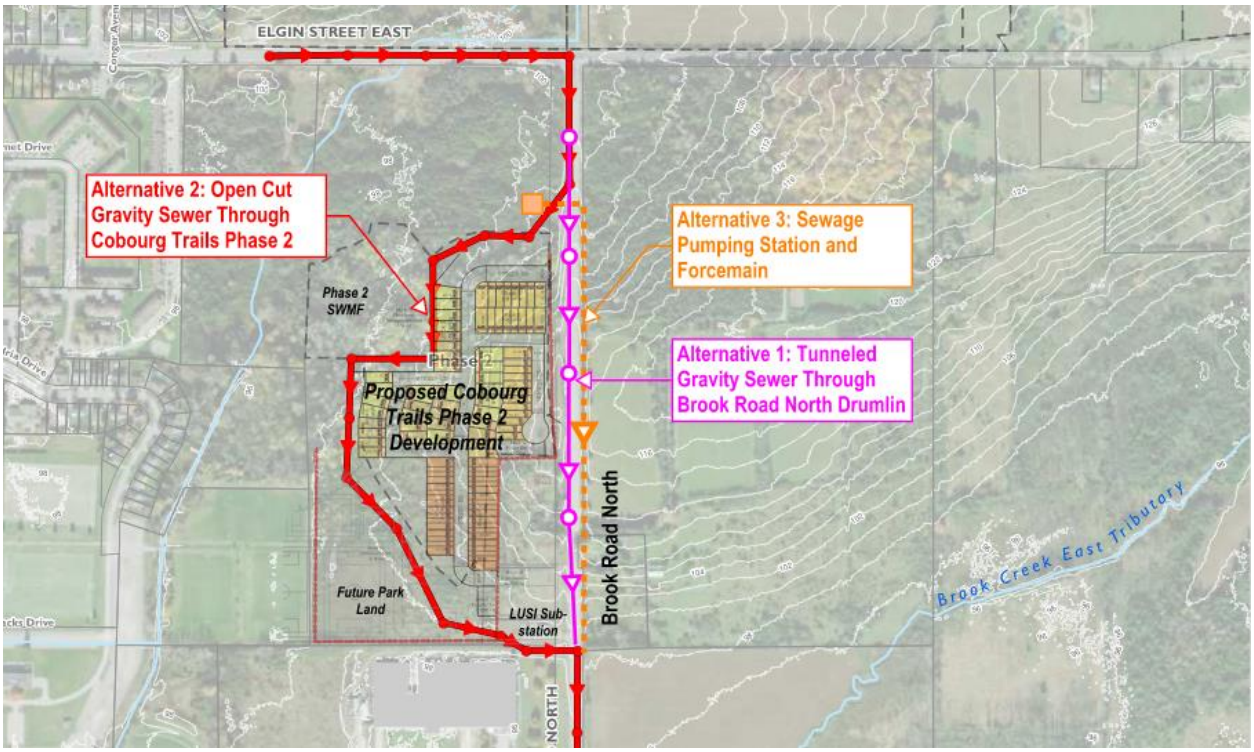


Figure 2.6: Cobourg Trails Phase 2 Area Alternative Sewer Alignments

2.5.3.5 Alternative 1 - Sewer Tunneled through Drumlin on Brook Road North

One option for installation of the trunk sewer in the area of Cobourg Trails Phase 2 involves tunneling along Brook Road North and installing the proposed trunk sanitary sewer under the drumlin that is described in **Section 2.5.3.2** above.

To reduce impacts and costs for this alternative, the Town has indicated it would agree to an increased maintenance hole spacing of 250 m for this section in comparison to the normally accepted 125 m spacing (per Town of Cobourg Design Guidelines). This will help to offset the disruption and costs of installing excessively deep sending and receiving shafts, and maintenance holes (18.5 m in the deepest area).

As such, this alternative would require the installation of sending and receiving shafts spaced approximately 250 m apart and positioned to avoid the high point of Brook Road

North. To eliminate open-cut at depths greater than 7.0 m along this section, four (4) such shafts would be installed and later converted to maintenance holes as illustrated schematically on **Figure 2.7**.

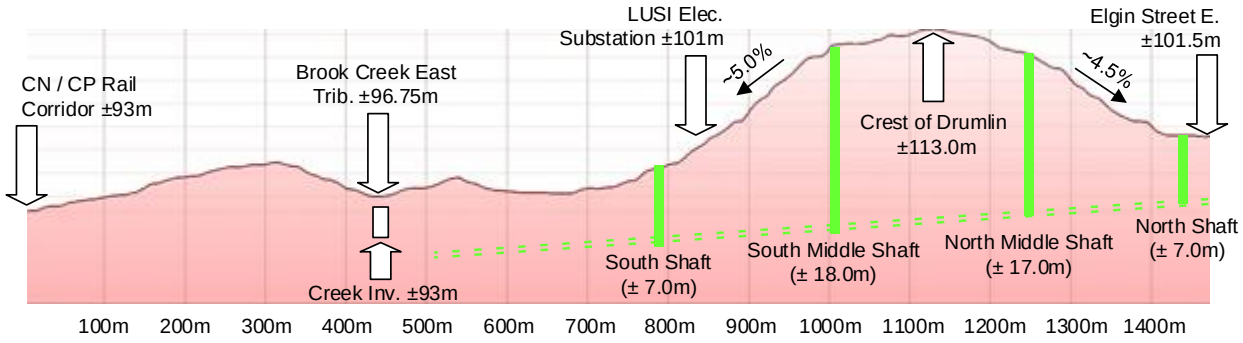


Figure 2.7: Schematic Illustration of Tunneling through Drumlin

Beyond the north and south shafts, installation would continue by open-cut methods although some consideration could be given to continuing a tunnel installation further south under the Brook Creek East Tributary and potentially beyond.

The construction cost of Alternative 1 is significant. Alternative 1 incorporates approximately 690 m of 600 mm dia. tunnelling as well as two (2) shafts/maintenance holes at ±7.0 m depth, one (1) at ±17 m depth and one (1) at ±18 m depth. The preliminary estimated order of magnitude construction cost for Alternative 1 is just under $10.0M as summarized in **Table 2.9**.

Table 2.9: Estimated Construction Cost for Alternative 1

Item	Estimated Cost
Trunk Sewer by Tunnelling (690 m)	$5,570,000.00
Shafts (2x at 7.0m, 1x at 17m, 1x at 18m)	$2,300,000.00
Conversion of Shafts to Maintenance Holes	$420,000.00
Restoration Around Shafts	$80,000.00
Miscellaneous (Incl. Dewatering Allowance)	$360,000.00
Sub Total	**$8,730,000.00**
General Items (2%)	$175,000.00
Contingency (10%)	$875,000.00

Total Construction Cost	**$9,780,000.00**

It can be anticipated that over the long-term the excessively deep maintenance holes and trunk sanitary sewers will cause increased challenges for maintenance including regular flushing and inspection as well as eventual rehabilitation.

2.5.3.6 Alternative 2 – Trunk Sewer Internal to Cobourg Trails Phase 2

As an alternative to tunnelling under the drumlin on Brook Road North the second option is to direct the proposed trunk sanitary sewer westerly from MH SA-E7 into Cobourg Trails Phase 2. This allows the sewer alignment to skirt around the west side of the drumlin, avoiding the crest and the greatest excessive sewer depth on Brook Road North.

Under this alterative approximately 900 m of proposed trunk sanitary sewer would be constructed largely in greenfield conditions at depths ranging from 3.5 to 7.0 m. The main elements/sections of the alignment are outlined as follows:

- Exit the Brook Road North right-of-way and cross vegetation communities 15 CUM1-1 and 14A FOC4-1 as identified by Niblett Environmental Associates Inc. (NEA) in their Environmental Impact Study (EIS) completed for Rondeau (Cobourg) Ltd. in May 2016.

  Based on preliminary discussions with the Ganaraska Region Conservation Authority (GRCA), this section of the alignment is expected to be acceptable with the following contingencies as outlined in the attached correspondence from GHD (Formerly NEA) included in **Appendix H**:

  - Ensuring the path of construction is as narrow as possible;
  - Avoiding damage to any trees not necessary for removal; and
  - 1:1 compensation for trees removed.

- Run west along the toe of the proposed slope for future Street BB (as shown on the current Phase 2 Draft Plan, Appendix F) at the north end of Phase 2.

  To accommodate vehicular access to each maintenance hole through this section of the sewer alignment and the section described in the bullet above, it is anticipated a 4.0 m gravel road in a 6.0 m wide corridor will be required. Extending from an entrance on Brook Road North to MH SA-E8-A this access road would be approximately 140 m long and the entrance would have a slope of 8.0 % over a length of 25 m.

- Run south and then west following a 6.0m access/maintenance route between the back of the proposed Phase 2 residential lots on the west side of future Street BB and the Phase 2 Stormwater Management (SWM) Facility.

  In this section the SWM Facility access route with connectivity to future Street BB and Street CC will also serve to provide access to the four (4) sanitary maintenance holes (SA-E9, SA-E10, SA-E11 and SA-E12-A).

- Continue south and then south-easterly through the future park lands that are ultimately to be conveyed to the Town.

  Through the future Park Lands it is understood that maintenance hole locations will need to be targeted to hard surfaced areas (i.e., parking lots and trails) and that vehicular access to each maintenance hole will be required for maintenance purposes. To accommodate this, it is proposed that a section of the multi-use trail extending north from the parking lot areas be overbuilt to a 4.0 m width with a 100 mm thick asphalt surface.

- Exit the Cobourg Trails Phase 2 lands and enter onto the southwest corner of LUSI's Brook Road Municipal Electrical Substation property, where LUSI has indicated that they are in principle agreeable to the location of the proposed sanitary maintenance hole.

  Access to the maintenance hole at this location would be provided through the existing sub-station entrance, which is also anticipated to function as a second (gated) emergency access to the Park Land southwest of Cobourg Trails Phase 2.

- Run southeast from the LUSI Substation property and enter onto the adjacent industrial property currently owned by Markham Metals and then run east along the northern driveway of the Markham Metals property to re-enter the Brook Road North right-of-way.

  Serval possible configurations for this section of sewer have been discussed with Markham Metals. Tribute has reached an agreement in principle with Markham Metals based on the alignment illustrated on **Figure 2.8**. Tribute, as the proponent of the sewer, is advancing the process of developing a formal agreement with Markham Metals. An easement extending from Brook Road North to a point 65 m west will be required to be provided by Markham Metals in favour of the Town to provide long-term maintenance access for the portion of sewer that runs along the north driveway on Markham Metals property.

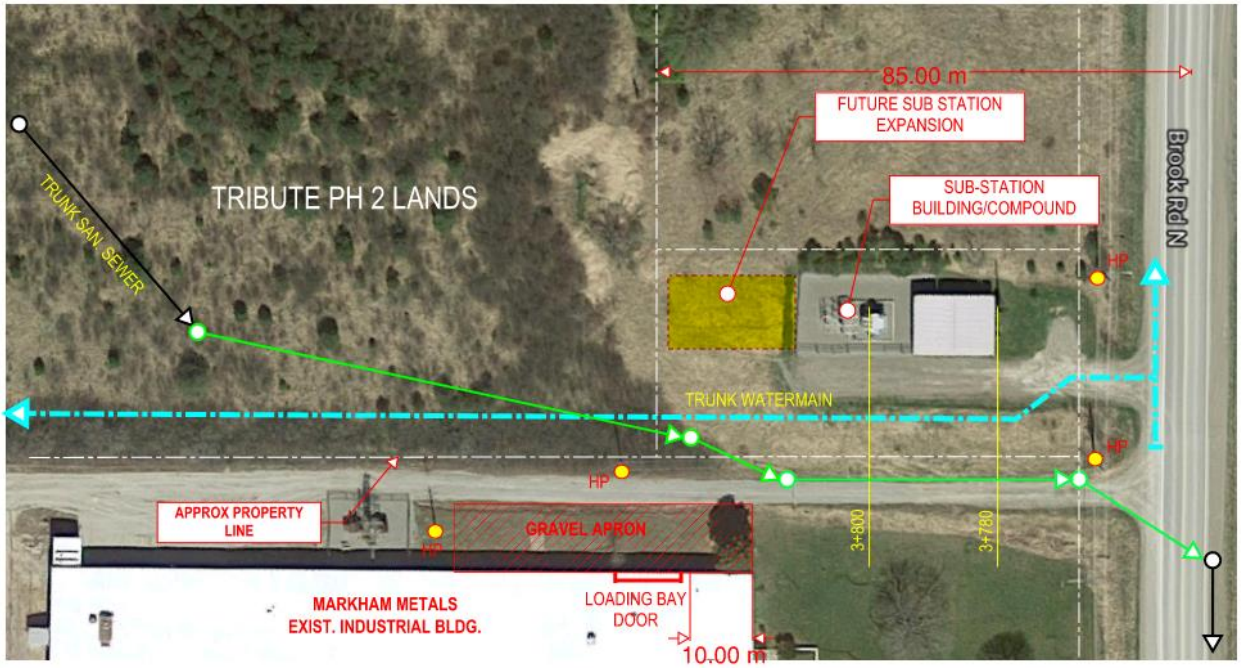


Figure 2.8: Trunk Sewer Routing Through Markham Metals Property

The construction cost for Alternative 2 is considerably less than Alternative 1 given that the majority of construction involves installing sewer in open-cut, at standard depths (less than 7.0 m) through greenfield areas that will be restored as part of the development process for Cobourg Trails Phase 2 and the adjacent Park Land. The preliminary estimated order of magnitude construction cost for Alternative 2 is just over $1.7M as summarized in **Table 2.10**.

Table 2.10: Estimated Construction Cost for Alternative 2

Item	Estimated Cost
Trunk Sewer by Open-Cut (904 m)	$1,147,000.00
Maintenance Holes (9x)	$190,000.00
Overbuilding Access Routes	$135,000.00
Miscellaneous	$50,000.00
Sub Total	**$1,522,000.00**
General Items (2%)	$30,000.00
Contingency (10%)	$150,000.00

Total Construction Cost	**$1,702,000.00**

2.5.3.7 Alternative 3 – Sewage Pumping Station and Forcemain

Alternatives 1 and 2 focus on gravity sewer options whereas Alternative 3 considers the possibility of utilizing a Sewage Pumping Station (SPS) to overcome the challenges associated with the drumlin on Brook Road North. Under this alternative an SPS facility located north of the Cobourg Trails Phase 2 lands would receive gravity flows from the Phase 2 lands (catchment J) as well as all other lands to the north, including catchments A, B, C, D, E, F, G, H and I. Ultimately, these catchment areas would produce a peak sewage flow of 211 L/s requiring a SPS with a firm rated capacity in the order of 220 L/s.

At an extremely preliminary level, the construction cost for a basic wet well-type SPS with submersible pumps and an outdoor generator (i.e., only a basic building) of this capacity is anticipated to be in the order of $7.5M (excluding forcemain costs). However, these costs could increase considerably based on the following:

- Town's design requirements for the facility and the desire to provide additional features such as a dry well pumping arrangement and indoor standby power equipment.
- Level of redundancy to be provided (i.e., divided wet well, the inclusion of emergency storage tanks, etc.).
- Ground conditions and groundwater conditions for wet well construction in an area that is generally low lying.

Allowing for 550 m of discharge forcemain between a pumping station and a discharge point on Brook Road North near the LUSI Substation property the anticipated forcemain costs are in the order of $1.0M. This results in a total estimated capital cost of $8.5M for Alternative 3 not including engineering or operating costs.

2.5.3.8 Preferred Alternative

At present Alternative 2 is the preferred alternative that is reflected in the functional design. In general, Alternative 2 is preferred because of its lower initial capital costs compared to the two other presented alternatives and the fact that it avoids the long-term operating challenges of a very deep sewer (Alternative 1) and the long-term operating costs associated with a pumping station (Alternative 3).

For Alternative 2 to proceed as outlined, the following key elements are required:

- Agreement from Markham Metals and LUSI to provide the necessary easements, which are currently being discussed.

- Acceptance from the Town of Cobourg of access route provisions along the sewer alignment.
- Agreement from the Ganaraska Region Conservation Authority (GRCA) with respect to environmental impacts along the north limit of Phase 2.

2.5.4 Brook Road North – Cobourg Trails Phase 2 to Brook Creek East Tributary Crossing

2.5.4.1 Design Flows

Downstream of the Cobourg Trails Phase 2 area the proposed trunk sanitary sewer is designed at 0.3% slope at approximately 63% full flow capacity for a length of approximately 185 m before flows would ultimately combine with external wastewater flows from the future Brook Creek East Tributary North Sub-Trunk (servicing sub-catchment K) at MH SA-E19-B. Sub-catchment K consists of 47.60 Ha of residential land and 8.66 Ha of industrial land that contributes dry weather and wet weather flows to the sub-trunk. Additionally, 12.18 Ha of environmental protection land is considered to contribute infiltration flow to the sub-trunk based on the surrounding topography. As such, the future Brook Creek East Tributary North sub-trunk is estimated to contribute 78.91 L/s of additional peak wastewater flow to the proposed trunk sewer.

The combined flow will be conveyed southerly from MH SA-E19-B to MH SA-E20-A via a 675 mm diameter sewer operating at approximately 65% full flow capacity. MH SA-E20-A on the north side of the Brook Creek East Tributary would be located in a shaft (sending or receiving) north of the existing box culvert that carries the creek under Brook Road North. At SA-E20-A wastewater flows would combine with flows from the future Brook Road West Side Sub-Trunk sub-catchment (N) which services 16.97 Ha of industrial land. Sub-catchment N is estimated to contribute 35.29 L/s of additional peak wastewater flow to the proposed trunk sewer.

2.5.4.2 Sewer Alignment

The proposed 600 mm diameter trunk sanitary sewer exiting the Cobourg Trails Phase 2 development lands crosses Brook Road North to MH SA-E18 located on the east side of Brook Road North, before continuing southerly ±185 m to MH SA-E19-B. The alignment of the trunk sewer on the east side of Brook Road North is to avoid conflicts with/impacts to the three-phase hydro-poles that run down the west side of the road.

2.5.4.3 Brook Creek East Tributary Crossing

The invert of the closed bottom box culvert is surveyed at an elevation of 92.95 m. It is assumed that the box culvert bottom slab thickness is 250 mm (matching the top slab)

and therefore the underside elevation of the box culvert is ±92.7 m. No drawings of the culvert are available to detail the foundations of the culvert. Based on the understanding that the culvert is closed bottom, the design of the proposed trunk sanitary sewer assumes that there are no deep foundations (piles or footings) below the bottom slab.

To avoid disturbing the natural watercourse, trenchless techniques are proposed for trunk sanitary sewer construction at the creek crossing. The final trenchless method will be selected based on the results of a geotechnical investigation that is currently underway. However, it is likely that micro-tunneling methods will be preferred as they are understood to be more effective than jack-and-bore methods in wet and soft soil conditions.

To reach a suitable shaft location south of the culvert and limit open-cut installation, a 91 m long trenchless installation is proposed. Reinforced concrete jacking pipe with 0.5% slope will be advanced between the two (2) shafts. Both shafts would be constructed in the east shoulder area at a diameter of ±6.0 m and will slightly encroach on the existing roadside ditches. The preliminary shaft locations and sewer alignment are shown on **Figure 2.9**.

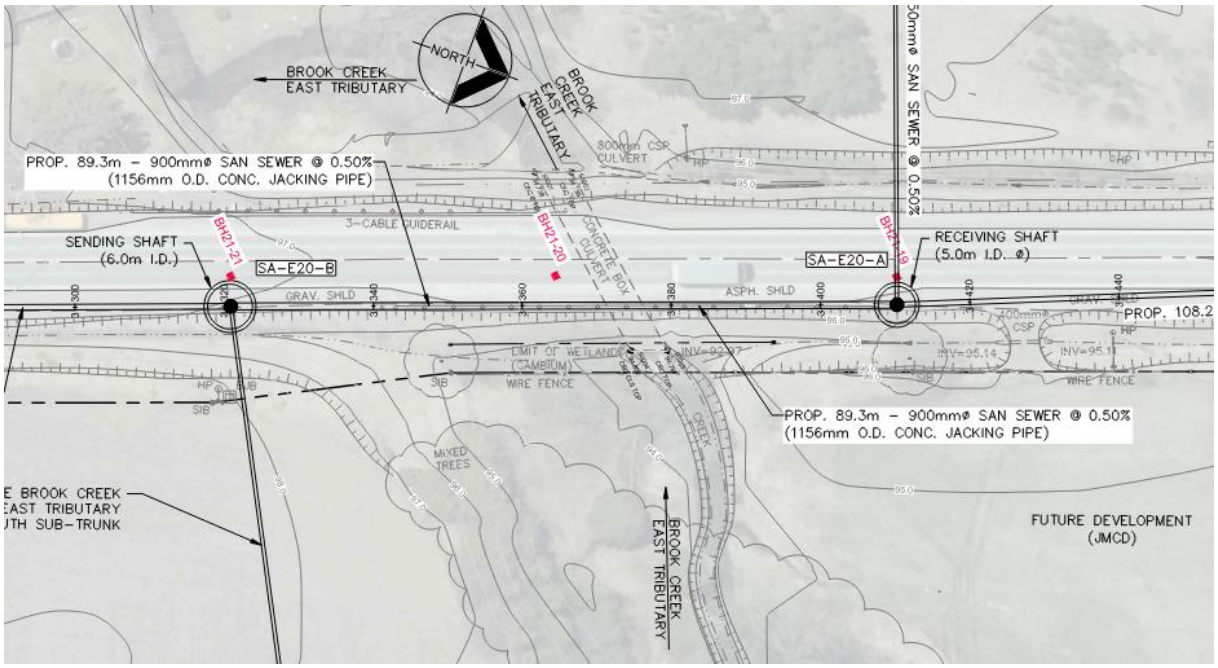


Figure 2.9: Preliminary Shaft Locations for Brook Creek East Tributary Crossing

The anticipated size of the jacking pipe is 900 mm dia., which is larger than the proposed 675 mm dia. sewer upstream and the 750 mm dia. sewer downstream. While the 900 mm dia. pipe is larger than what is required from a hydraulic capacity perspective, concrete jacking pipe is not readily available in size increments between 600 and 900 mm.

The oversized pipe will be positioned to match the obvert of the upstream sewer and the invert of the downstream sewer. Using a larger jacking pipe is beneficial as it provides additional safety factors for workers to enter the tunnel if required during the construction and also eliminates the need for a separate casing pipe (casing and carrier pipe are the same). The larger pipe will also provide additional hydraulic capacity at the crossing location. The sewer invert has been set to provide 1.50 m vertical separation between the crown of the 1,156 mm outside diameter jacking pipe and the underside of the culvert. The profile of the tributary crossing is illustrated in **Figure 2.10**.

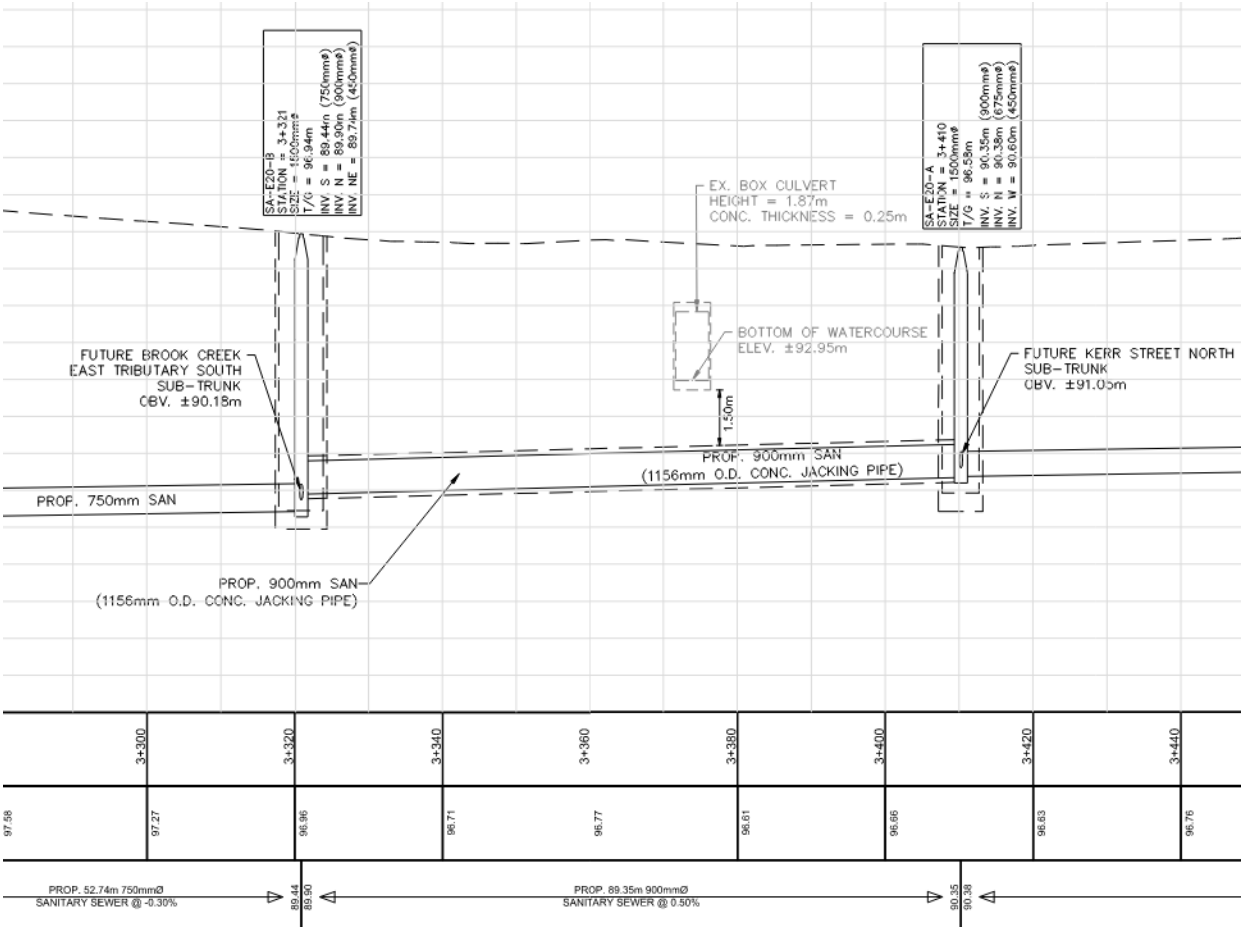


Figure 2.10: Preliminary Profile of the Brook Creek East Tributary Crossing on Brook Road North

2.5.5 Brook Road North – Brook Creek East Tributary Crossing to Mistral Land Developments Inc.

2.5.5.1 Design Flows

MH SA-E20-B on the south side of the Brook Creek East Tributary crossing is located approximately 53 m south of the centerline of the creek. Flows from future Brook Creek

East Tributary South Sub-Trunk (sub-catchment L1), which services 50.09 Ha of residential land contributing dry and wet weather flows and 16.25 Ha of environmental protection lands contributing wet weather flows, as well as the northern portion of Mistral Land Developments Inc. East Village North development (sub-catchment L2), servicing 16.06 Ha of residential land contributing dry and wet weather flows, combine with the proposed trunk sanitary sewer at MH SA-E20-B contributing an additional 80.53 L/s of peak wastewater flow to the downstream 750 mm dia. sewer. With the addition of flows from sub-catchment L1 and L2 the proposed trunk sanitary sewer is estimated to flow at 67% of its capacity downstream of MH SA-E20-B.

2.5.5.2 Sewer Alignment

Downstream of MH SA-E20-B the proposed trunk sewer runs southerly along the east shoulder of Brook Road North for approximately 145 m to MH SA-E22, south of which it deflects east to MH SA-E23-A at the anticipated location of future Kerr Street, in order to accommodate a future grade separation crossing of the railway tracks. Given its relatively deep depth (7–9 m) it is possible that the section of sewer between MH SA-E20-B and MH SA-E22 will be continued as a trenchless installation if the ground conditions are suitable, and it is possible to continue the tunneling operation from the creek crossing in an economical manner.

2.5.6 Mistral Land Developments Inc. – Brook Road North to CN/CP Rail Corridor Crossing

Mistral Land Developments Inc. owns a parcel of land totaling approximately 58 Ha that is located north of the CN/CP rail corridor and east of Brook Road North. This parcel has approximately 780 m of frontage along the east side of Brook Road North and is generally referred to as *East Village North*. The northern portion of the parcel is largely occupied by wetland areas and the flood plain associated with the east branch of Brook Creek. The southern portion of the parcel is largely agricultural land situated on the south slope of a drumlin located north of the CN/CP rail corridor.

2.5.6.1 Design Flows at the West-End of Mistal Land Developments Inc. Lands

Prior to entering the East Village North development lands, approximately 145 m south of MH SA-E20-B, the Future Kerr Street Sub-Trunk sewer (sub-catchment O) will discharge an estimated 6.23 L/s peak wastewater flow to the proposed trunk sewer at MH SA-E22. The combined peak flow rate in the trunk sewer at this point is 417.07 L/s. The 750 mm dia. Trunk sewer is of sufficient size to accommodate the added flows while keeping capacities between 51% and 74% outside of the East Village North development lands owned by Mistral Land Developments Inc.

Just downstream, MH SA-E23-A has been assumed (conservatively) as the connection point for all flows from the East Village North – Southern Portion (sub-catchment M1) and from a 1 Ha allowance included for potential non-residential development in sub-catchment M1 or M2. At MH SA-E23-A 29.32 L/s of peak wastewater flow is added to the trunk sewer. With these flows introduced downstream of MH SA-E23-A the capacity utilization of the 750 mm dia. sewer will be 74%.

2.5.6.2 Mistral Land Developments Inc. Block Plan and Development Concept

Monument Geomatics (Monument) has prepared a concept plan for Mistral Land Developments Inc.'s proposed development on the East Village North lands. A block plan illustration of the concept with an annotated overlay of the proposed external trunk sewer alignment is provided as **Figure 2.11** below. The full plan is included as **Appendix K**.

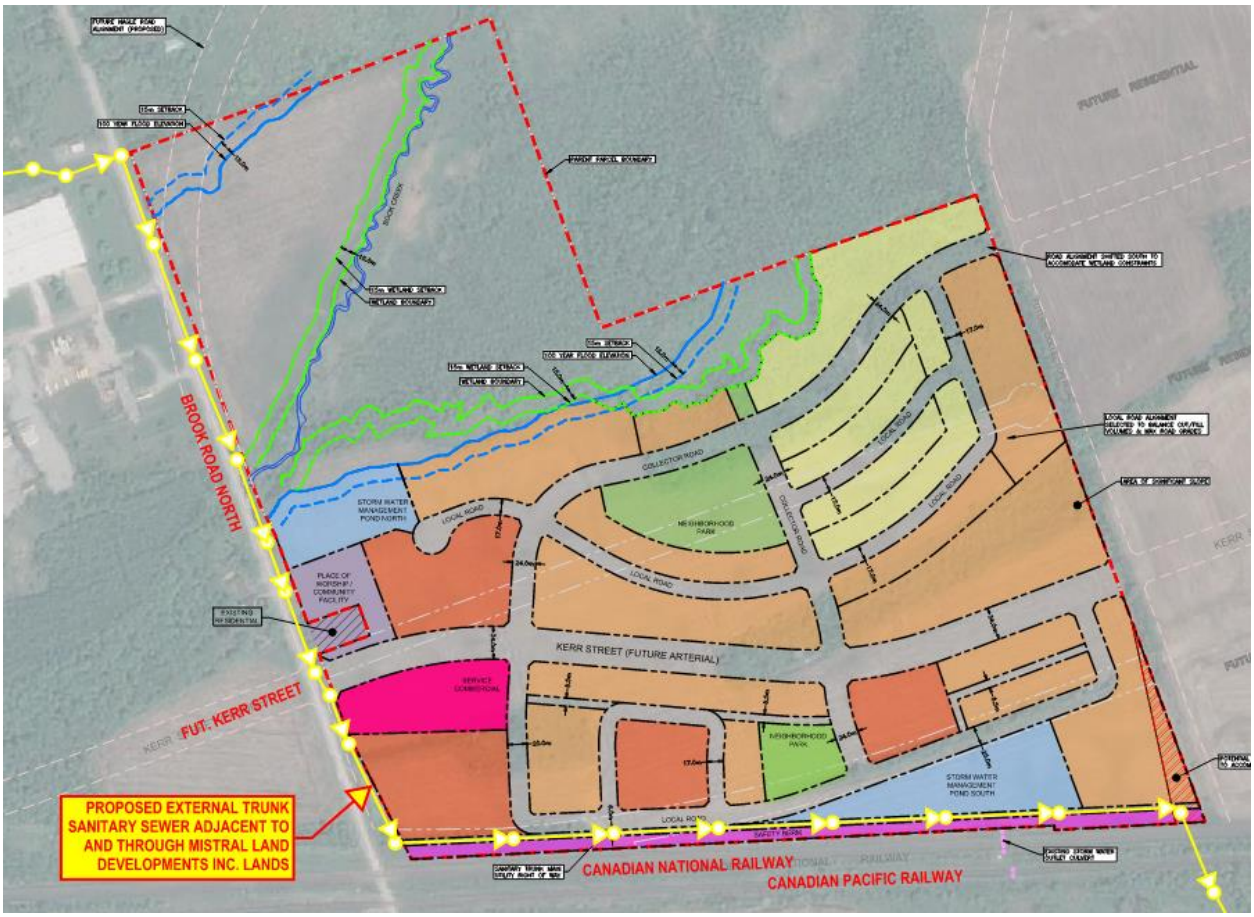


Figure 2.11: Mistral Land Developments Inc. East Village North Development Concept (Annotated)

The proposed development concept for East Village North includes the following elements that are relevant to the proposed trunk sewer:

- Earth works to flatten the site with a cut/fill balance that will involve cutting down the elevation of the drumlin and placing the material generated from the cut as fill along the southern portion of the site.
- A continuous block along the southern portion of the site that will accommodate the safety berm (grading) required adjacent to the CN/CP railway corridor. Given the proposed earth works that will raise the southern portion of the site it is anticipated that grading in this block will take the form of a slope down from the development lands to the railway rather a typical berm like cross-section.
- An internal local road along the south side of the development that will abut the railway safety berm block on the western portion of the site, and the stormwater management facility block as well as residential development on the eastern portion of the site.
- A 6 m wide servicing corridor in the southwestern corner of the site that will connect the above noted local road right-of-way to the Brook Road North right-of-way.

2.5.6.3 Sewer Alignment Adjacent to Brook Road North

The easterly deflection onto future Kerr Street at MH SA-E23-A is intended to transition the sewer alignment from Brook Road North into the future development lands currently owned by Mistral Land Developments Inc. on the east side of Brook Road North. This will allow the trunk sewer to be aligned along the toe of the future grading works for the planned construction of a grade separated crossing of Brook Road North over the CN/CP rail corridor.

Continuing the proposed trunk sewer easterly along future Kerr Street is not considered viable due to the depth of the trunk sewer at the future intersection which is approaching 9.0 m and the fact that grades along Kerr Street will continue to rise as it traverses up the west face of the drumlin on lands belonging to Mistral Land Developments Inc.

The Town/County have previously secured property in the Brook Road North right-of-way to accommodate the grade separation based on drawings prepared by Totten Sims Hubicki Associates Limited (TSH) for the County of Northumberland in July 1971. Subsequent grade separation options had been prepared by iTrans Consulting Inc. (iTrans) in 2007. At present, the proposed trunk sanitary sewer is aligned at a 3.0 m offset to the west (inside) of the east right-of-way widening established by the 1971 plan, which is illustrated in **Figure 2.12**. It is possible that with the future profile associated with the grade separation proposed by iTrans in 2007, the future elevation at the intersection of Kerr Street and Brook Road North may increase resulting in additional depth of cover over the trunk sewer in the area of MH SA-E22 and MH SA-

E23-A. It is unclear on whether this has been accepted by the Town and whether it supersedes the TSH profile, as a 4m increase in grade +/-250m away from the railway crossing appears to be extreme and may have negative impacts on the existing properties and future development. This will be further investigated in the detailed design stage when pipe materials and sewer alignment are further refined.

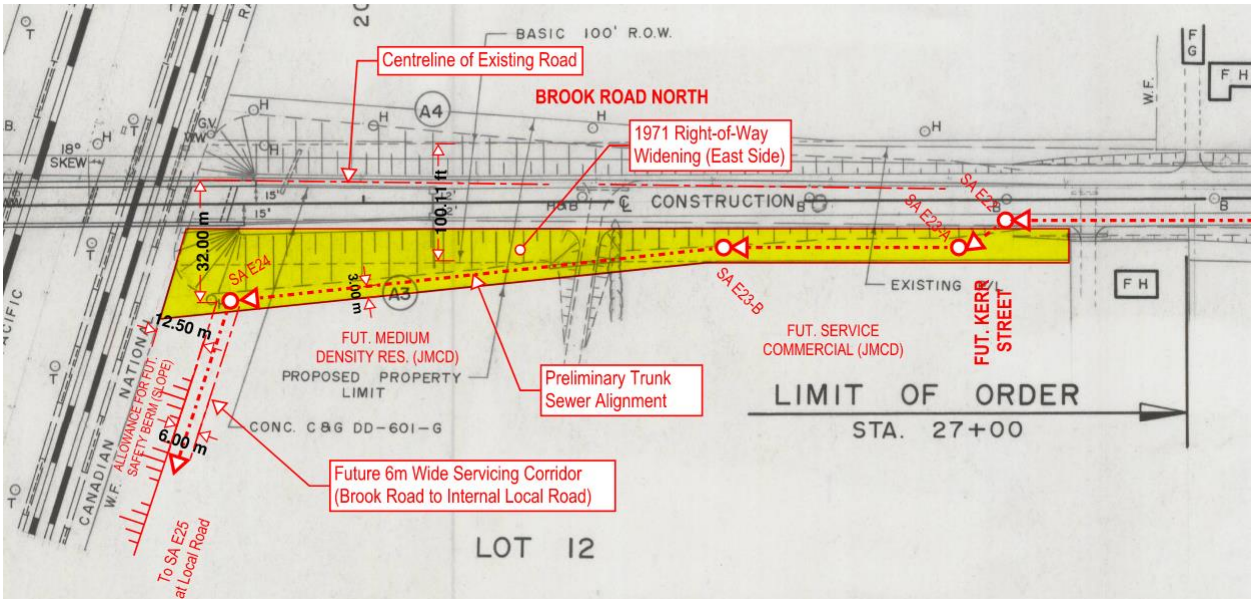


Figure 2.12: Preliminary Sewer Alignment East of Future Grade Separation

Preliminary input from Monument indicates that the anticipated earthworks on the East Village North property will involve the placement of ±4.9 m of fill in the southwestern corner of the site near the CN/CP railway corridor and Brook Road North. The 1971 profile prepared by TSH indicates approximately 7.5 m of fill at the north abutment for the proposed grade separation. Considering the foregoing, the proposed grading will potentially reduce the height (above finished grade) of the approach embankment for the future grade separation by approximately 50%. This would reduce the footprint of the approach embankment and create an opportunity (space) for an access route along the sanitary sewer at the toe of the embankment.

It is anticipated that primary access for the maintenance holes along this section would be as follows:

- SA-E24 would be accessible via the 6 m wide servicing corridor parallel to the railway that is part of the conceptual block plan for East Village North.
- SA-E23-B would be positioned as far north as possible to facilitate access from Brook Road North in a location where the approach embankment height will be limited and transitioning back to match the existing/future road grade.

2.5.6.4 Sewer Alignment Parallel to CN/CP Railway Corridor

Within the Mistral Land Developments Inc., East Village North development lands the proposed trunk sanitary sewer flows easterly towards the future Willmott Street right-of-way paralleling the CN/CP rail corridor from MH SA-E24 to MH SA-E32. At the west end of the Mistral Land Developments Inc. development lands the sewer has been situated at a 16 m offset from the north side of the CN/CP rail corridor. This places the sewer outside of the safety berm/slope area and within the servicing corridor and local road right-of-way that are identified on the conceptual block plan for the East Village North property.

On the eastern portion of the Mistral Land Developments Inc. development lands, the trunk sanitary sewer is proposed to continue parallel to the railway and be located along the south side of the future south SWMF block and the medium-high density residential block located in the southeast corner of the property. Based on discussions with Monument it is anticipated that an access route for this portion of the trunk sanitary sewer would be shared with the access route for the SWMF. **Figure 2.13** illustrates a typical cross section of the sewer parallel to the CN/CP rail corridor, including the future conceptual finished grade elevation as currently understood based on plans provided by Mistral Land Developments Inc.

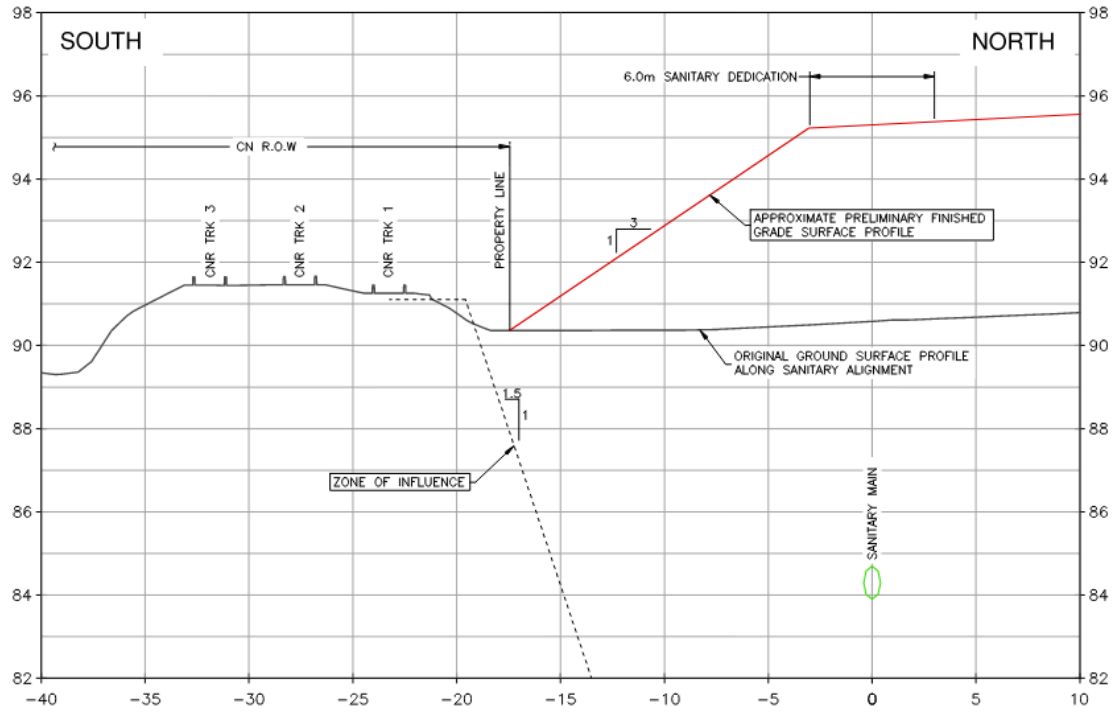


Figure 2.13: Typical Cross-Section of Sanitary Sewer Parallel to CN/CP Rail Corridor

The preliminary design sets the 750 mm dia. trunk sanitary sewer at a 5–6 m depth below existing grade with 0.5% slope through the East Village North property to allow for adjustments to the sewer alignment/length or grade as necessary to accommodate future development layout alignment changes. Post-development the anticipated fill placement on the southern portion of Mistral Land Developments Inc. East Village North property will place the sewer at 7.8 – 10.6 m below finished grade. It is understood that the additional depth over the trunk sewer, resultant of the fill placement expected for the East Village North property, is not ideal from an operations and maintenance perspective for the Town of Cobourg. Opportunities to adjust the alignment of the sewer closer to the north limit of the CN/CP rail property to minimize the depth of cover, while maintaining the same, or better, level of access to the trunk sewer as is currently proposed, will be further investigated through the detailed design stage in coordination with Mistral Land Developments Inc. This could mean locating the sewer within the safety berm, provided that it remains outside of the railways zone of influence. Additional discussions will also be required with Mistral Land Developments Inc. to confirm their proposed grading plans.

Capacity of the trunk sewer through the East Village North property is conservatively evaluated based on a 0.3% slope to confirm that a reduction in grade resultant of changes to the sewer alignment would not require a larger pipe diameter.

2.5.6.5 Flows at East-End of Mistral Land Developments Inc. Lands

At the east limit of the Mistral Land Developments Inc. East Village North development lands at MH SA-E32, wastewater flows from the future Massey Creek Sub-Trunk sub-catchment (Q) and Railway Sub-Trunk sub-catchment (P) combine with the proposed trunk sewer. The sub-catchments together contribute flows from an additional 48.66 Ha of residential land, 12.22 Ha of industrial land and 20.79 Ha of environmental protection land adding 83.36 L/s of dry weather and infiltration flow to the trunk sewer system. The conceptual plan and profiles for both sub-trunks are included in **Appendix B**. To accommodate the additional flows the trunk sewer south of MH SA-E32 is increased to 900 mm dia. at a capacity utilization of 53%.

2.5.7 CN/CP Rail Corridor Crossing

As outlined in **Section 1.2**, the Canadian Pacific (CP) and Canadian National (CN) railway lines pass through the Town of Cobourg at the south limit of the Cobourg East Community. In this location, the two railway right-of-ways directly abut each other forming a corridor approximately 60 m wide that includes one (1) CP track and three (3) CN tracks.

The proposed trunk sanitary sewer runs parallel to the rail corridor through the East Village North property as described in the section above before turning south at MH SA-E32. The trunk sewer is required to cross under the rail corridor to ultimately connect to the existing trunk sewer network approximately 1 km south at the intersection of Willmott Street and Thompson Street.

2.5.7.1 Horizontal Alignment of CN/CP Rail Corridor Crossing

The sewer alignment through the rail corridor is designed at an approximate angle of 72° degrees to the railway, matching the angle at which the unopened Willmott Street right-of-way (between Lots 10 and 11) intersects the railway. Like the rail crossing on Brook Road North, there are future plans for an extension of Willmott Street northerly from King Street East inclusive of a grade separated crossing of the CN/CP rail corridor. As such, a triangular shaped parcel adjacent the original, unopened Willmott Street right-of-way to accommodate grading for the future grade separation is expected to ultimately exist on the north and south sides of the rail corridor. To avoid encroaching into the embankments or structural elements of the future grade separation, the trunk sanitary sewer is aligned at the western edge of the triangular areas as illustrated in **Figure 2.14** below.

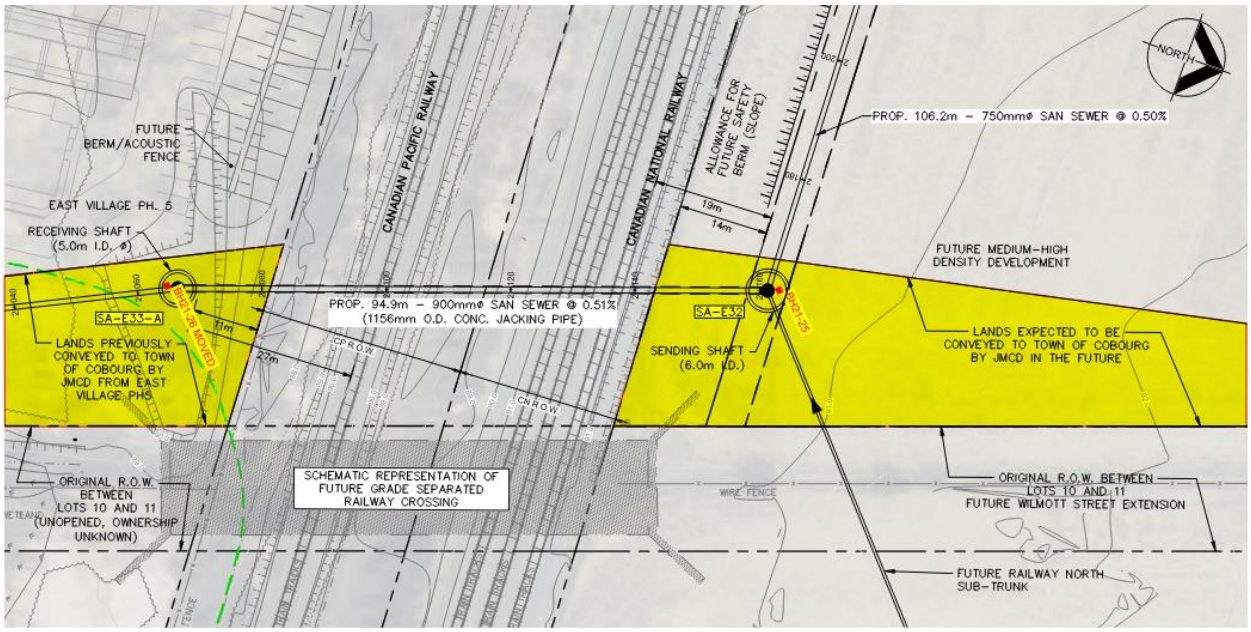


Figure 2.14: Preliminary Trunk Sewer Alignment at CN/CP Rail Corridor Crossing

On the south side of the CN/CP rail corridor the triangular widening to the west side of the Willmott Street right-of-way was created as Block 65 of the plan of subdivision for East Village Phase 5 and in the future will be conveyed to the Town by Mistral Land Developments Inc. Discussions with Mistral Land Developments Inc. have confirmed that Mistral Land Developments Inc. expects to convey a similar triangular block to the

Town on the north side of the CN/CP rail corridor as part of developing the lands north of the railway.

Based on the details above it is not practical to cross the tracks at a preferred 90° angle. In this regard, the CN Utility Specification and Application Process does not allow the angle of sewer crossings to be less than 45°. The proposed 72° crossing is acceptable relative to the above-mentioned constraints.

2.5.7.2 Vertical Alignment of CN/CP Rail Corridor Crossing

A trenchless method of sewer installation will be utilized to cross the rail corridor. Similar to the requirements of the Brook Creek East tributary crossing on Brook Road North, sending and receiving shafts will be installed on either side of the corridor outside of the CN/CP rail corridor right-of-way:

- On the south side a 6.0 m dia. sending shaft (MH SA-E33-A) is located 27 m from the nearest CP rail and 11 m south of the CP right-of-way.
- On the north side a 5.0 m dia. receiving shaft (MH SA-E32) is located at 19 m from the nearest CN rail and 21 m from the CN right-of-way.

The shaft locations have been selected to place shafts in accessible locations that are beyond the track loading zone of influence, which is illustrated on **Figure 2.15**.

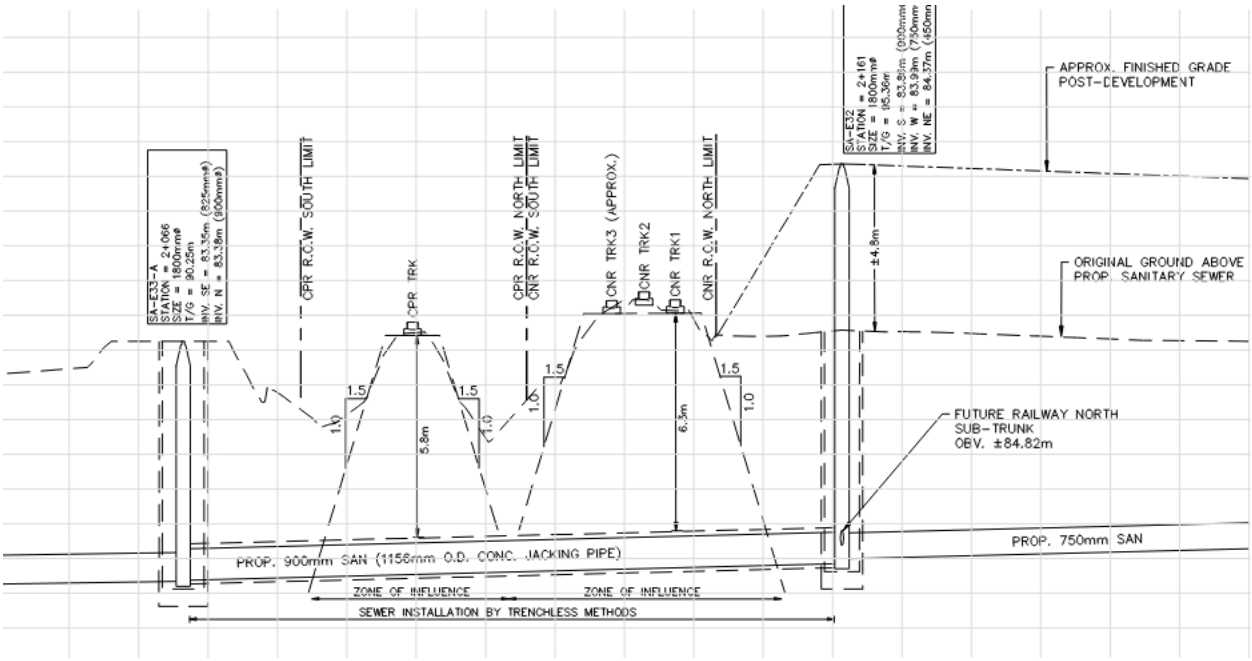


Figure 2.15: Preliminary Profile of Railway Crossing

As shown on **Figure 2.15** a 900 mm dia. concrete jacking pipe is proposed for the crossing under the rail corridor. This is a larger diameter sewer than what is required to convey the design flow. However, 825 mm dia. jacking pipe, that would match the

downstream sewer size, is not commonly available. Installing a sanitary sewer with a slightly larger dimension under the railway corridor is also more conservative to accommodate additional development in the future and adds additional safety factors for install if there is a need for workers to enter the tunnel during construction. In the DECAST tunneling supply list, 900 mm dia. jacking pipes are sufficient for the design purpose to withstand both jacking force and external earth loads. The RCP used for jacking should meet Cooper E90 design load. Considering the jacking pipe size is 900 mm with a 6.3 m height of fill, the design live load for the concrete jacking pipe should be D-1350 minimum. Specifics of the jacking pipe will be further refined in the detailed design stage.

To account for potential vertical alignment deviations during the tunnelling process, this section of sewer has been designed at a 0.5% slope with hydraulic calculations based on 0.3% slope. The 900 mm dia. crossing (at 0.3%) is expected to operate at 53% of its full flow capacity.

2.5.8 Unopened Willmott Street Right-of-Way – CN/CP Rail Corridor to King Street

2.5.8.1 Design Flows

The proposed sewer downstream of the rail corridor crossing sending shaft (MH SA-E33-A) is designed as 825 mm dia. at 0.3% slope and is expected to operate at 68% of its full flow capacity. Aside from flows conveyed from upstream of the sewer, no additional flows are expected to be introduced to this section of the trunk sewer.

2.5.8.2 Willmott Street Right-of-Way and Future Grade Separation

Currently, an unopened right-of-way (between Lots 10 and 11) exists between King Street East and the CN/CP rail corridor. This right-of-way will ultimately accommodate the future Willmott Street extension, which includes a future grade separation at the rail corridor as discussed in **Section 2.5.7**. The ownership of the eastern half of the right-of-way is currently unclear. It is possible that the eastern half of the right-of-way was previously conveyed to the owners of the parcel of land to the east of the right-of-way. The status of the eastern side of the right-of-way is currently being investigated by others. If the eastern half of the right-of-way is currently not in public ownership, the proposed sanitary sewer alignment can be modified to be contained within the western portion of the right-of way. This potential alternative is illustrated by the red dashed line on **Figure 2.16**.

There is a triangular shaped parcel of land adjacent the west side of the unopened Willmott Street right-of-way, which is required to accommodate the future grade

separation south of the CN/CP rail corridor. This parcel is currently owned by Mistral Land Developments Inc. and has been included as Block 65 of their East Village Phase 5 development. Ultimately, this land will be conveyed to the Town of Cobourg. The future bridge structure with abutment and wingwall for the grade separation may be partially accommodated within the above-mentioned triangular parcel along with approach embankment grading.

2.5.8.3 Sewer Alignment

As illustrated on **Figure 2.16**, the proposed trunk sanitary sewer is strategically placed outside of the original Willmott Street right-of-way for most of its length and as close as possible to the eastern boundary of East Village Phase 5. From the rail crossing sending shaft (MH SA-E33-A) the proposed trunk sewer runs southeasterly along an alignment following the east limit of East Village Phase 5 at a 5.0 m offset. This is intended to minimize interaction with the embankment of the future Willmott Street grade separation.

This alignment also serves to separate the proposed trunk sanitary sewer from the existing wetland that is located inside of the original right-of-way, which was outlined by Cambium Inc. in the 2018 Environmental Impact Study (EIS) prepared for East Village Phase 5. The proposed trunk sanitary sewer alignment is approximately 15 m away from the wetland feature, but within the 30 m buffer as illustrated on **Figure 2.16**.

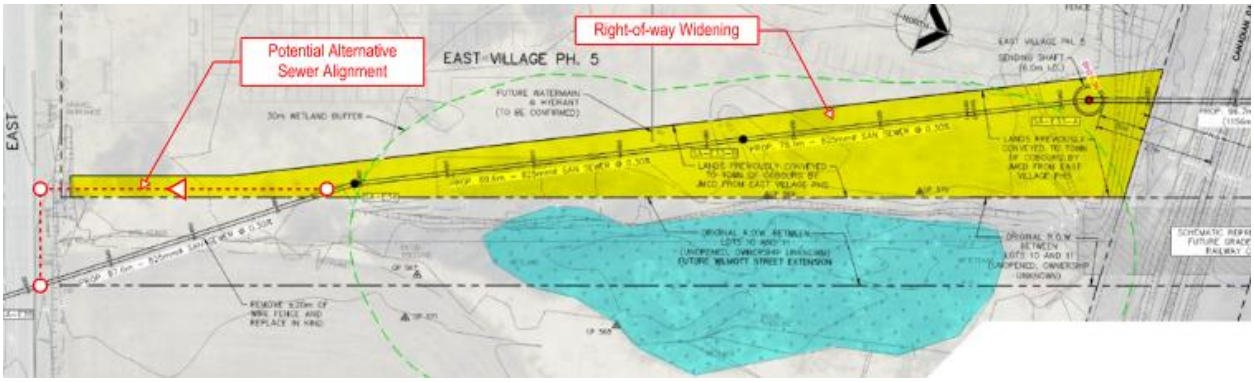


Figure 2.16: Preliminary Trunk Sewer Alignment Willmott Street Unopened ROW

As shown on **Figure 2.16** above, the proposed trunk sanitary sewer alignment does enter the original right-of-way between Lots 10 & 11 south of MH SA-E34. This alignment is intended to provide the most direct connection to the existing sewer alignment on Willmott Street south of King Street East. If it is determined that the right-of-way is not owned by the Town, an alternative alignment can be pursed to shift the proposed sewer further west as illustrated by the red dashed lines on the figure above. Such an alignment may also be preferred if other parallel infrastructure needs to be accommodated as well.

2.5.9 Willmott Street – King Street to Thompson Street

2.5.9.1 Design Flows

The proposed trunk sanitary sewer is planned at this time to replace the existing sewer on the east side of Willmott Street. As such, flow from existing industrial properties and future infill of developable land east of Willmott Street were considered in evaluating the capacity of the proposed trunk sanitary sewer. Service laterals from adjacent industrial properties will be connected to the trunk sanitary sewer after removal of the existing sewer. Throughout its length, the trunk sewer receives an additional 48.70 L/s of wastewater flow from the existing and future developments on the east side of Willmott Street.

2.5.9.2 Sewer Alignment

As discussed in **Section 2.2.3**, due to the favourability of the east boulevard for trunk sewer construction, the proposed sewer is located along the alignment of and will replace the existing 375 mm dia. Willmott Street local sewer. The existing 375 mm diameter sewer is located in a 7.0 m wide easement adjacent to the east side of the 20.1 m wide Willmott Street right-of-way.

The proposed 825 mm dia. trunk sanitary sewer is aligned within the 7.0 m easement and flows southerly along Willmott Street from MH SA-E35 at King Street East to Thompson Street and connects to the existing 1,200 mm dia. trunk sewer on Thompson Street at MH SA-0651. To accommodate the proposed 825 mm dia. trunk sewer connection, a new 2,400 mm dia. maintenance hole (MH SA-0651) is proposed to replace the existing 1,800 mm dia. maintenance hole at the Willmott Street and Thompson Street intersection.

2.5.9.3 Downstream Capacity of the Existing Thompson Street Trunk Sewer

The existing 1,200 mm dia. trunk sewer on Thompson Street was evaluated to ensure it would have sufficient capacity to convey future flows from Cobourg East (conveyed by the proposed trunk sewer) in addition to existing and future wastewater flows from the existing serviced areas. The approach applied to evaluate the existing peak flow in the Thompson Street trunk sewer considers the following:

- The entire contributing area for the lands (developed and undeveloped) on the east side of Willmott Street (Sub-catchment AA) are allocated as industrial and institutional flows estimated as described in **Section 2.2.3**;
- The contributing area from the west of side of Willmott Street that is primarily residential and flows entirely by gravity to the existing trunk on Thompson Street (Sub-catchments X and Y); and

- Flows from the Brook Road SPS and McGill Street SPS assumed to be equivalent to the combined firm rated pumping capacity of the stations as described in **Section 2.2.3**. *This approach is more conservative than what was previously considered for the downstream sewer capacity analysis performed by Engage Engineering as part of the East Village Phase 5 FSR dated April 2019, where the average daily flow rate was applied for McGill Street and Brook Road pumping station flows.*

Inclusive of existing and future flows from the sources noted above, the total flow from the existing serviced area not conveyed through the proposed trunk sewer is 403.41 L/s as summarized in **Table 2.11.**

Table 2.11: Flows to Thompson Street Sewer from Existing Serviced Area

Catchment Area	Description	Peak Flow (L/S)
AA	Industrial/Institutional Flow from Developed/ Undeveloped Lands East of Willmott Street	50.22
X	Existing Residential Lands West of Willmott Street	16.98
Y	East Village Phase 5	9.21
SPS	Brook Road SPS Firm Capacity	81.00
SPS	McGill Street SPS Firm Capacity	246.00
Total Flow from Existing Serviced Area		**403.41**

Additional to the flows summarized in **Table 2.11,** the Thompson Street trunk sewer will receive an ultimate peak flow from the proposed trunk sanitary sewer of 578.45 L/s for a total estimated peak flow of 981.86 L/s. When adjusted to account for the reduced residential peaking factor from all areas combined this becomes 981.77 L/s. At this flow rate (981.77 L/s) the existing Thompson Street trunk sewer, which is a 1,200 mm dia. concrete pipe at a slope of 0.13%, is expected to operate at 70% of its full flow capacity at a velocity of 1.34 m/s.

2.6 Future Sub-Trunk Sewers

In addition to the proposed trunk sewer described in **Section 2.4**, conceptual alignments and profiles have been created for future sub-trunk sewers that are

anticipated to ultimately connect to the proposed trunk sewer to support servicing of many of the sub-catchment areas outlined in **Section 2.2.2**.

The actual design of the future sub-trunk sewers will be influenced by the proposed development structure and road pattern within the sub-catchment areas themselves. The conceptual horizontal alignments for future sub-trunk sewers are illustrated on **Figure 2.2** and are shown in profile in **Appendix B**.

In general, the sub-trunk sewers have been aligned to work with the natural topography of their respective catchment areas. To evaluate the feasibility of each future sub-trunk sewer a typical minimum design slope of 0.5% has been applied and the sewers have been aligned to achieve 2.7 m cover in residential areas and 1.8 m cover in industrial/commercial areas in most instances. The following provides a summary of the future sub-trunk sewers required to connect various catchment areas to the proposed trunk sewer.

2.6.1 Railway Sub-Trunk

From MH SA-E32 on the proposed trunk sewer in the unopened Willmott Street right-of-way it is anticipated that the future Railway sub-trunk sewer will extend approximately 950 m east roughly parallel to the north side of the CN/CP rail corridor. This alignment would facilitate collection of wastewater flows from development on the south slope of the hill that is located north of the rail corridor. This area is shown as Sub-Catchment P and rises from an elevation of ±90 m along the rail corridor to elevations ranging from ±98 m to ±118 m at the crest of the hill.

Extending east at a slope of 0.5% from an invert elevation of 84.37 m at MH SA-32, the future Railway sub-trunk sewer is anticipated to have cover of 6.0 m in the area between the unopened Willmott Street right-of-way and Workman Road. At Workman Road the future sub-trunk would cross under Massey Creek with anticipated cover of ±1.80 m based on a surveyed creek invert elevation of 88.88 m. East of the crossing under Massey Creek, the Railway sub-trunk would likely continue east along Workman Road to the east boundary of the Town. Anticipated cover below the existing road profile along this eastern section is anticipated to be in the range of 3.0 m to 4.0 m.

2.6.2 Massey Creek Sub-Trunk

Extending approximately 900 m north from the Railway sub-trunk along Workman Road the future Massey Creek sub-trunk sewer is anticipated to drain lands in the area shown as Sub-Catchment Q. The lands generally slope southeast towards Massey Creek. From an invert elevation of 87.12 m at the Railway sub-trunk, the Massey Creek sub-trunk can be extended north along Workman Road at a slope of 0.5% with cover of

approximately 3.0 m where it parallels Massey Creek (located on the east side of the road). Further north along Workman Road the natural topography rises steeply from ±96 m to ± 110 m providing additional cover and steeper sewer grades. To avoid multiple drop structures along Workman Road it is possible that the Massey Creek sub-trunk could be integrated into future development layout to more closely follow the natural topography.

On the west side of Workman Road, the lands in the south part of Sub-Catchment Q are separated from the rest of the catchment by Massey Creek and will likely need a local sewer crossing the creek or flowing south to service the area.

2.6.3 Future Kerr Street Sub-Trunk

The Future Kerr Street sub-trunk will extend west of Brook Road North to service lands along and south of the future extension of Kerr Street. It is anticipated that the Future Kerr Street sub-trunk would connect to the proposed trunk sewer at MH SA-E22 approximately 220 m north of the CN/CP rail corridor. The catchment area for the Future Kerr Street sub-trunk is shown as Sub-Catchment O and is expected to capture the block of commercial land located between the CN/CP rail corridor and the east tributary of Brook Creek.

Connecting to the proposed trunk sewer on Brook Road North at an invert elevation of ±89.24 m, the Future Kerr Street sub-trunk initially has ±9.0 m of cover at Brook Road North. This cover declines to ±3.0 m as the sewer extends west/south at a slope of 0.5% for 250 m. Along this length, ground elevations drop from 98.5 m at Brook Road North to 92.5 m near the environmental protection land associated with the Brook Creek East Tributary.

Providing for the connection of the Future Kerr Street sub-trunk at MH SA-E22 approximately 220 m north of the CN / CP rail corridor requires the proposed trunk sewer to be approximately 0.6 m deeper than it otherwise would be at this location. Alternatives to avoid this would include:

- Connecting to the proposed trunk sewer further south at MH SA-E24. This would require that the Future Kerr Street sub-trunk cross Brook Road North within the limits of the approach embankment (or cut) for the future grade separation of the CN/CP rail crossing.
- Connecting the Future Kerr Street sub-trunk to the existing sewer system at the north end of the 375 mm dia. sewer that was previously extended under the CN/CP rail corridor on Brook Road North. This would send flows from the commercial lands in the Kerr Street sub-trunk catchment area to the Brook Road SPS, which already has capacity limitations during wet weather events.

In this regard, setting the proposed trunk sewer at a slightly lower elevation is considered to be the best approach. This approach also benefits other sub-trunk connections further upstream as discussed in the following sections.

2.6.4 **Brook Creek East Tributary South Sub-Trunk**

Extending east of Brook Road North this sub-trunk is intended to capture wastewater flows from the future residential lands situated between the Brook Creek East Tributary and the ridge that parallels the creek 600 to 700 m to the southeast. These lands are shown as Sub-Catchment L1 and L2 and encompass approximately 66 Ha of future residential development.

It is anticipated that the Brook Creek East Tributary South sub-trunk will initially extend east and then northeast towards Workman Road following the portions of the future internal subdivision road network that will roughly parallel the south edge of the environmental protection lands associated with the creek. Conceptually, the alignment for this section of the sub-trunk sewer has been set to follow the 98 m contour. Southeast of this section of the sub-trunk sewer, the lands in the catchment area rise to elevations of up to 118 m. Depending on how the sewer is aligned to the internal road network and how the future subdivision developments are graded this section of sewer is anticipated to have typical cover ranging from 2.8 m to 5.0 m with the western most portion near Brook Road North being deeper.

At Workman Road is anticipated that the Brook Creek East Tributary South sub-trunk will run northwards along Workman Road. Along Workman Road the sub-trunk would roughly follow the 104 m contour paralleling the east edge of the environmental protection area. This would allow local sewers to flow back towards the sub-trunk from the higher lands to the east, which reach elevations of 112 to 134 m. Along Workman Road anticipated cover ranges from 2.8 m to 5.0 m with the depth of cover decreasing to the north. Additional cover could be provided by ultimately aligning the sewer further east of Workman Road in conjunction with the future road pattern.

2.6.5 **Industrial Lands Sub-Trunk**

North of the Brook Creek East Tributary it is anticipated that a sub-trunk sewer will extend west into industrial lands that form Sub-Catchment N. These lands generally slope to the southwest away from the trunk sewer. The eastern portion of the lands in Sub-Catchment N can likely be drained directly to the proposed trunk sewer on Brook Road North, however the lands further west will likely require an internal sub-trunk running parallel to the creek to capture and convey flows.

Such a sub-trunk sewer can service the majority of the lands while maintaining a 1.8 m depth of cover, which assumes the industrial development in this area will not have basements. The very southwest corner of Sub-Catchment N will not likely be serviceable with the proposed trunk sewer by gravity. This area may either require onsite pumping stations or a sewer connection to the west. A connection to the west would ultimately flow to WPCP #1, which may be viable if the sewage flow does not exceed the flow rate that currently flows to the west under existing conditions (refer to **Section 1.2.2.1**).

2.6.6 Brook Creek East Tributary North Sub-Trunk

Extending east of Brook Road North this sub-trunk is intended to capture wastewater flows from the future lands situated between the Brook Creek East Tributary and the ridge that parallels the creek 500 m to the northwest. This area is shown as Sub-Catchment K and encompass approximately 56 Ha of future residential and employment land. The residential land is primarily located on the south slope of the ridge, which rises from ±100 m to ±124 m and typically has a slope of 10 – 12 % towards the creek.

Given the topography, it is anticipated that the Brook Creek East Tributary North sub-trunk will have to be located at or near the bottom of the slope and extend northeast from MH SA-19-B along an alignment roughly parallel to the north edge of the environmental protection lands associated with the creek. Conceptually, the alignment for this section of the sub-trunk sewer has been set to follow the 98 m contour gradually transitioning towards the 100 m contour over a length of 1,400 m.

Running at 0.5% this 1,400 m long section of sub-trunk sewer as considered herein typically has cover of 2.5 to 3.0 m. However, some portions have less cover (e.g., 1.8 m). It is anticipated that this will not be a major issue as the adjacent development will all be situated on a slope significantly higher than the sewer alignment. Alternatively, the sewer could be aligned to place it further up the slope increasing cover with development on the downslope side built on fill to generally provide a less steeply sloped development area.

Approximately 1,400 m northeast of Brook Road North it is anticipated that the sub-trunk sewer will turn northwards to cross Elgin Street East and then follow a path northeast again along the 106 m contour. North of this area local sewers would drain the residential and employment lands along the existing alignment of Danforth Road, which are situated at significantly higher elevations up to ±146 m.

2.6.7 **Elgin Street East Sub-Trunk**

At Elgin Street East the proposed trunk sewer on Brook Road North turns west along Elgin Street East to provide a connection for the Cobourg Trails sub-trunk sewer discharging to Elgin Street East at future Street A in Phase 1. East of Brook Road North it is anticipated that the Elgin Street East sub-trunk sewer will extend easterly towards Greer Road. This section of Elgin Street East rises at approximately 5% from west-to-east providing considerable flexibility for the grade and depth of the trunk sewer.

It is anticipated that the Elgin Street East sub-trunk sewer will capture flows from catchment areas on both sides of Elgin Street East in the Sub-Catchments shown as E, F2 and I. Sub-catchment F2 includes the lands in Phase 7 of the Cobourg Trails development, which cannot be practically captured in the sub-trunk that is internal to the development (F1).

2.6.8 **Cobourg Trails Sub-Trunk**

The Cobourg Trails internal sub-trunk sewer has been designed by Biddle to service Phases 1, 3, 4, 5 & 6 of the Cobourg Trails development (Sub-Catchment F1). The Cobourg Trails internal sub-trunk will generally follow the alignment of future Steet A and will connect to the proposed external trunk sewer at the intersection of Elgin Steet East and future Steet A (at MH SA-18). Immediately upstream of MH SA-18 the proposed Cobourg Trails sub-trunk sewer is a 450 mm dia. pipe at 0.65% slope.

The Cobourg Trails sub-trunk sewer has been sized by Biddle to accommodate external flows from a number of areas located to the north and east including:

- Sub-Catchment G, which is a small area (1.54 Ha) of future residential land north of Phase 1 that is expected to flow to the Cobourg Trails sub-trunk by gravity.
- Sub-Catchment A, which is the low-lying future residential and employment land adjacent to Midtown Creek. The majority of Sub-Catchment A is undevelopable due to environmental constraints. 13.57 Ha is considered developable, but due to its low elevations would have to be serviced by a local pumping station discharging to the Cobourg Trails sub-trunk.
- Sub-Catchments C and D, which include the future employment lands that are located on the north side of Danforth Road. It is anticipated that that an external sub-trunk sewer would convey flows from these areas along Danforth Road to connect to the Cobourg Trails internal sub-trunk at future Street L. This sub-trunk would be approximately 1,000 m long with an average slope of 1.8% achievable based on the existing topography.
- Sub-Catchment B, which is 11.66 Ha of residential land located east of Greer Road at the head waters of the Brook Creek West Tributary. It is anticipated that

sub-trunk sewers along Greer Road would convey flows connecting to the Cobourg Trails internal trunk at future Street U.

3 Water Servicing

Preliminary alignment and profile of trunk and sub-trunk watermains for external servicing of Cobourg East was set by Town of Cobourg design guidelines and other relevant design standards and criteria as summarized in **Section 3.1**.

An overview of the proposed trunk/sub-trunk watermain preliminary alignments is provided in **Figure 3.1** below. The scope of work is summarized in the Table below and further described in **Section 3.2.3** in the context of the Cobourg Drinking Water System Master Plan and related works being design by others (i.e., internal servicing).

Table 3.1: Scope of Work for Proposed Trunk and Sub-Trunk Watermain

Street Name	Design Elements
Elgin Street East From: Cobourg Trails Future Street A To: ±560 m East of Brook Road North	400 mm Dia. CPP or PVC Typical Depth 1.8-2.0 m
Brook Road North From: Elgin Street East To: LUSI Electrical Sub-Station Property	400 mm Dia. CPP or PVC Typical Depth 1.8-2.0 m
Barracks Drive / Cobourg Park Lands From: Barracks Drive at Preferred Zone 2 BPS Site To: Brook Road North	400 mm Dia. CPP or PVC Typical Depth 1.8-2.0 m
Densmore Road / Danforth Road From: Parkview Hills Drive To: Cobourg Trails Future Street L	300 mm Dia. HDPE or PVC by HDD Typical Depth 1.8-2.0 m

HAMILTON TOWNSHIP

HIGHWAY 401

Zone 2

Fut. Zone 3

Densmore Road

Danforth Road

Future Grade Level Tank(s) (Zone 2)

Future Booster Pumping Station (Zone 3)

Future Street L

Phase 3

Phase 4

Phase 5

Future Street U

Midtown Creek

Brook Creek West Tributary

Future Street A - West Leg

Future Street A - East Leg

Phase 1

Phase 6

Phase 7

Future Natural Channel Restoration (Design By Others)

ELGIN STREET EAST

Phase 2

Brook Creek East Tributary

BROOK ROAD NORTH

D'ARCY STREET

UNIVERSITY AVENUE EAST

Chapel Street

KING STREET EAST

Queen Street

D'Arcy Street

Coverdale Avenue

Willmott Street

Massey Creek

Canadian National Railway

Canadian Pacific Railway

Lakeshore Drive

Lakeshore Road

LAKE ONTARIO

2a 2b 2c 2d 2e 2f 2g 2h 2i 2j 2k 2l 2m 2q 2r 2t 1a 1b 1c 3a 3b

LEGEND

PROPOSED WATER INFRASTRUCTURE

- EXTERNAL TRUNK / SUB-TRUNK WATERMAIN
- TRUNK / INTERNAL SUB-TRUNK WATERMAIN DESIGN BY OTHERS

FUTURE WATER INFRASTRUCTURE

- ELEVATED TANK (ZONE 1)
- GRADE LEVEL TANK(S) (ZONE 2)
- BOOSTER PUMPING STATION (ZONE 2)
- BOOSTER PUMPING STATION (ZONE 3)

FUTURE TRUNK WATERMAIN UPGRADES (COBOURG DWS MASTER PLAN)

- ZONE 1 TRUNK WATERMAIN
- ZONE 2 SUB-TRUNK WATERMAIN
- ZONE 2 TRUNK WATERMAIN
- ZONE 3 SUB-TRUNK WATERMAIN

EXISTING WATERMAIN

- LESS THAN 300MM
- 300MM
- 400MM
- 450MM
- 600MM
- RAW WATER INTAKE PIPE

LAND USE

- RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- ENVIRONMENTAL CONSTRAINT
- PARK
- MAIN CENTRAL AREA
- SHOPPING NODE
- MIXED USE
- MAJOR INSTITUTIONAL
- EMPLOYMENT
- SECONDARY PLAN AREA

OTHER FEATURES

- PRESSURE ZONE 1/ZONE 2 BOUNDARY
- PRESSURE ZONE 2/FUTURE ZONE 3 BOUNDARY
- BUILDING FOOTPRINT (>= 10,000 SQ. FT.)
- COBOURG TRAILS DEVELOPMENT PHASING
- TOWN OF COBOURG MUNICIPAL BOUNDARY

CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters — 1:7,000

PROJECT NAME: **COBOURG TRAILS EXTERNAL SERVICING**

SHEET TITLE: **WATERMAIN EXTERNAL SERVICING PLAN**

PROJECT No: C14-0454		CLIENT FILE No: ---
DRAFTER: S. ELLIOTT	DESIGNER: ---	FIGURE No: 3.1
APPROVER: D. CAMPBELL	APPROVER: ---	
DATE: 1/7/2022		SHEET No: 1 of 1

3.1 Applicable Design Criteria Standards

The proposed watermains have been designed in accordance with the following design standards and guidelines:

- The latest revision of Town of Cobourg Design Guidelines, revised April 2015;
- Design Guidelines for Drinking-Water Systems, Ministry of the Environment (MOE), revised 2008;
- Design Specification for Watermains, The Regional Municipality of Durham, revised April 2020; and
- F-6-1 Procedures to Govern Separation of Sewers and Watermains, Ministry of the Environment, Conservation and Parks, revised July 2021.

3.2 Required Pumping and Water Distribution System Upgrades

The Town of Cobourg is currently comprised of two (2) pressure zones. Pressure Zone 1 encompasses the lower elevation areas in the Town and contains relatively little undeveloped land. Pressure Zone 2 encompasses the northern, higher elevation areas in the Town inclusive of the majority of undeveloped lands within the Town of Cobourg. With exception to the serviced areas south of the CN/CP rail corridor in the area of Willmott Street, most of the Study Area is located in Pressure Zone 2. Development in the Study Area will result in build-out within existing Pressure Zone 2 and the establishment of a third pressure Zone in the northeast corner of the Cobourg urban area (in the Greer Road, Nagle Road, Danforth Road area).

Based on the Cobourg Drinking Water System Master Plan (July 2021) prepared by CIMA+, Phases 1, 2, 3, 4 and 7 of the Cobourg Trails Community are located in existing Pressure Zone 2. Phases 5 and half of 6 of the proposed development are located in future Pressure Zone 3.

3.2.1 Zone 2 Pumping Requirements

Future demands in Cobourg East will be satisfied by supplying treated water from Pressure Zone 1 via existing and future booster pumping stations to the higher elevations of Zone 2 and Zone 3.

As discussed in **Section 1.3.4**, there is currently sufficient Zone 2 pumping capacity to support Cobourg Trails development Phase 1 along with other near-term development that the Town has approved (to various levels) in Zone 2. However, additional pumping capacity is required to support the full build-out of the Cobourg Trails development.

In general, the existing Ewart Street Booster Pumping Station (BPS) operating up to 80% of its firm rated capacity is considered to have sufficient capacity to support an additional population of 2,225 persons. When the report outlined in **Section 1.3.4** was prepared (January 2021), the Cobourg Trails Phase 1 development (with forecasted population of 514 people) along with other Zone 2 residential developments that were draft approved, fully approved or under construction and an allowance for non-residential growth, represented additional water demands in Zone 2 equivalent to 1,900 people.

The Cobourg Drinking Water System Master Plan (Master Plan) identifies a total combined future Zone 2 pumping capacity requirement of 432 L/s to meet the full build-out demands of Zone 2 and Future Zone 3, which would be serviced through Zone 2. The Master Plan recommend that this pumping capacity be provided by the Ewart Street BPS with a firm rated capacity of 152 L/s plus new pumping facilities as illustrated in red in **Figure 3.2**.

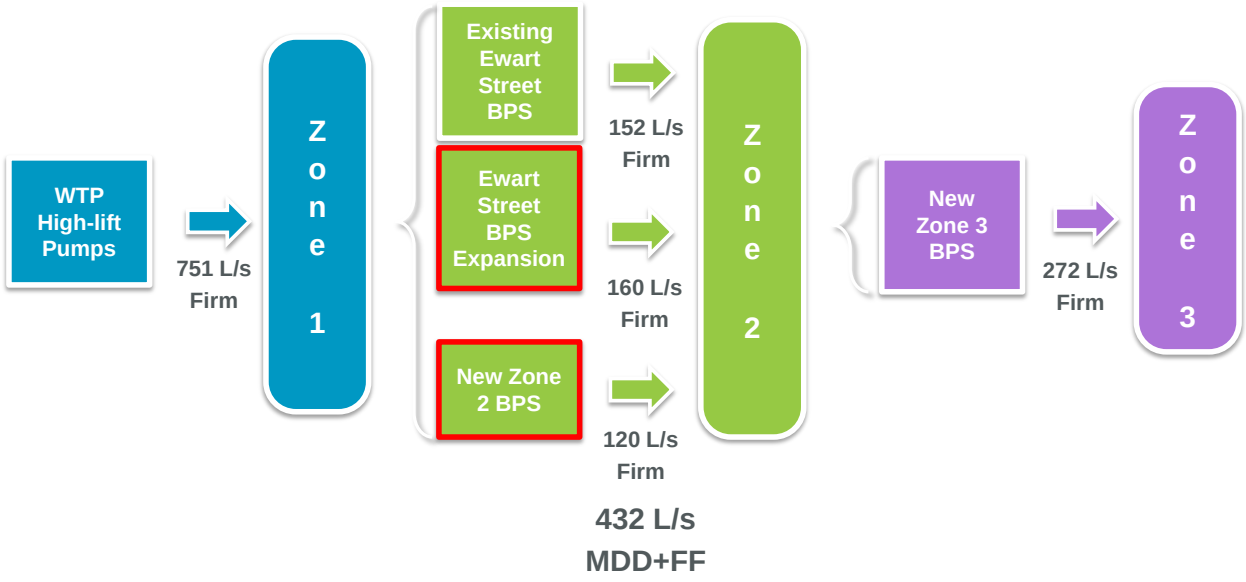


Figure 3.2: Master Plan Pumping Strategy

The Master Plan identifies that the first stage of additional Zone 2 pumping capacity that would support development Phase 2 and beyond of the Cobourg Trails Community would be provided by the construction of a new Zone 2 BPS facility with a firm rated capacity of 120 L/s. The Master Plan identifies the preferred location for this new Zone 2 BPS facility as the site of the preferred location of the new Zone 1 Elevated Tank (ET) as discussed in **Section 1.3.3**. This site located southeast of the Cobourg Community Centre (CCC) would accommodate co-location of both the Zone 2 BPS facility and the Zone 1 ET at the rear of Buildings 18 &19 of the Northam Industrial Park as schematically illustrated in **Figure 3.3**.

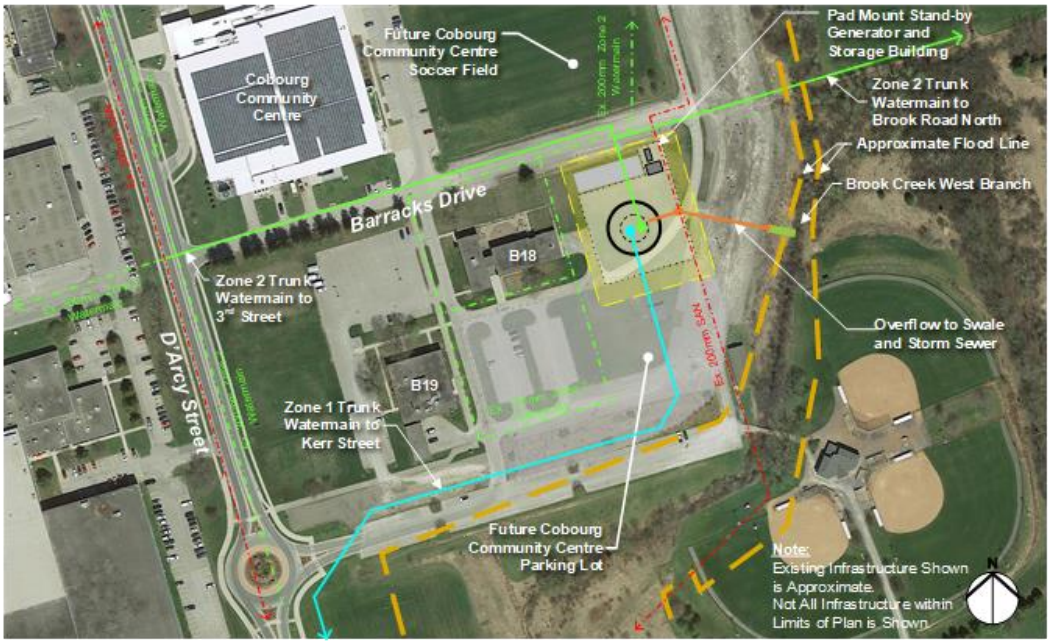


Figure 3.3: Master Plan Preferred Site for Co-Located Zone 2 BPS and Zone 1 ET

Completion of a Schedule B Municipal Class Environmental Assessment (MCEA) is required to confirm the location of these facilities. It is anticipated that LUSI will initiate the MCEA in 2022. Site investigations to support the MCEA have been completed in 2021 including a natural environment investigation (Cambium) and an archeological / cultural heritage investigation (Bluestone Research). It is also anticipated that a request for proposals to undertake a geotechnical investigation for these facilities and the related watermains connecting to D'Arcy Street will be released in early 2022.

The ability to support the earlier phases (i.e., Phase 2) in advance of the provision of additional Zone 2 pumping capacity can potentially be determined based on the following with consideration for the timeline of the new Zone 2 BPS entering service:

- LUSI's comfort in operating the Ewart Street BPS at levels exceeding 80% of capacity; and
- The progress of other developments in Zone 2 (in addition to Tribute's) and the actual resultant increase in Zone 2 water demand.

3.2.2 Zone 3 Pumping Requirements

To service Cobourg Trials Phase 5 and 6 a BPS to service Pressure Zone 3 will be required. Based on the Master Plan, supply of Zone 3 will likely be provided in the form of an above-grade in-line BPS to supply treated water into a closed distribution system.

3.2.3 **Water Distribution Infrastructure**

To effectively service the Cobourg Trails development area, a network of new trunk and sub-trunk watermains is required. These new watermains will expand the Zone 2 distribution system connecting the proposed development lands to existing trunk and sub-trunk watermains as well as the proposed new Zone 2 BPS facility discussed in **Section 3.2.1**.

At a high-level, preliminary preferred alignments for proposed watermains are based on the Master Plan with consideration given to providing a “looped” water distribution network that would limit dead-end scenarios. The external trunk and sub-trunk watermains addressed in detail by this FSR are the Zone 2 watermains that are necessary to service the portions of the Cobourg Trails development that are located in Pressure Zone 2 (i.e. Phases 1, 2, 3 ,4 & 7). These proposed watermains are illustrated with heavy solid blue linework on **Figure 3.1** and include:

- New 400 mm dia. trunk watermain east from the preferred Zone 2 BPS site to Brook Road North along the south side of existing soccer fields at the rear of the Cobourg Community Centre through Cobourg Trails Phase 2 and along the south side of the existing Lakefront Utility Services Inc. (LUSI) Brook Road North electrical substation property. This is Master Plan project 2b and is required to support development of Phase 2 and beyond.
- New 400 mm dia. trunk watermain on Brook Road North between the LUSI electrical substation property to Elgin Street East. This is the northern portion of Master Plan Project 2c and is required to support development of Phase 2 and beyond.
- New 400 mm dia. trunk watermain along Elgin Street East from Brook Road North westerly to future Street A within Phase 1 of the Cobourg Trails development. Collectively, with the watermain upgrades being designed by Biddle to provide a 400 mm dia. watermain between Conger Avenue and future Street A, this comprises Master Plan project 2e and is required to support development of Phase 2 and beyond.
- New 400 mm dia. trunk watermain along Elgin Street East from Brook Road North easterly to future Street A between Phases 5 and 7 of the Cobourg Trails development. This is Master Plan project 2d and is required to support development in Zone 3 (Phase 5 & 6) as well as Phase 7. The need for this project support development of Phase 4 should be confirmed through the development of an FSR specifically for the internal servicing of that phase.

  New 300 mm dia. sub-trunk watermain is required east along Densmore Road/Danforth Road from Parkview Hills Drive to ± 1,060 m east of the Brook Road North unopened right-of-way to future Street L, as proposed by Tribute,

and southerly into the Cobourg Trails development lands between Phase 3 and Phase 4. This is generally equivalent to Master Plan projects 2m and 2l (L) in terms of the total length of watermain and the connectivity and looping that it provides and is required to support development of Phase 2 and beyond.

The alignment of this section has been modified through the development of this FSR to avoid the unopened right-of-way of Brook Road North and continue the watermain easterly along Danforth Road. This change was made to avoid environmental impacts and construction logistical challenges related to the wetland areas along the unopened Brook Road North right-of-way (see **Section 3.6.1** for further details).

To support the watermain projects/works that are specifically addressed in this FSR it is necessary for other trunk/sub-trunk watermain improvements to be implemented by others. These watermains are illustrated with heavy blue dashed linework on **Figure 3.1** and include:

- New 400 mm dia. watermain on Barracks Drive between D'Arcy Street and the preferred Zone 2 BPS site to connect the new Zone 2 BPS to the existing sub-trunk watermain on D'Arcy Street at 3rd Street. This is Master Plan project 2a and is anticipated to be advanced by LUSI in conjunction with the new Zone 2 BPS facility.
- New 450 mm dia. watermain along D'Arcy Street and the Legion Fields access road to supply Zone 1 water to the intake side of the New Zone 2 BPS facility. This is Master Plan project 1c and is anticipated to be advanced by LUSI in conjunction with the new Zone 2 BPS and Zone 1 ET facilities.
- Internal 300 mm dia. watermain along future Street A within Cobourg Trails being designed by Biddle. This is Master Plan project 2t and would likely be built in stages with:
    - The portion from where the west leg of future Street A intersects Elgin Street East northerly to future Street L proceeding first with Phases 1 and 3 and providing a looped connection between Danforth Road and Elgin Street.
    - The portion from future Street L, east/southerly to future Street U proceeding with Phase 4 and providing a connection to the trunk watermain that forms part of Master Plan project 2f.
- New 400 mm dia. watermain along future Street A within Cobourg Trails from where the west leg of future Street A intersects Elgin Street East northerly and easterly to future Street U. This is a portion of Master Plan project 2f and

provides looping of the internal watermains servicing Phase 4, plus future connectivity for Zone 2 storage facilities and Zone 3 pumping facilities located to the northeast.

This FSR does not address external watermains and pumping infrastructure required to supply Phase 5 and Phase 6 of the Cobourg Trails development, which are located in Pressure Zone 3.

3.3 Watermain Sizing

The watermain sizing outlined above has been established initially based on the Cobourg Drinking Water System Master Plan. Given that Master Plan was developed based on full build-out demands and the ultimate conditions trunk/sub-trunk watermain network, several additional scenarios were evaluated to confirm watermain sizing with respect to interim development and infrastructure conditions.

These additional scenarios are generally described as below and outlined further in the subsequent sections:

- **Scenario 1:** Considers the development of Phases 1 & 2 of Cobourg Trails along with other under construction and approved development in Zone 1 and Zone 2 of the Town of Cobourg supported by a minimum level of new infrastructure that includes only some of the new watermains in Tribute's planned external servicing scope and no additional pumping or storage facilities.
- **Scenario 2a:** Considers the development of Phases 1, 2, 3 & 4 (of Cobourg Trails along with other under construction and approved development in Zone 1 and Zone 2 of the Town of Cobourg supported by additional infrastructure that includes all of the watermains in Tribute's planned external servicing scope and the new Zone 2 BPS with firm pumping capacity of 120 L/s.
- **Scenario 2b:** Considers the development of Phases 1, 2, 3, 4 & 7 of Cobourg Trails plus the lower elevation portions of Phases 4 & 5 (i.e., all Zone 2 phases) along with other under construction and approved development in Zone 1 and Zone 2 of the Town of Cobourg supported by additional infrastructure that includes all of the watermains in Tribute's planned external servicing scope and the new Zone 2 BPS with firm pumping capacity of 120 L/s.
- **Scenario 3:** Considers a scenario where the watermains in Tribute's planned internal and external servicing scope have been built and will support full build-out of Pressure Zone 3.

Table 3.2 summarizes the infrastructure and demands included in the three (3) modeling scenarios.

Table 3.2: Summary of Additional Modelling Scenarios

Scenario	New Infrastructure Included	Demands Included
1	External servicing watermains • 2a, 2b, 2c (north), 2e Internal watermains • 2t (in Phase 1) sub-trunk • Phase 1 & 2 local watermains	Existing + Under construction and approved Zone 1 & Zone 2 development + Cobourg Trails Phase 1 & 2
2a	External servicing watermains • 2a, 2b, 2c (north), 2e, **2m** Infrastructure by Others • WM **1c**, New **Zone 2 BPS** and New **Zone 1 ET** Internal watermains • 2t (Phase 1, **3 & 4**), **2l** sub-trunks • Phase 1, 2, **3 & 4** local watermains	Existing + Under construction and approved Zone 1 & Zone 2 development + Cobourg Trails Phase 1, 2, **3 & 4**
2b	External servicing watermains • 2a, 2b, 2c (north), **2d**, 2e, 2m Infrastructure by Others • WM 1c, New Zone 2 BPS and New Zone 1 ET Internal watermains • **2f** (Zone 2 only), 2t, 2l sub-trunks • Phase 1, 2, 3, 4 **& 7** local watermains and Phases **5 & 6 Zone 2** local watermains	Existing + Under construction and approved Zone 1 & Zone 2 development + Tribute Phase 1, 2, 3, 4 **& 7** + Lower elevation portions of **Phase 5 & 6** (i.e., all Zone 2 development)

Scenario	New Infrastructure Included	Demands Included
3	External servicing watermains • 2a, 2e, 2c, 2d, 2e, 2m Infrastructure by Others • WM 1c, New Zone 2 BPS and New Zone 1 ET, WMs **3a** & **3b** and New **Zone 3 BPS** Internal watermains • **2f**, 2t, 2l sub-trunks Phase 1, 2, 3, 4, **5 & 6** local watermains	Existing + Under construction and approved Zone 1 & Zone 2 development + Tribute Phase 1, 2, 3, 4 & 7 + Lower elevation (Z2) portions of Phase 5 & 6 + **Zone 3 PHD** (35.8 L/s) including Tribute Phase 5 & 6.

For the purposes of this analysis the following conditions have been reviewed for each modelling scenario:

- Pressures under Maximum Day Demand (MDD) conditions with no Zone 2 booster pumps operating. In this scenario the Zone 2 Elevated Tank is set at a level of 7.2 m full, which is 3.8 m below the TWL of 158.40 m. It is understood that this is the level at which Zone 2 booster pumps are typically started to replenish the level of the Zone 2 Elevated Tank.
- Pressures under MDD conditions with Zone 2 booster pumps operating at the Ewart Street BPS. In this scenario the Zone 2 Elevated Tank is set at a level of 7.2 m full, which is 3.8 m below the TWL of 158.40 m. It is understood that this is the level at which Zone 2 booster pumps are typically started to replenish the level of the Zone 2 Elevated Tank.
- Available fire flows under MDD conditions with the largest pumps out of service at each pumping facility and the Zone 2 elevated tank at a level of 6.0 m part-way into the fire storage.
- Velocities in the proposed external trunk watermains when MDD plus a simulated fire flow is being supplied to the newly developed area of Cobourg Trails.

It is anticipated that additional detailed modeling will be completed to support the design of internal watermains within each Phase and specifically define the location of pressure zone boundaries.

3.3.1 Scenario 1 Modelling Results

Scenario 1 includes the new infrastructure listed in **Table 3.2**. The new external trunk/sub-trunk watermains included in Scenario 1 are shown in red on **Figure 3.4** and the internal sub-trunk watermains are shown in orange. In addition to external trunk and sub-trunk watermains, Scenario 1 includes the local watermains for Phases 1 & 2 of Cobourg Trails along with the demands for these phases and for other committed developments elsewhere in Zone 1 and Zone 2. There is no additional Zone 2 pumping capacity included in Scenario 1.

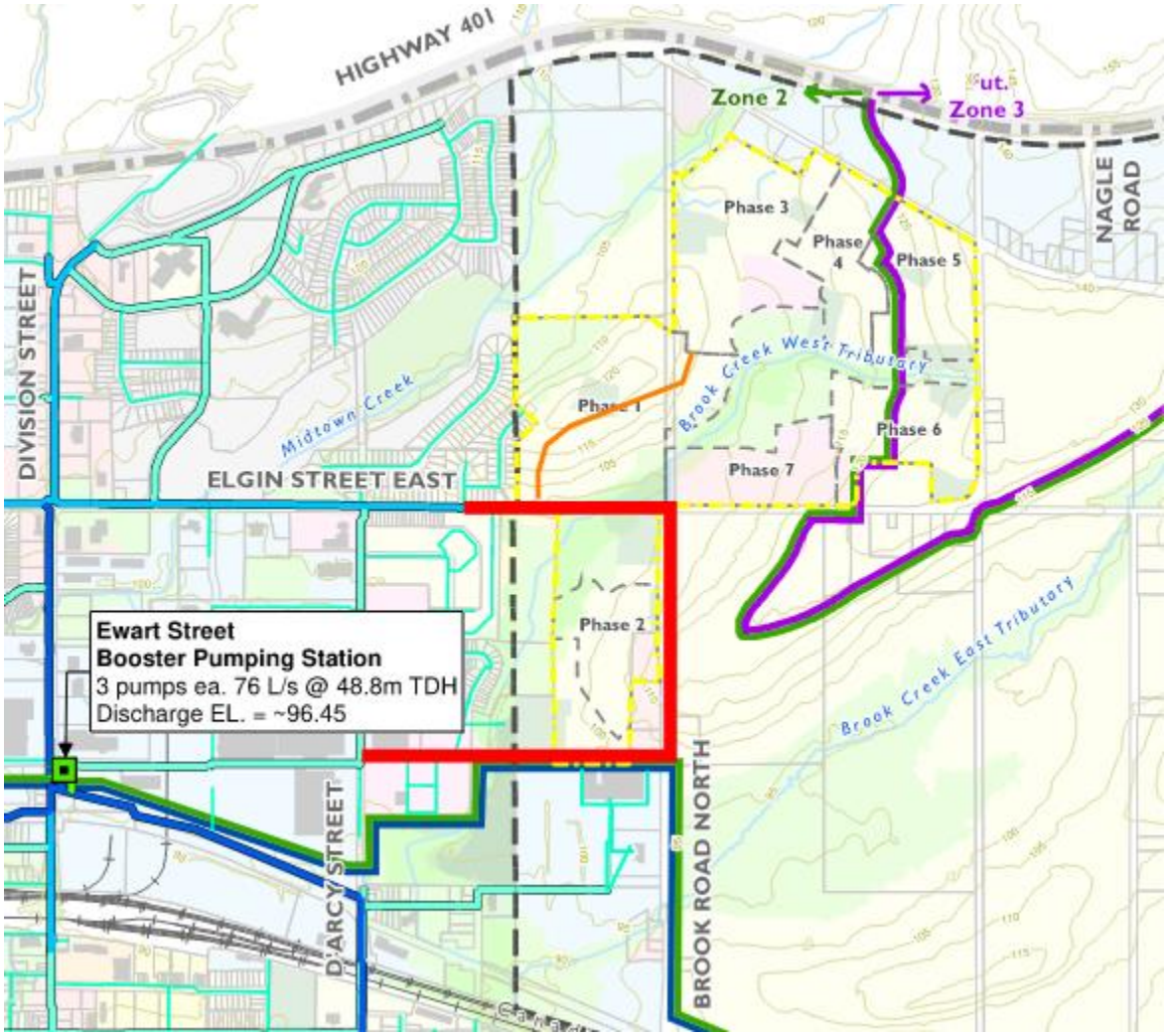


Figure 3.4: Scenario 1 New Watermain Infrastructure

3.3.1.1 Maximum Day Demand Pressures

Under Scenario 1 maximum day demand pressures are as outlined in **Table 3.3**. These pressures are largely within the MECP recommended normal operating range of 350 to 480 kPa (50 to 70 PSI) and are all above the minimum allowable pressure under normal

conditions, which is 275 kPa (40 psi). The lowest pressures occur at the high point in Phase 1 where elevations are approximately 120 m, which is at the upper end of the range serviced by Zone 2.

Table 3.3: Scenario 1 Internal Pressures

Phase	MDD No Pumping		MDD With Pumping	
	Press. (psi)	Press. (kPa)	Press. (psi)	Press. (kPa)
Phase 1 (1)	47 to 73	324 to 503	52 to 78	359 to 538
Phase 2	68 to 76	469 to 524	73 to 81	503 to 558

Notes:

1. Phase 1 low pressures adjusted for earthworks cut, reducing maximum elevations in Phase 1 from ±123.5 m (existing) to ±118.5 m (proposed). All other pressures are based on existing topography elevations.

3.3.1.2 Available Fire Flows

While maintaining residual pressures in the distribution system of 140 kPa (20 psi) the Scenario 1 watermain network is able to deliver fire flows (from a single junction) within the proposed development areas that range from 9,500 L/min on 200 mm dia. local watermains in Phase 1 to 16,500 L/min on 300 mm dia. local watermains in Phase 2. Fire flows that can be delivered by the Scenario 1 watermain network are summarized in **Table 3.4** for each development phase.

Table 3.4: Scenario 1 Available Fire Flows

Phase	Flow (L/s)	Flow (L/min)
Phase 1	160 to 235	9,500 to 14,000
Phase 2	280	16,500

These available fire flows are above the 4,000 L/min requirement provided in the Fire Underwriters Survey (FUS) document Water Supply for Fire Protection (1999) short form table for wood frame dwellings having greater than 3.0 m separation, and are also above the 9,000 L/min requirement that is typically calculated using the full FUS method for wood frame single family dwellings that have less than 3.0 m separation (on two (2) sides) and total floor areas (excl. basements) of less than 2,500 sq ft.

3.3.1.3 External Watermain Velocities

Under maximum day demand conditions plus a fire flow of 15,000 L/min simulated in Phase 1, velocities in the proposed external watermains included in Scenario 1 are as summarized in **Table 3.5**

Table 3.5: Scenario 1 External Watermain Velocities under Maximum Day Demand plus Fire Flow (15,000 L/min)

Location	Velocity (m/s)
Elgin Street East west of Brook Road North	1.37
Brook Road North south of Elgin Street East	0.63
D'Arcy Street to Brook Road North Connection south of Phase 2	0.65

The velocities noted above are all less than the maximum allowable velocity of 3.0 m/s. Given that the above noted velocities occur under what would be considered relatively high flow rates, it is anticipated that it will be necessary to isolate particular branches of the trunk watermain to achieve flushing velocities of 0.8 m/s.

3.3.2 Scenario 2a Modelling Results

Scenario 2a includes the new infrastructure listed in **Table 3.2**. The new external trunk/sub-trunk watermains included are shown in red on **Figure 3.5** and the internal sub-trunk watermains are shown in orange. Scenario 2a also includes the local watermains for Phases 1, 2, 3 & 4 of Cobourg Trails along with the demands for these phases and other committed developments elsewhere in Zone 1 and Zone 2 of the Town of Cobourg. The new Zone 2 Booster Pumping Station (BPS) is also included in Scenario 2a.

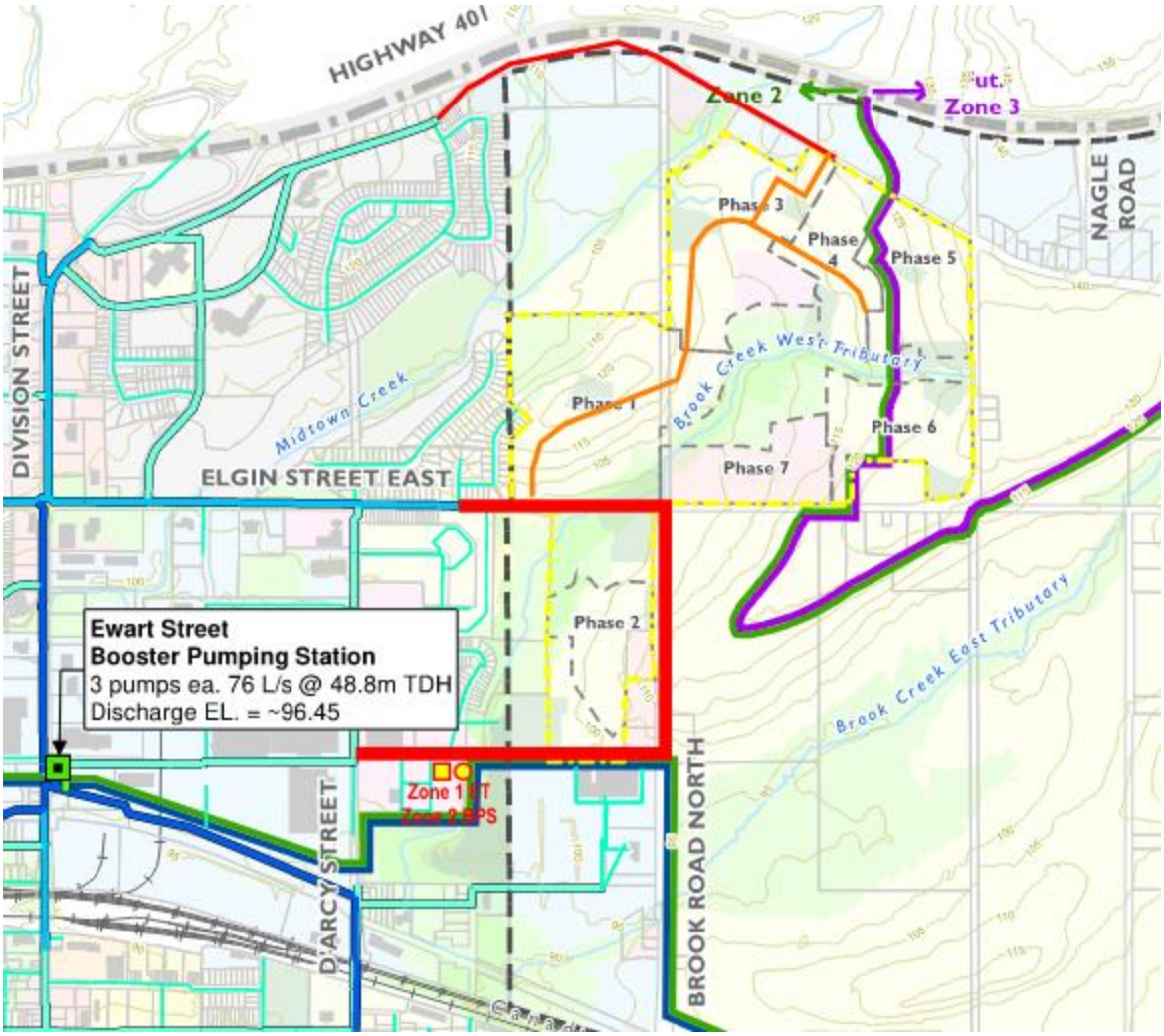


Figure 3.5: Scenario 2a New Watermain Infrastructure

3.3.2.1 Maximum Day Demand Pressures

Under Scenario 2a maximum day demand pressures are as outlined in **Table 3.6**. These pressures are largely within the MECP recommended normal operating range of 350 to 480 kPa (50 to 70 PSI) and are also above the minimum allowable pressure under normal conditions, which is 275 kPa (40 psi). The lowest pressures occur at the high points in Phase 1 and Phase 6 where elevations are approximately 120 m, which is at the upper end of the range serviced by Zone 2.

Table 3.6: Scenario 2a Internal Pressures

Phase	MDD No Pumping		MDD With Pumping	
	Press. (psi)	Press. (kPa)	Press. (psi)	Press. (kPa)
Phase 1 (1)	46 to 73	317 to 503	58 to 84	400 to 579
Phase 2	67 to 75	462 to 517	79 to 87	545 to 600
Phase 3	49 to 61	338 to 421	60 to 72	414 to 496
Phase 4	46 to 55	317 to 379	57 to 67	393 to 462

Notes:

1. Phase 1 low pressure adjusted by +4.2 psi to account for earthworks cut reducing maximum elevations in Phase 1 from ±123.5 m (existing) to ±118.5 m (proposed). All other pressures are based on existing topography elevations.

3.3.2.2 Available Fire Flows

While maintaining residual pressures in the distribution system of 140 kPa (20 psi) the Scenario 2a watermain network is able to deliver fire flows (from a single junction) within the proposed development areas that range from 12,000 L/min on 200 mm dia. local watermains in Phase 1 to 23,000 L/min on 300 mm dia. local watermains in Phase 2. Fire flows that can be delivered by the Scenario 2a watermain network are summarized in **Table 3.7** for each development phase.

Table 3.7: Scenario 2a Available Fire Flows

Phase	Flow (L/s)	Flow (L/min)
Phase 1	200 to 370	12,000 to 21,000
Phase 2	390+	23,000+
Phase 3	300+	18,000+
Phase 4	235 to 305	14,000 to 18,000

These available fire flows are above the 4,000 L/min requirement provided in the Fire Underwriters Survey (FUS) document Water Supply for Fire Protection (1999) short form table for wood frame dwellings having greater than 3.0 m separation and are also above the 9,000 L/min requirement that is typically calculated using the full FUS method

for wood frame single family dwellings that have less than 3.0 m separation (on two (2) sides) and total floor areas (excl. basements) of less than 2,500 sq ft.

3.3.2.3 External Watermain Velocities

Under maximum day demand conditions plus a fire flow of 18,000 L/min simulated in **Phase 1**, velocities in the proposed external watermains included in Scenario 2a are as summarized in **Table 3.8.**

Table 3.8: Scenario 2a External Watermain Velocities under Maximum Day Demand (MDD) plus Fire Flow (18,000 L/min)

Location	Velocity (m/s)
Elgin Street East west of Brook Road North	0.78
Brook Road North south of Elgin Street	0.78
D'Arcy Street to Brook Road Connection south of Phase 2	0.81

The velocities noted above are all less than the maximum allowable velocity of 3.0 m/s. Given that the above noted velocities occur under what would be considered relatively high flow rates it is anticipated that it will be necessary to isolate particular branches of the trunk watermain to achieve flushing velocities of 0.8 m/s.

3.3.3 Scenario 2b Modelling Results

Scenario 2b includes the new infrastructure listed in **Table 3.2**. The new external trunk/sub-trunk watermains included are shown in red on **Figure 3.6** and the internal sub-trunk/trunk watermains are shown in orange. Scenario 2b also includes the local watermains for Phases 1, 2, 3, 4 & 7 of Cobourg Trails plus the lower elevation (i.e., Zone 2) areas of Phases 5 & 6, along with the demands for these phases and for committed developments elsewhere in Zone 1 and Zone 2 of the Town of Cobourg. The new Zone 2 Booster Pumping Station (BPS) is also included in Scenario 2b.

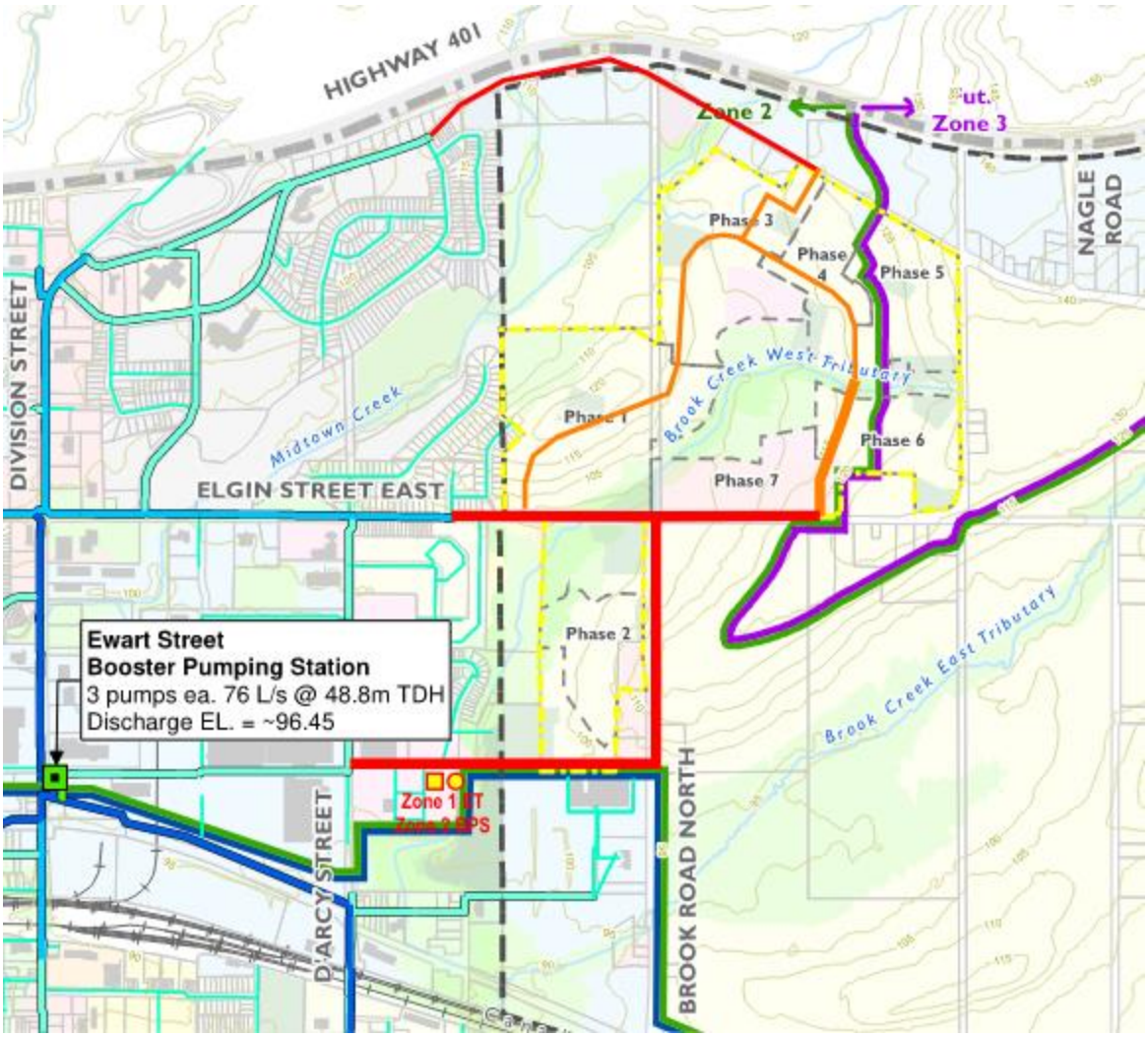


Figure 3.6: Scenario 2b New Watermain Infrastructure

3.3.3.1 Maximum Day Demand Pressures

Under Scenario 2b maximum day demand pressures are as outlined in **Table 3.9**. These pressures are largely within the MECP recommended normal operating range of 350 to 480 kPa (50 to 70 PSI) and are also above the minimum allowable pressure under normal conditions, which is 275 kPa (40 psi). The lowest pressures occur at the high points in Phases 6 and 7 where elevations are approximately 120 m, which is at the upper end of the range serviced by Zone 2.

Table 3.9: Scenario 2b Internal Pressures

Phase	MDD No Pumping		MDD With Pumping	
	Press. (psi)	Press. (kPa)	Press. (psi)	Press. (kPa)
Phase 1 (1)	46 to 72	317 to 496	58 to 84	400 to 579
Phase 2	67 to 75	462 to 517	78 to 87	538 to 600
Phase 3	49 to 61	338 to 421	60 to 72	414 to 496
Phase 4	45 to 55	310 to 379	57 to 67	393 to 462
Phase 5 (Z2) (2)	45 to 50	310 to 345	56 to 61	386 to 421
Phase 6 (Z2) (2)	42 to 51	290 to 352	53 to 63	365 to 434
Phase 7	42 to 72	290 to 496	53 to 83	365 to 572

Notes:

1. Phase 1 low pressure adjusted by +4.2 psi to account for earthworks cut reducing maximum elevations in Phase 1 from ±123.5 m (existing) to ±118.5 m (proposed). All other pressures are based on existing topography elevations.
2. Low range of pressures can be controlled for when adjusting zone boundary to account for future earthworks/grading.

3.3.3.2 Available Fire Flows

While maintaining residual pressures in the distribution system of 140 kPa (20 psi) the Scenario 2b watermain network is able to deliver fire flows (from a single junction) within the proposed development areas that range from 12,000 L/min on 200 mm dia. local watermains in Phase 1 to 24,000 L/min plus on 300 mm dia. local watermains in Phase 2. Fire flows that can be delivered by the Scenario 2b watermain network are summarized in **Table 3.10** for each development phase.

Table 3.10: Scenario 2b Available Fire Flows

Phase	Flow (L/s)	Flow (L/min)
Phase 1	200 to 380	12,000 to 22,000
Phase 2	390+	23,000+
Phase 3	280 to 400	16,000 to 24,000
Phase 4	285 to 400	16,000 to 24,000
Phase 5 (Zone 2)	225	13,000
Phase 6 (Zone 2)	350 to 390	21,000 to 23,000
Phase 7	390+	23,000+

These available fire flows are above the 4,000 L/min requirement provided in the Fire Underwriters Survey (FUS) document Water Supply for Fire Protection (1999) short form table for wood frame dwellings having greater than 3.0 m separation and are also above the 9,000 L/min requirement that is typically calculated using the full FUS method for wood frame single family dwellings that have less than 3.0 m separation (on two (2) sides) and total floor areas (excl. basements) of less than 2,500 sq ft.

3.3.3.3 External Watermain Velocities

Under maximum day demand conditions plus a fire flow of 24,000 L/min simulated in **Phase 4**, velocities in the proposed external watermains included in Scenario 2b are as summarized in **Table 3.11**.

Table 3.11: Scenario 2b External Watermain Velocities under Maximum Day Demand (MDD) plus Fire Flow (24,000 L/min)

Location	Velocity (m/s)
Elgin Street East west of Brook Road North	1.38
Brook Road North south of Elgin Street East	1.20
D'Arcy Street to Brook Road North Connection south of Phase 2	1.21
Elgin Street East east of Brook Road North	1.58
Densmore Road east of Future Street L	1.22

The velocities noted above are all less than the maximum allowable velocity of 3.0 m/s. Given that the above noted velocities occur under what would be considered relatively high flow rates it is anticipated that it will be necessary to isolate individual branches of the trunk watermain to achieve flushing velocities of 0.8 m/s.

3.3.4 Scenario 3 Modelling Results

Scenario 3 includes the new infrastructure listed in **Table 3.2**. The new external trunk/sub-trunk watermains included are shown in red on **Figure 3.7** and the internal sub-trunk/trunk watermains are shown in orange. Scenario 3 also includes the local watermains for Phases 1, 2, 3, 4 & 7 of Cobourg Trails plus the lower elevation (i.e., Zone 2) areas of Phases 5 & 6 along with the demands for these phases and for committed developments elsewhere in Zone 1 and Zone 2 of the Town of Cobourg, as well as build-out of Zone 3 (including portions of Phase 5 & 6).

The new Zone 2 Booster Pumping Station (BPS) is also included in Scenario 3 along with the new Zone 3 BPS. Since there will be no floating storage in Zone 3, to be conservative it is assumed that under maximum day demand (MDD) plus fire flow conditions in Zone 2 the Zone 3 BPS will be required to meet Peak Hour Demand (PHD) of 35.8 L/s.

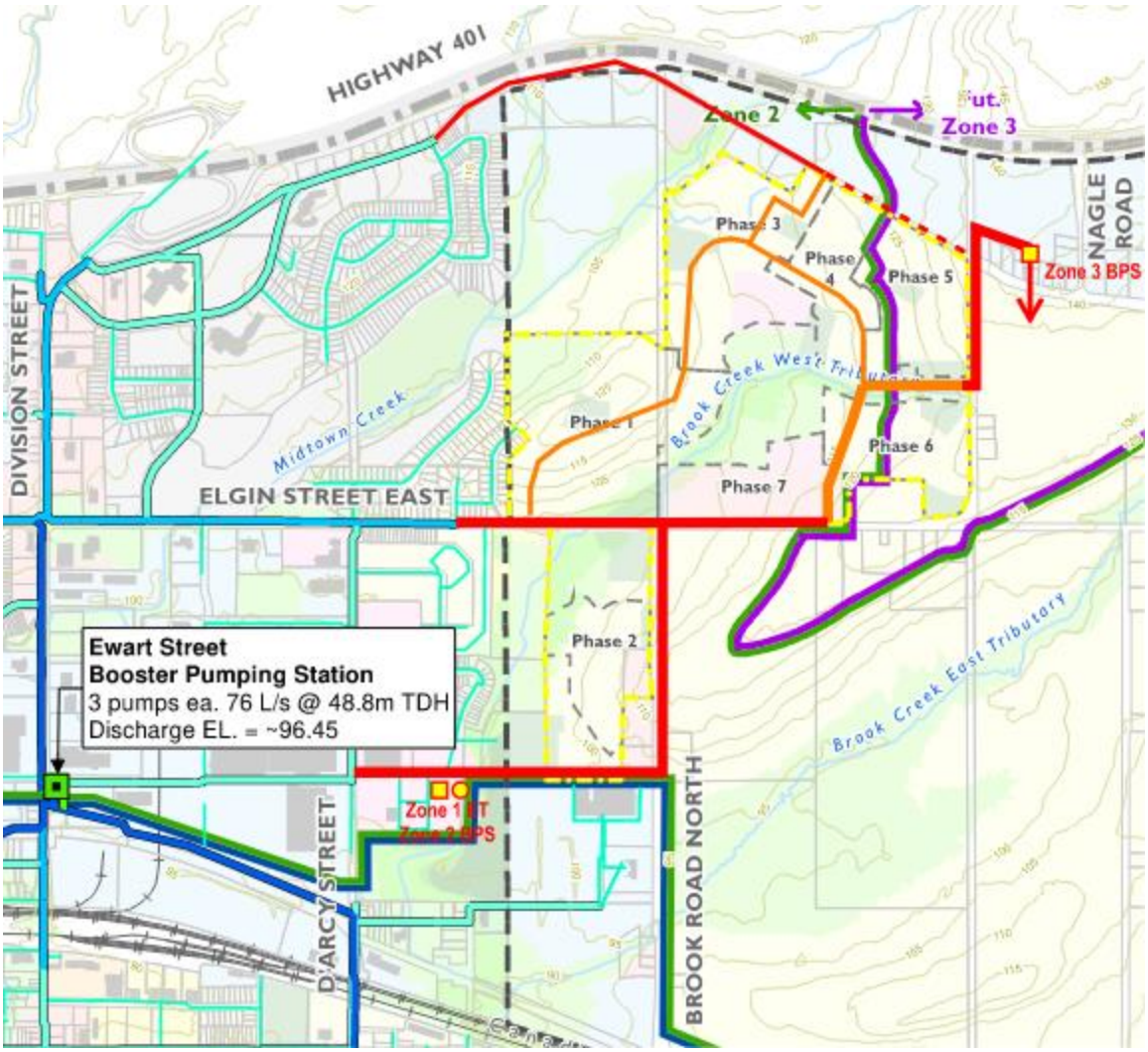


Figure 3.7: Scenario 3 New Watermain Infrastructure

3.3.4.1 Maximum Day Demand Pressures

Under Scenario 3 maximum day demand pressures are as outlined in **Table 3.12**. These pressures are slightly reduced as compared to Scenario 2b due to the additional Zone 3 demand, which will mainly flow through the Cobourg Trails area to the future Zone 3 BPS.

Table 3.12: Scenario 3 Internal Pressures

Phase	MDD No Pumping		MDD With Pumping	
	Press. (psi)	Press. (kPa)	Press. (psi)	Press. (kPa)
Phase 1 (1)	44 to 70	303 to 483	56 to 82	386 to 565
Phase 2	64 to 72	441 to 492	77 to 84	531 to 579
Phase 3	46 to 58	317 to 400	58 to 70	400 to 483
Phase 4	43 to 56	296 to 386	55 to 65	379 to 448
Phase 5 (Z2) (2)	43 to 51	296 to 352	55 to 63	379 to 434
Phase 6 (Z2) (2)	40 to 49	276 to 338	51 to 61	352 to 421
Phase 7 (2)	40 to 69	276 to 476	51 to 81	352 to 558
Phase 5 (Z3)	65 to 80	448 to 552	67 to 91	462 to 627
Phase 6 (Z3)	55 to 80	379 to 552	77 to 92	531 to 634

Notes:

1. Phase 1 low pressure adjusted by +4.2 psi to account for earthworks cut reducing maximum elevations in Phase 1 from ±123.5 m (existing) to ±118.5 m (proposed). All other pressures are based on existing topography elevations.
2. Low range of pressures can be controlled for when adjusting zone boundary to account for future earthworks/grading.

These pressures are within the MECP recommended normal operating range of 350 to 480 kPa (50 to 70 PSI) and are also above the minimum allowable pressure under normal conditions, which is 275 kPa (40 psi). The lowest pressures occur at the high points in Phase 1 and Phase 6 where elevations are approximately 120 m, which is at the upper end of the range serviced by Zone 2. Similarly, lower pressures occur in the Zone 2 portions of Phases 5, 6 & 7. Opportunities to manage these pressures through grading of the site (i.e., lowering the highest grades in these areas) or realigning the pressure zone boundary westerly will exist during detailed design.

3.3.4.2 Available Fire Flows

While maintaining residual pressures in the distribution system of 140 kPa (20 psi) the Scenario 3 watermain network is able to deliver fire flows (from a single junction) within

the proposed development areas that range from 11,500 L/min on 200 mm dia. local watermains in Phase 1 to 16,000 L/min on 300 mm dia. local watermains in Phase 2.

Fire flows that can be delivered by the Scenario 3 watermain network are summarized in **Table 3.13** for each development phase.

Table 3.13: Scenario 3 Available Fire Flows

Phase	Flow (L/s)	Flow (L/min)
Phase 1	195 to 255	11,500 to 15,000
Phase 2	270	16,000
Phase 3	225 to 240	13,000 to 14,000
Phase 4	225	13,000
Phase 5 (Zone 2)	225	13,000
Phase 6 (Zone 2)	225	13,000
Phase 7	240 to 260	14,000 to 15,000
Phase 5 (Zone 3)	195	11,500
Phase 6 (Zone 3)	195	11,500

The lower end of the available fire flows for Scenario 3 is generally comparable to Scenario 2b. However, the higher available flows are reduced due to the need to maintain pressure (minimum 10 psi) in the Zone 2 watermain that extends into Zone 3 to supply the Zone 3 BPS, which becomes the controlling factor under higher flow conditions. The impact of this situation will generally be reduced at such time as the first Zone 2 at-grade tank is constructed near (or above) the Zone 3 BPS to provide additional supply to the suction side of the Zone 3 BPS during higher flow events.

The available flows in Zone 3 are a function of the pumping capacity of the Zone 3 BPS.

These available fire flows are above the 4,000 L/min requirement provided in the Fire Underwriters Survey (FUS) document Water Supply for Fire Protection (1999) short form table for wood frame dwellings having greater than 3.0 m separation and are also above the 9,000 L/min requirement that is typically calculated using the full FUS method for wood frame single family dwellings that have less than 3.0 m separation (on two (2) sides) and total floor areas (excl. basements) of less than 2,500 sq ft.

3.3.4.3 External Watermain Velocities

Under maximum day demand plus peak hour demand in Zone 3, plus a Zone 2 fire flow of 13,500 L/min simulated in **Phase 4**, velocities in the proposed external watermains included in Scenario 3 are as summarized in **Table 3.14.**

Table 3.14: Scenario 3 External Watermain Velocities under Maximum Day Demand plus Fire Flow (13,500 L/min)

Location	Velocity (m/s)
Elgin Street East west of Brook Road North	0.85
Brook Road North south of Elgin Street East	0.92
D'Arcy Street to Brook Road North Connection south of Phase 2	0.92
Elgin Street East east of Brook Road North	1.11
Densmore Road east of Future Street L	0.73

The velocities noted above are all less than the maximum allowable velocity of 3.0 m/s. Given that the above noted velocities occur under what would be considered relatively high flow rates it is anticipated that it will be necessary to isolate individual branches of the trunk watermain to achieve flushing velocities of 0.8 m/s.

3.3.5 Pressure Zone 3 Considerations

The Cobourg Water Master Plan mainly examines the future water distribution system under ultimate built-out conditions. The scenarios described in the preceding sections provide additional information about interim conditions that will influence the development of new infrastructure to service pressure Zone 3.

- With the realignment of the proposed sub-trunk watermain on Densmore Road/ Danforth Road to extend the watermain to future Street L rather than down the Brook Road North unopened right-of-way (see **Section 3.6.1** below) it becomes viable to consider extending a Zone 2 sub-trunk further along Danforth Road to Greer Road. This modification to the Master Plan network is shown as a red

dashed line on **Figure 3.7** and initially provides greater redundancy for the supply of the Zone 3 BPS prior to the provisions of a future Zone 2 trunk watermain along the Kerr Street – Nagle Road corridor. The additional length of watermain provided can generally be offset by eliminating the need for Zone 2 watermain on Nagle Road north of Danforth Road.

- Depending on the timing of Phase 5 & 6 development in Zone 3, some consideration may be given to locating the Zone 3 BPS to a lower elevation if land near Nagle Road is not available. Potential alternative locations would include the southwest corner of Danforth Road and Greer Road within Cobourg Trails Phase 5 or near the intersection of future Streets A & U also within Phase 5. A potential relocation of the pumping station will not eliminate the need for the future Zone 2 at-grade tanks to be located north of Danforth Road at an elevation above 140 m.
- For watermains 300 to 800 mm dia., flow velocities entering the suction side of a booster pumping station should be 1.5 m/s or less. Under fire flow conditions in Zone 3, velocities in the 300 mm and 400 mm dia. Zone 2 watermains supplying the Zone 3 BPS will exceed 1.5 m/s and thus some consideration for a length of larger 600 mm dia. common suction line should be provided to reduce velocities.
- A more detailed analysis of internal servicing conditions could potentially consider the opportunity to supply the Zone 3 portions of Phase 5 & 6 with:
    - Lower normal operating flows at high pressures (e.g., 50+ psi) with the first phase of the Zone 3 BPS equipped with smaller pumps.
    - Higher fire flows at lower pressure (i.e., as low as 20 psi) from Zone 2 by opening valves at the Zone 2/Zone 3 boundary during a fire event.

  This approach would require detailed review of the final elevations to be serviced, local demands and operational concerns of both LUSI and the Cobourg Fire Department.

3.4 Watermain Material

According to the Regional Municipality of Durham (the Region) Design Specifications for Watermains:

- Feedermains are generally 400 mm in dia. or larger and shall be constructed of Concrete Pressure Pipe (CPP). However, there are exceptions where 400mm PVC pipe can be accepted.
- Distribution mains are generally 150 mm to 300 mm in dia. and shall be constructed of Polyvinyl Chloride (PVC) to AWWA C900.

- HDPE Pipe is only to be considered in Horizontal Directional Drilling (HDD) applications providing a geotechnical survey indicates favourable conditions.

The Region's approved manufacturers' products list specifies 400 mm dia. CPP pipe to be C-303 Bar Wrapped. This product may be used for the 400 mm dia. trunk watermain from the new Zone 2 BPS to Brook Road North as well as for the 400 mm dia. trunk watermain along Elgin Street East and Brook Road North. However, PVC pipe may also be considered, should LUSI deem the material to be acceptable for the proposed application.

It is proposed that the new sub-trunk watermain along Densmore Road/Danforth Road would be constructed by HDD trenchless method (see **Section 3.6.1** for additional details). There is no standard in the Town of Cobourg Design Guidelines for pipe materials in HDD installation. LUSI had provided a preliminary indication of preference for the use of HDPE pipe on Densmore Road. The disadvantage of HDPE pipe is that the interior diameter (ID) is typically less at the same nominal pipe size due to increased wall thickness and therefore would impact the hydraulic performance of the distribution system. It should be noted that the Region approves both PVC and HDPE materials for HDD installation methods. As such, CIMA considers the self-restraining PVC pipe product IPEX TerraBrute (or approved equivalent), which meets the AWWA C900 standard, to be a reasonable alternative pipe material for the sub-trunk watermain installation along Densmore Road/Danforth Road.

The watermain appurtenances such as gate valves, air release valves, couplings, fittings, hydrants, tracer wires for PVC or HDPE pipe, etc. will be chosen from approved product lists provided by the Region or the Town of Cobourg in the detailed design phase.

3.5 Operating Pressures

The Town of Cobourg Design Guidelines stipulate that the distribution system maximum sustained operating pressures shall not exceed 700 kPa (100 psi). Under the normal operating conditions, the operating pressures shall not drop below 275 kPa (40 psi). As indicated in the MECP guideline, the maximum normal operating pressure in water distribution systems should generally be 70 psi under maximum daily flow conditions. Pressures outside of the generally accepted minimum and maximum ranges as described above may be dictated by distribution system size and/or topography.

As presented in the Master Plan, most Zone 2 pressures exceed the MECP recommended maximum normal operating pressure with pressures in excess of 80 psi. Therefore, it is recommended to install pressure reducing valves on individual water services for any new developments in Zone 2 where potential exists for pressures

above 80 psi to occur in occupied spaces. It is recommended that in the detailed design phase the specific water demand and site topographic information for the Cobourg Trails Community be added into the Master Plan model to evaluate and verify Zone 2 operating pressures.

3.6 Alignment and Profile Design

3.6.1 Densmore Road/Danforth Road Sub-trunk Watermain – Parkview Hills Drive to Cobourg Trails Future Street L

At the northwest limit of the Study Area the proposed 300 mm dia. watermain on Densmore Road will be connected to the existing 300 mm dia. watermain capped at the intersection of Densmore Road and Parkview Hills Drive. The proposed sub-trunk watermain will run easterly along Densmore Road/Danforth Road to future Street L, as proposed by Tribute, and connect to the sub-trunk watermain internal to the Cobourg Trails development as designed by Biddle. This section of watermain is required to support development in Phase 3 and beyond.

Given that there will be no service connections (or very few connections) along this section of watermain and considering that trenchless methods will be required for two (2) watercourse crossings, installation of the sub-trunk watermain along Densmore Road/Danforth Road is proposed to be completed entirely by HDD.

The sub-trunk is proposed to be aligned in the middle of the eastbound (southern) lane on Densmore Road/Danforth Road. The horizontal alignment will follow the existing Densmore Road/Danforth Road alignment with a 200 m minimum radius for horizontal bends. This is in compliance with the manufacturer's requirements for TerraBrute PVC pipe installed by HDD methods, which specifies any radius should not be less than 160 m.

In development of the proposed alignment presented above, an alternative alignment was also considered. This alternative alignment involved the placement of the proposed sub-trunk watermain on the south shoulder along Densmore Road/Danforth Road. While this alternative alignment would potentially reduce traffic impacts during construction, it is not recommended for the following reasons:

1. The existing shoulders are typically so narrow that aligning the watermain under the shoulder would likely have negligible benefit towards keeping the eastbound lane open during construction.

2. Given the curvature of the road the existing utility poles are either close to the shoulder or guyed towards the shoulder. As such, it is likely that aligning the watermain under the shoulder would result in conflicts between the existing

utilities poles/utility guy anchors and the watermain.

3. Table 5-5 of the Town of Cobourg's 2021 Development Charge Background Study identifies future urbanization of Densmore Road/Danforth Road from Parkview Hills Drive to Jarvis Road. As such, placing the watermain under the shoulder would create a potential conflict in future with catch basins or sewers for a storm sewer system.

It should be noted that the Master Plan shows the watermain on Densmore Road running east to the unopened portion of Brook Road North and turning south along the unopened right-of-way to Tribute's future Street I, as previously mentioned in **Section 3.2.3**. After reviewing field conditions and engaging Cambium Inc. to complete additional environmental reviews for the external servicing work, it has been concluded that it is preferrable to continue the proposed sub-trunk watermain east onto Danforth Road and connect to the Cobourg Trails internal distribution network at Tribute's future Street L to avoid wetland disturbance and watercourse crossings within the unopened Brook Road North road allowance.

The proposed watermain alignment will cross Midtown Creek twice on Densmore Road/Danforth Road. Even if a trenchless method is not used for the entire watermain installation, trenchless installation technology is proposed for both watercourse crossings to reduce environmental impacts. The channel invert elevation of Midtown Creek at the Densmore Road crossing was verified to be 107.77 m during the preliminary design stage. According to as-built drawings, there is an existing 2.5 m wide and 2.0 m high concrete, open bottom culvert with 1.2 m deep footings that passes under Densmore Road at the crossing. The vertical alignment of the watermain is proposed at 2.5 m under the bottom of the creek which is ±1.3 m below the existing culvert footing. The sending and receiving pits are proposed at 30 m from either side of the crossing.

The channel invert elevation of the Midtown Creek branch at the Danforth Road crossing was determined to be 110.13 m. The watermain profile is proposed to be 2.5 m below the bottom of the existing 900 mm dia. CSP pipe at this crossing. The sending and receiving pits are located approximately 35 m from either side of the crossing.

In addition to the benefit of HDD installation for the watercourse crossings, it is recommended to use an HDD approach for constructing the entire length of watermain on Densmore Road/Danforth Road due to the limited number of services along the proposed alignment and limited space in the right-of-way for installation.

A total of twelve (12), 5 m deep boreholes have been requested at this preliminary design stage to support decision making about a continuous HDD installation of proposed watermain along Densmore Road/Danforth Road. Should the soil conditions

not support the directional drilling approach, open-cut will be proposed for the watermain construction except for at the watercourse crossings which will be constructed with appropriate trenchless techniques.

3.6.2 Elgin Street East Trunk Watermain – Cobourg Trails Future Street A to Brook Road North

The servicing design for Phase 1 of Cobourg Trails being prepared by Biddle includes extension of the existing 400 mm dia. watermain on Elgin Street East ±210 m easterly from Conger Avenue to a point just beyond (east of) the western leg of future Street A where it enters Phase 1. This extension will replace a short section of existing 200 mm dia. watermain on Elgin Street East.

The first section of the proposed external 400 mm dia. trunk watermain on Elgin Street East will connect to the terminus of the above noted 400 mm dia. watermain extension and continue easterly on Elgin Street East from the western leg of future Street A to Brook Road North. This section will provide connectivity necessary to service Phase 2 and 3.

This section of watermain will be ±325 m long and aligned along the north shoulder of Elgin Street East. The final alignment within the road cross-section will be further refined during detailed design to avoid potential utility conflicts. It is proposed that installation will be by open-cut. As discussed in **Section 2.5.1**, the trunk watermain will cross Brook Creek West Tributary. It is recommended that the crossing be installed in conjunction with the proposed trunk sanitary sewer construction.

In accordance with the Town of Cobourg Design Guidelines, the watermain is designed with at least 2.50 m horizontal separation from the proposed trunk sanitary sewer and between 1.8-2.0 m depth below the centerline of Elgin Street East. The vertical alignment (profile) of the watermain follows the Elgin Street East road profile increasing in elevation from west to east with no significant intermediate high points along its length.

A tee connection is proposed at the intersection of Elgin Street East and Brook Road North. Three (3) isolation valves will be installed at the tee to provide for the isolation of pipe segments during maintenance. The location of additional valves along the length of the watermain will be established as the detailed design is progressed.

3.6.3 Elgin Street East Trunk Watermain – Brook Road North to ±450 m East

The external trunk watermain described in the preceding section will eventually be continued further east from Brook Road North along Elgin Street East. This continuation of the proposed trunk watermain will support development in Phase 4, 5, 6 and 7 and

also provide connectivity for future Zone 2 storage and Zone 3 pumping facilities to be located to the northeast.

The proposed 400 mm dia. trunk watermain will terminate approximately 450 m east of Brook Road North where a future connection will be continued north along the eastern leg of future Street A. This northern connection will provide looped watermain connectivity for the eastern portion of the Cobourg Trails development and will also provide trunk watermain connectivity for the future facilities noted above.

Similar to the section of watermain west of Brook Road North the continuation to the east is proposed to be installed in the northern shoulder of Elgin Street East. This avoids potential impacts to wooded areas and wetland areas adjacent to the southern side of the road right-of-way.

3.6.4 Brook Road North Trunk Watermain – Elgin Street East to LUSI Electrical Substation Property

The proposed 400 mm dia. external watermain along Brook Road North between Elgin Street East and LUSI's Brook Road North electrical substation property is ±650 m in length. This section of watermain is necessary to support development in Phases 2 and 3.

It is proposed that the 400 mm dia. trunk watermain will be located along the east shoulder of Brook Road North and installed by open-cut. The exact alignment of the proposed watermain within the cross-section will be determined during detailed design based on utility information, which is currently being collected.

The vertical alignment of the trunk watermain has been set to follow what is currently understood to be the future Brook Road North profile as designed by Biddle/Burnside to address sightline considerations for the Phase 2 intersections. The proposed trunk watermain has been set at the minimum 1.8 m depth below the future road profile.

As discussed in **Section 2.5.3.2**, the ground elevation of Brook Road North increases southerly by an average of 2% from the Elgin Street East intersection to a high point on Brook Road North at ±113 m before descending to the south toward the CN/CP rail corridor. As such, the design includes for a high point in the proposed watermain located approximately 380 m south of Elgin Street East.

The Town of Cobourg Design Guidelines specify:

- Air release valves shall be placed at all significant high points on feedermains, as approved by the Town of Cobourg.
- Drain valves shall be located at the low points of all watermains 450 mm dia. and greater and shall be constructed in an approved chamber.
- All valves 400 mm dia. and smaller shall be installed in valve boxes and specified direct bury operators shall be used.

A 100 mm air release valve with chamber is proposed at the high point on Brook Road North to ensure trapped air is released to maximize the system performance and prevent air lock. A 100 mm dia. outlet pipe will be provided to discharge water to the existing ditch along the east shoulder of Brook Road North from the air release chamber.

3.6.5 Zone 2 BPS Trunk Watermain – New Zone 2 BPS to Brook Road North

As discussed in **Section 3.2.3** a new Zone 2 trunk watermain is required between D'Arcy Street and Brook Road North to connect the future Zone 2 BPS to the Zone 2 water distribution network. The section of watermain east of the future Zone 2 BPS (Master Plan project 2b) will be constructed as part of Tribute's planned external servicing works.

The proposed watermain east of the future Zone 2 BPS will cross the west branch of Brook Creek and run easterly along the south side of the existing soccer fields at the rear of the Cobourg Community Centre. East of the soccer fields the proposed watermain will continue east along the southern limit of the Cobourg Trails Phase 2 development though an area that will ultimately become parkland. East of Phase 2 the proposed trunk watermain will enter the LUSI electrical substation property and continue to Brook Road North. The watermain will then be deflected northerly and connected to the proposed trunk watermain on Brook Road North that is described in the previous section.

It is noted that where the watermain exits the LUSI substation property at Brook Road North it will run through the existing substation entrance. The incoming and outgoing electrical feeds from the substation transition from aerial lines along Brook Road North to underground at the entrance and connect to the substation facilities. The watermain will cross below these lines requiring that they are temporarily supported during construction. It is anticipated that short-term de-energization of these feeds will also have to be coordinated with LUSI.

As noted, the proposed watermain will cross the Brook Creek West Tributary behind the Cobourg Community Centre between the future Zone 2 BPS site and existing soccer fields. Trenchless installation technology is proposed for the crossing. Two (2) boreholes have been requested approximately 20 m on either side of the crossing to investigate/confirm existing ground conditions. If ground conditions are suitable, it is anticipated that a trenchless method conducive to the geotechnical recommendations will be used to install a casing below the Brook Creek's West Tributary to accommodate the watermain installation.

In addition to the external servicing scope described above, a new 400 mm dia. trunk watermain will be required west of the future Zone 2 BPS facility. It is understood that the portion to the west of the future BPS (Master Plan project 2a) will be constructed by

LUSI in conjunction with the future Zone 2 BPS facility. This section of watermain is expected to run west along Barracks Drive (south of the CCC) and connect to existing 300 mm dia. watermains on D'Arcy Street and 3rd Street.

4 Supporting Studies

4.1 Municipal Class Environmental Assessment

P. Becker Consulting was engaged to provide advice and guidance with respect to the Municipal Class Environmental Assessment (MCEA) requirements that may apply to proposed external servicing works. Patricia Becker, MES is an EA Specialist with over 30 years of EA experience (including 22 years as P Becker Consulting). Pat has worked for municipalities and the private sector in the areas of environmental assessment, environmental planning and approvals throughout Ontario. An MCEA opinion letter from P. Becker Consulting is included in Appendix J.

From an MCEA perspective:

- The proposed watermain works can be considered as two independent projects that could potentially be implemented separately. The northern portion of the proposed watermain works on Densmore Road/Danforth Road is located entirely within the existing right-of-way and involves trenchless watermain crossings and as such is considered a Schedule A+ project.
- The southern portion of the proposed watermain works on Elgin Street East and Brook Road North is within existing road right-of-ways and involves staged work in conjunction with channel restoration for a minor watercourse at the west branch of Brook Creek and as such would be schedule A projects. However, these works are connected to the watermain works between the CCC property and Brook Road north that are located outside of a municipal right-of-way and thus the southern portion of the watermain work is a Schedule B project.
- The proposed sanitary sewer works form one continuous project and are variably within and outside of existing municipal right-of-ways and as such are a Schedule B project.

The *COVID 19 Economic Recovery Act (2020)* included changes to the *Environmental Assessment Act* definition of "proponent". Previously it was interpreted that the definition meant that the municipality had to be the proponent of the project where they would own and operate the infrastructure after the developer had built it. The current definition makes it clear that the proponent is someone who:

a) carries out or proposes to carry out a project, or
b) is the owner or person having charge, management or control of a project

The key is the word “or” so for the Cobourg Trails external servicing work the proponent can be the developer since they will carry out the project, which is the Class EA work and not necessarily the construction or operation of the water and wastewater infrastructure.

Tribute as the developer, proposes to be the proponent of the external servicing works projects. As such, it is understood that the projects may proceed forward to implementation as part of the review and approvals process for Tribute’s proposed development and further *Environmental Assessment Act* (EAA) requirements are not applicable. This is resultant of the fact that O.Reg. 345/93 indicates that developers are only subject to the EAA when they are the proponent of Schedule C projects. Also, based on the changes to the EAA found in the *More Homes, More Choice Act (2019)* it is now deemed that any Schedule A or A+ projects are exempt from meeting the requirements of the EAA regardless of the proponent. These projects may proceed to implementation.

Regardless of which organization is the proponent, the Schedule A+ watermain work on Densmore Road/Danforth Road could proceed to implementation without further MCEA process.

4.2 Environmental Impact Study

To support the development of this FSR, Cambium Inc. (Cambium) was engaged by Tribute to prepare an Environmental Impact Study (EIS) for the planned external watermain and sanitary sewer works. Cambium’s EIS included additional field investigations along the anticipated watermain and sewer alignments (as illustrated herein) to expand previously completed development related studies for the following locations:

- The EIS for lands internal to the Cobourg Trails development – Niblett Environmental Associates (May 2016) *Environmental Impact Study for Rondeau (Cobourg) Ltd. Development Draft Plan of Subdivision 14t-06001-R, Cobourg East Community Secondary Plan Area, Elgin Street East/County Road 20 Part Lots 11, 12 and 13, Concessions A and 1 Block D, Plan 277 Town of Cobourg.*
- The EIS for the East Village Phase 5 – *Cambium Inc. (November 2018) Environmental Impact Study for JMCD Holdings (now referred to as Mistral Land Developments Inc.): 460 King Street East, Cobourg, Ontario.*
- The EIS for the lands recently acquired by Mistral Land Developments Inc. on the east side of Brook Road North, north of the CN/CP railway corridor – *Cambium (2021) Draft Environmental Impact Study for JMCD Holdings (now referred to as Mistral Land Developments Inc.): Brook Road North, Cobourg, Ontario.*

- The design brief for realignment of the Brook Creek West Tributary upstream of Elgin Street East – *GEO Morphix Ltd. (July 2019) Technical Design Brief Tributary of Brook Creek Realignment, Town of Cobourg, Ontario.*

In preparing the EIS, Cambium also consulted with the Ganaraska Region Conservation Authority (GRCA) regarding the proposed external servicing works to develop a terms of reference for the scope of the EIS.

A full copy of Cambium's report is appended to this report as **Appendix I**. Key findings from Cambium's EIS that have informed development and modification of the proposed external servicing alignments to reduce environmental impacts are summarized as follows:

- Shifting the alignment of the proposed trunk sanitary sewer west away from the center of the future Willmott Street right-of-way between King Street East and the CN/CP rail corridor. This places the sewer in the additional right-of-way widening lands to be conveyed to the Town as part of the East Village Phase 5 development and avoids direct impacts to the wetland feature that currently exists in the original Willmott Street right-of-way.
- Relocating the alignment of Master Plan watermain projects 2m and 2l (L) away from the Brook Road North unopened right-of-way south of Densmore Road. Relocation of the watermain alignment away from the Brook Road North unopened right-of-way to instead continue east on Danforth Road to future Street L avoids impacts to wetlands and associated natural features along Brook Road North which otherwise will not be disturbed.
- Development of a strategy for integrating the replacement of the existing culvert on Elgin Street East at the Brook Creek West Tributary crossing with the planned restoration and naturalization of the creek upstream of Elgin Street East. This strategy allows for a staged open-cut installation of the proposed watermain and sanitary sewer on Elgin Street East that will have minimal impact to the watercourse.
- Aligning the proposed watermain on Elgin Street East (east of Brook Road North) on the north side of the road to avoid possible impacts to woodlands and wetlands along the south side of the right-of-way.

4.3 Sub Surface Utility Engineering Investigation

To support the initial development of sewer and watermain alignments at the functional servicing stage, utility information has been reviewed based on existing drawings,

visible surface features and general (rough) mapping provided by utility companies through One-Call's planning locate request process.

Given the rural/undeveloped nature of most of the study area, municipal utilities are relatively limited and located at proposed connection points and along Willmott Street from King Street to Thompson Street. Private utilities within the study area include:

- Gas mains owned and operated by Enbridge including a high-pressure gas main that crosses Densmore Road/Danforth Road at the intersection with the unopened portion of the Brook Road North right-of-way.
- Electrical utilities owned and operated by LUSI, which are primarily overhead but include underground cables at the Brook Road North Substation.
- Underground telecommunication lines that are primarily owned and operated by Bell, Cogeco and Rogers.

4Sight Utility Engineers (4Sight) have been engaged to complete a Subsurface Utility Engineering (SUE) investigation of the utilities that cross the proposed watermain and sewer alignments or run parallel to the alignments (on the same side of the road). Phase 1 of this investigation will involve completing SUE Quality Level B surface locates to more accurately map the location of the existing utilities and will commence in January 2022. Phase 2 of the SUE investigation will involve Quality Level A locates to expose existing utilities at potential crossing conflicts and confirm depths at crossings and other key locations. Phase 2 will commence with the progression of the detailed design, once the Quality Level B locates have been completed.

4.4 Geotechnical Investigation

To support further design of the proposed trunk sewer and watermain infrastructure, Golder Associates Ltd. (Golder) has been engaged to undertake a staged geotechnical investigation. The geotechnical investigation will address ground conditions (including groundwater at trenchless crossings) as they will influence infrastructure design as well as soil characterization with respect to opportunities and constraints for disposal of excess soils.

Field work for the first stage of the investigation commenced in December 2021 and is focused on areas where the use of trenchless technology is anticipated or being considered for sewer and watermain construction. These areas include:

- CN/CP Rail Corridor sewer crossing in the Unopened Willmott Street ROW
- Potential trenchless sewer installation along Brook Road North from future Kerr Street north to the east tributary of Brook Creek.
- Brook Creek East Tributary sewer crossing on Brook Road North

- Brook Creek West Tributary watermain crossing in the soccer field east of the Cobourg Community Centre
- Midtown Creek watermain crossing on Densmore Road
- Brook Creek West Tributary watermain crossing on Danforth Road
- Potential trenchless watermain installation (HDD) along Densmore Road and Danforth Road between 80 m west of Parkview Hills Drive and Future Street L in Cobourg Trails

As the detailed design of the watermain and sanitary sewer progresses, the second stage of the geotechnical investigation will be undertaken along the anticipated open-cut sections of the alignment.

4.5 Archeological Investigations

Archeological investigations are currently being scoped for completion in 2022. In general, the scope of the planned archeological investigations will include:

- Stage 1 review to confirm that locations where proposed external servicing is to be installed along/within existing roads have been previously disturbed and will not require further archeological investigation.
- Review of existing Stage 2 investigations for undisturbed areas that have been previously studied for other purposes to identify potential areas of concern
- Additional Stage 2 investigations in areas that have not been studied previously.

5 Cost Estimate

A high-level (order of magnitude) conceptual cost estimate has been prepared to support the preliminary design presented in this Functional Servicing Report. A summary of the total costs have been provided in **Table 5.1** below. A complete breakdown of the estimate is included in this report as **Appendix L**.

Table 5.1: Preliminary Cost Estimate for External Trunk Servicing Work

External Trunk Sanitary Sewer	
Administrative and Contractual Items	$818,897.00
Trunk Sanitary Sewer – Open Cut	$5,936,827.00
Trunk Sanitary Sewer - Trenchless	$2,837,500.00

Trunk Sanitary Sewer – Maintenance Holes	$1,065,000.00
Restoration	$1,035,025.00
Miscellaneous	$789,039.00
TOTAL – External Trunk Sanitary Sewer	**$12,509,288.00**
External Trunk Watermain	
Administrative and Contractual Items	$363,090.00
Trunk Watermain – Open Cut	$2,743,620.00
Trunk Watermain – Trenchless	$1,858,000.00
Restoration	$723,550.00
Miscellaneous	$119,875.00
TOTAL – External Trunk Watermain	**$5,808,135.00**

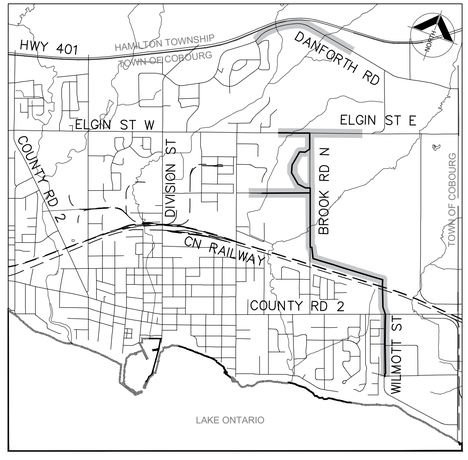
These costs do not include any contingency or engineering and are based on 2021 construction pricing (and therefore does not account for any future inflation). The cost estimate will be refined as the design progresses and the exact scope of works is confirmed. These are the total estimated construction costs, based on the project progressing independently of any Town or County road works and does not currently account for any cost sharing/apportionment.

A

Appendix A: Cobourg Trails External Servicing Preliminary Design Drawings, CIMA+

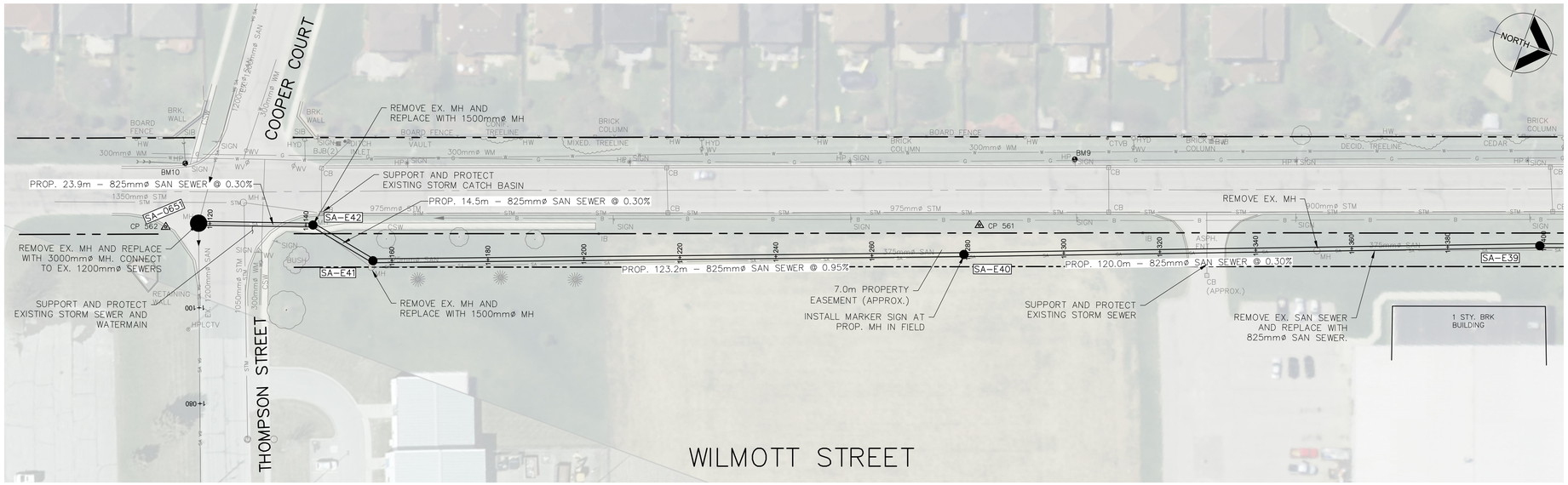
COBOURG TRAILS
EXTERNAL SERVICING

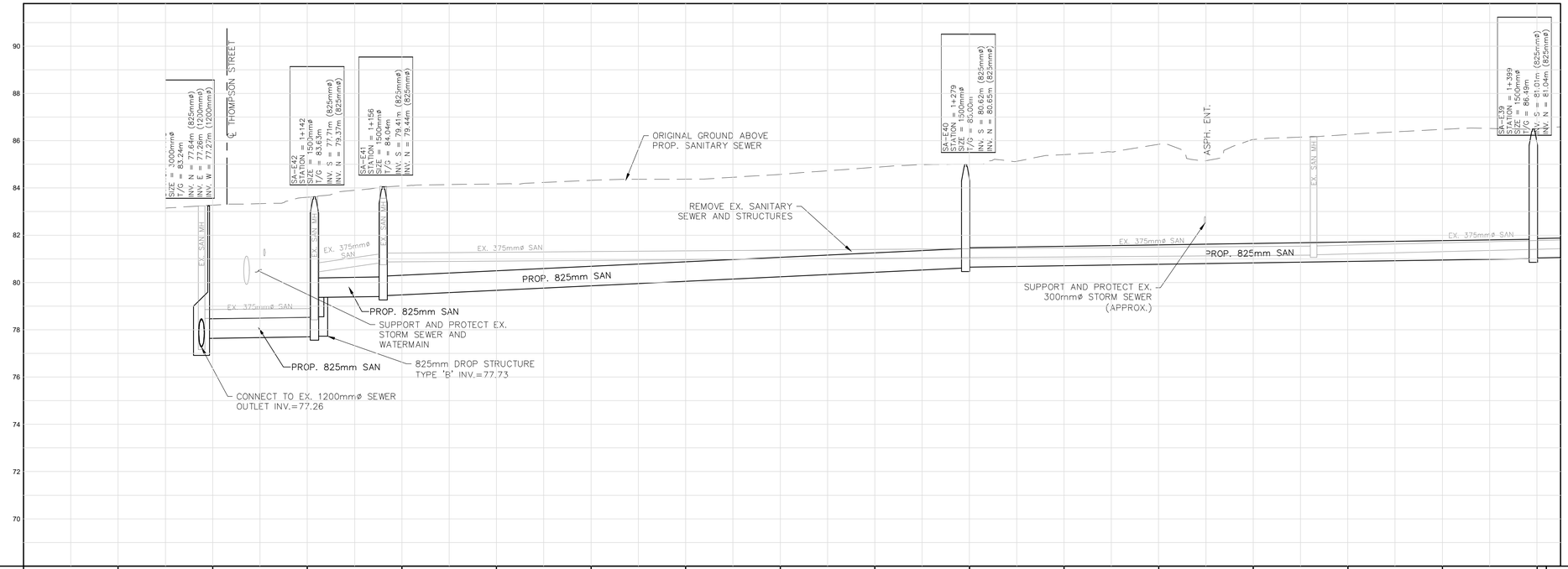
DRAWING LIST



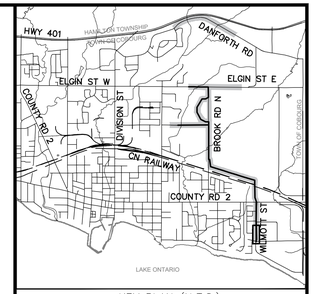
KEY MAP
N.T.S.

ISSUED FOR FUNCTIONAL SERVICING REPORT





STATION	1+100	1+120	1+140	1+160	1+180	1+200	1+220	1+240	1+260	1+280	1+300	1+320	1+340	1+360	1+380	1+400	STATION
CENTERLINE GRADE FINISHED / EXISTING	83.00	83.11	83.27	83.60	84.09	84.17	84.32	84.37	84.57	84.87	85.00	85.41	85.84	86.04	86.26	86.48	86.51	CENTERLINE GRADE FINISHED / EXISTING
SANITARY SEWER INVERT	PROP. 23.86m 825mmØ SANITARY SEWER @ 0.30%			77.64	77.71	77.71	79.41	79.44	PROP. 14.54m 825mmØ SANITARY SEWER @ 0.30%	PROP. 123.16m 825mmØ SANITARY SEWER @ 0.95%						80.62	80.65	PROP. 120.02m 825mmØ SANITARY SEWER @ 0.30%		81.01	81.04	SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT:

Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
WILMOTT ST SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE:

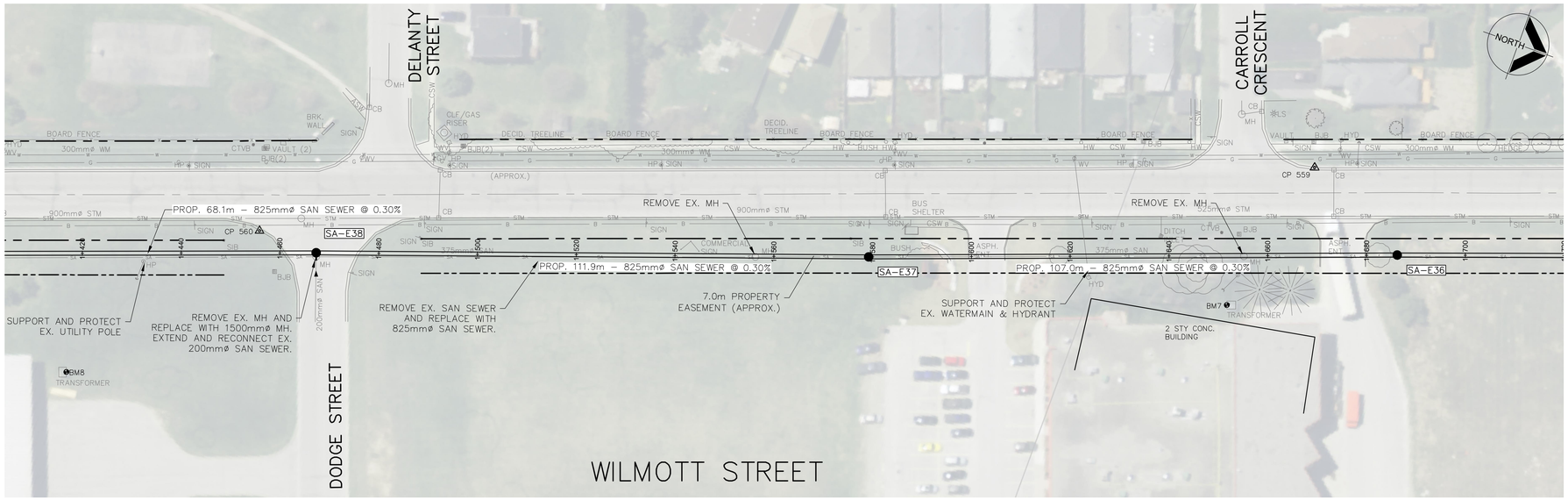
MUNICIPAL INFRASTRUCTURE

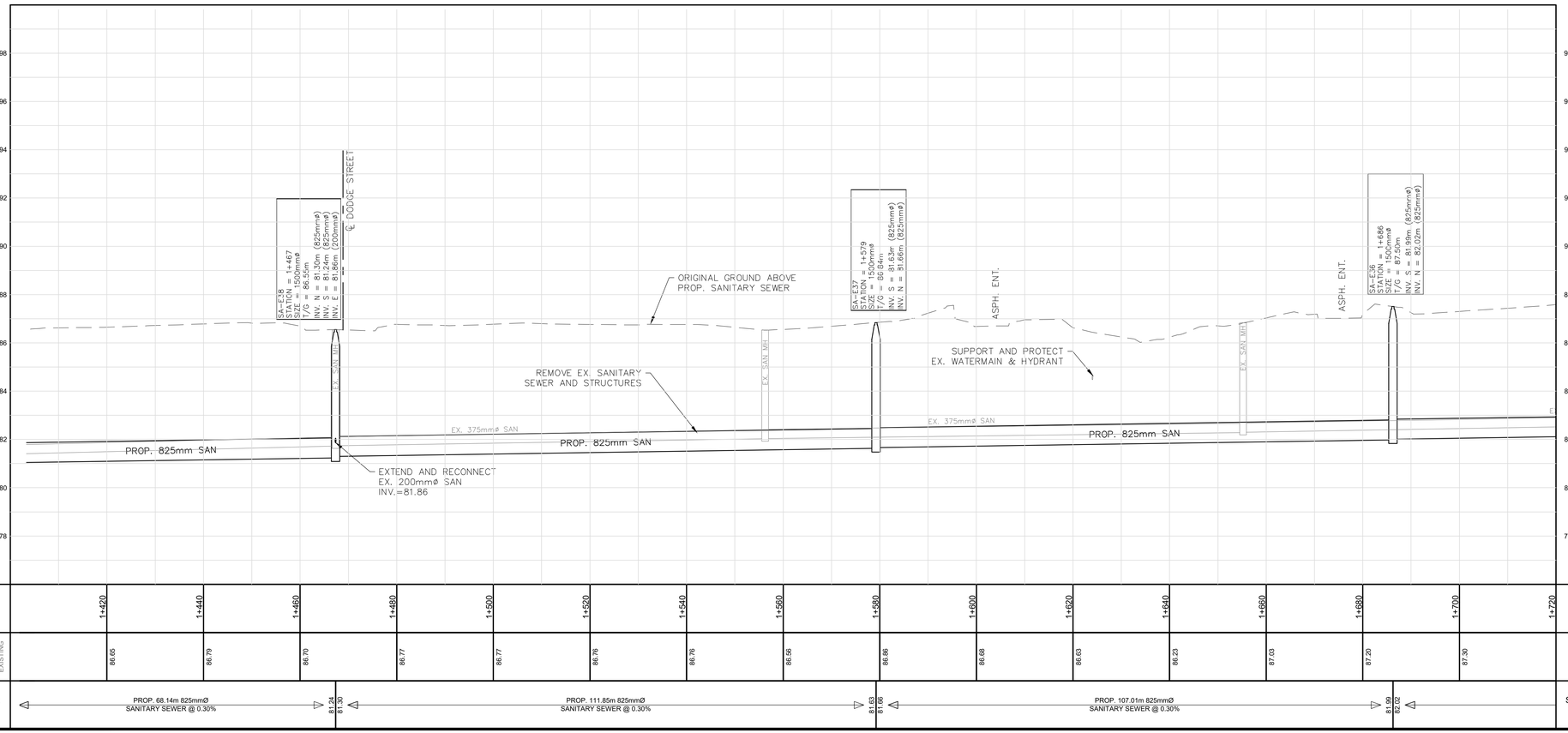
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14-0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–1
DATE: August, 2021
SHEET No: ---- OF ----

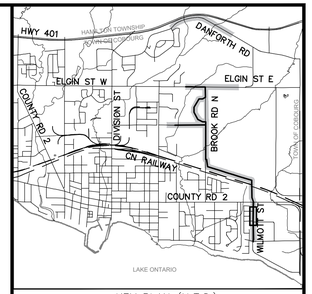
Jan. 21, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION	1+420	1+440	1+460	1+480	1+500	1+520	1+540	1+560	1+580	1+600	1+620	1+640	1+660	1+680	1+700	1+720	STATION
CENTERLINE GRADE FINISHED	86.65	86.79	86.70	86.77	86.77	86.76	86.76	86.56	86.86	86.68	86.63	86.23	87.03	87.20	87.30		CENTERLINE GRADE FINISHED
SANITARY SEWER INVERT	PROP. 68.14m 825mmØ SANITARY SEWER @ 0.30%				PROP. 111.85m 825mmØ SANITARY SEWER @ 0.30%					PROP. 107.01m 825mmØ SANITARY SEWER @ 0.30%							SANITARY SEWER INVERT
	81.24		81.30						81.63	81.56					81.99	82.02	



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
WILMOTT STREET SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–2
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 21, 22

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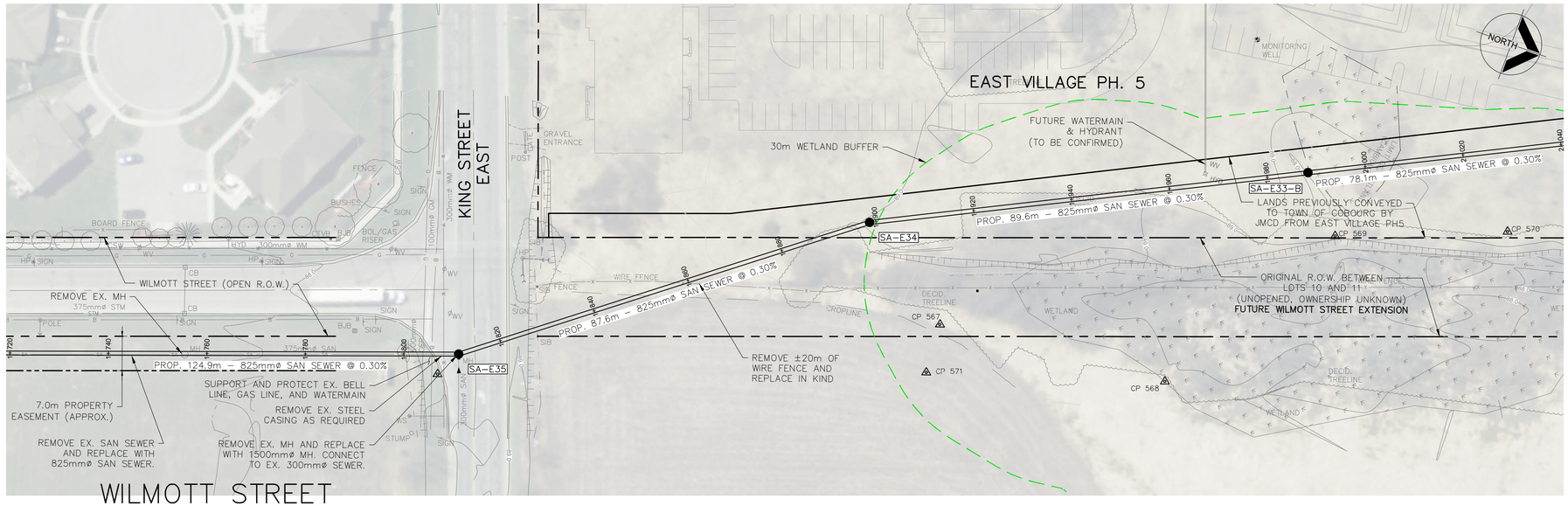
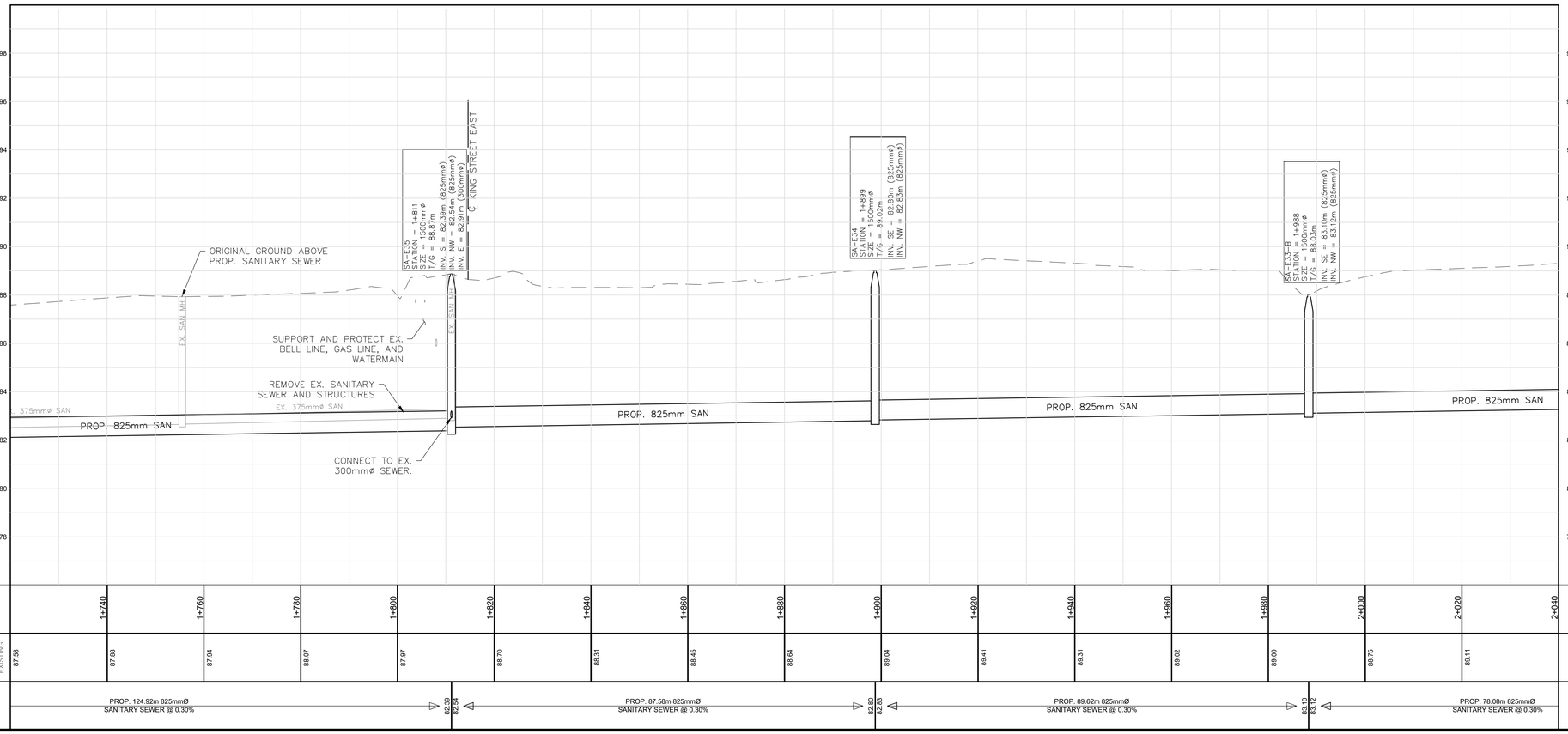
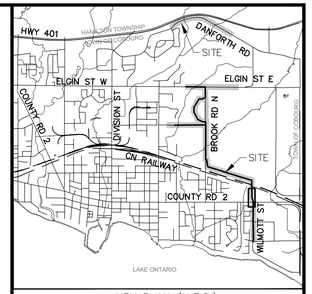




STATION	1+740	1+760	1+780	1+800	1+820	1+840	1+860	1+880	1+900	1+920	1+940	1+960	1+980	2+000	2+020	2+040	STATION
CENTERLINE GRADE FINISHED / EXISTING	87.98	87.88	87.94	88.07	87.97	88.70	88.31	88.45	88.64	89.04	89.41	89.31	89.02	89.00	88.75	89.11	CENTERLINE GRADE FINISHED / EXISTING
SANITARY SEWER INVERT	PROP. 124.92m 825mmØ SANITARY SEWER @ 0.30%				82.39 / 82.54	PROP. 87.58m 825mmØ SANITARY SEWER @ 0.30%				82.80 / 82.63	PROP. 89.62m 825mmØ SANITARY SEWER @ 0.30%			83.10 / 83.12	PROP. 78.08m 825mmØ SANITARY SEWER @ 0.30%			SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx — xxx.xxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
WILMOTT STREET SANITARY
STA. X+XXX TO STA. X+XXX

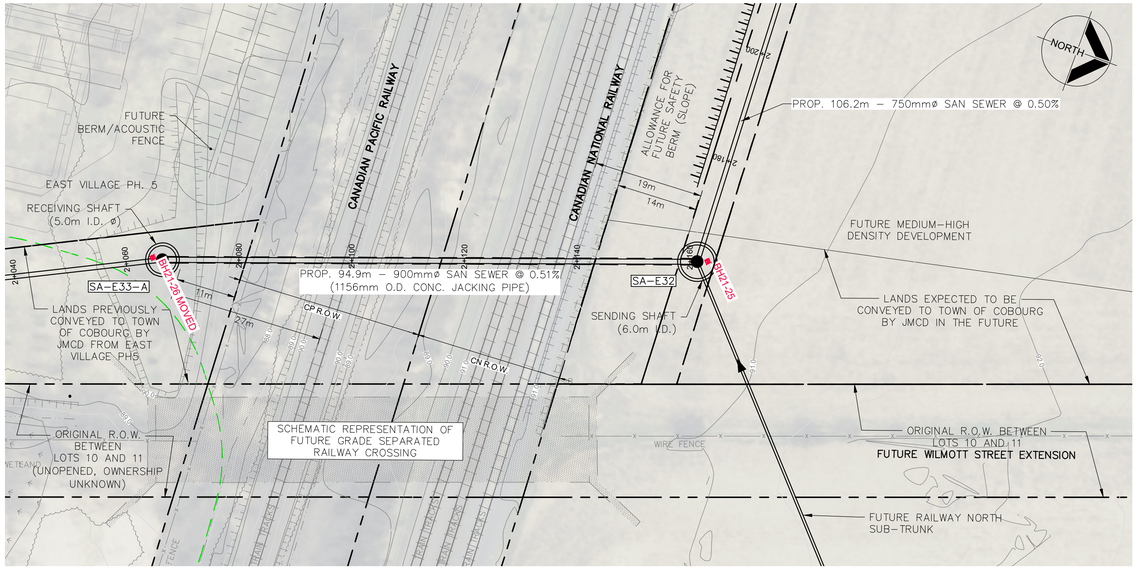
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

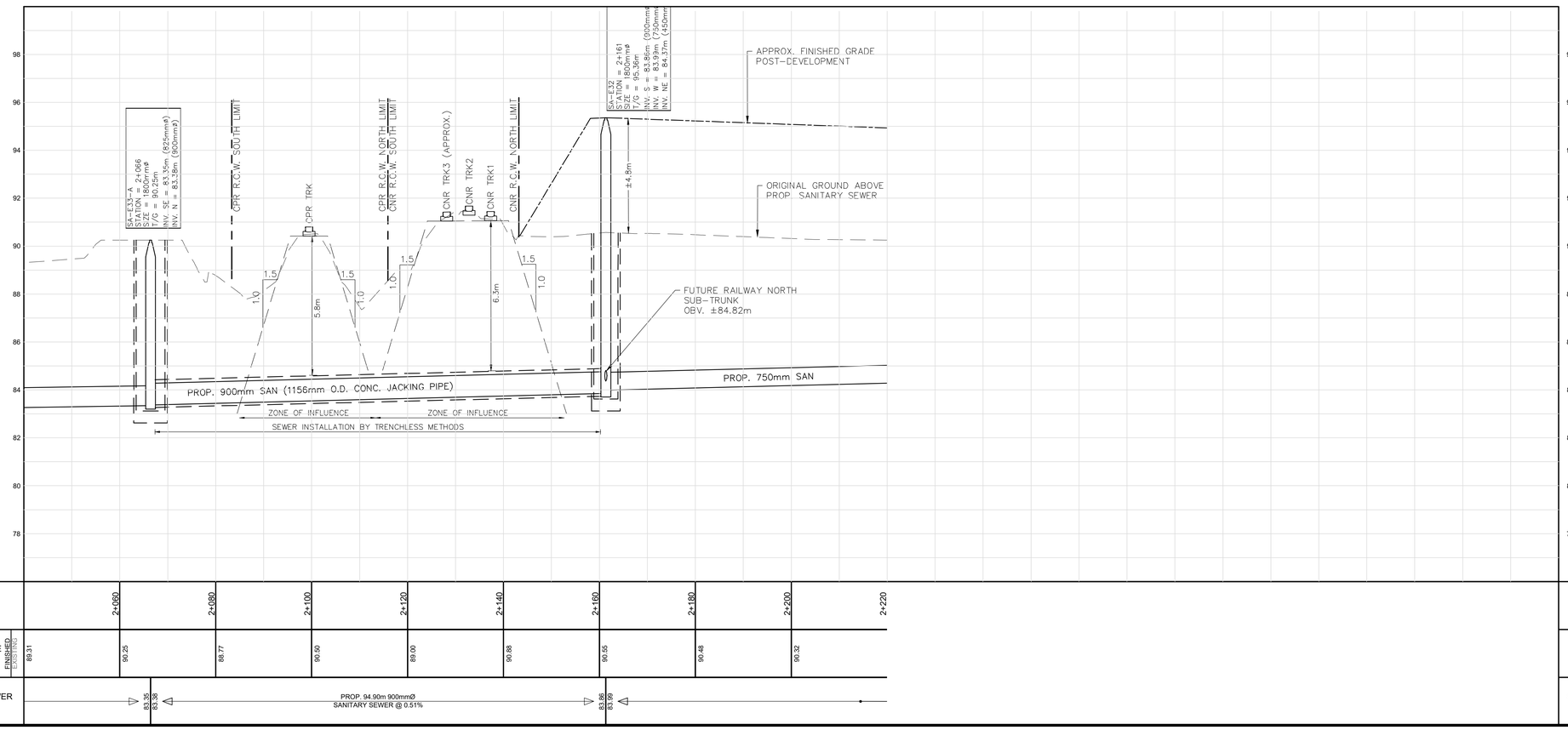
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–3
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 27, 22

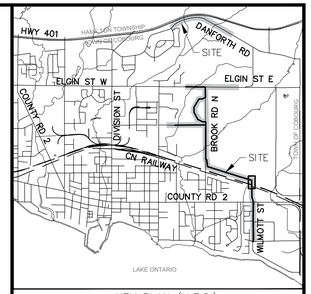
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION	2+060	2+080	2+100	2+120	2+140	2+160	2+180	2+200	2+220
CENTERLINE GRADE (FINISHED / EXISTING)	89.31	90.25	88.77	90.50	89.00	90.88	90.55	90.48	90.32
SANITARY SEWER INVERT	83.35 / 83.38	PROP. 94.90m 900mmØ SANITARY SEWER @ 0.51%						83.86 / 83.99	

STATION	2+060	2+080	2+100	2+120	2+140	2+160	2+180	2+200	2+220
CENTERLINE GRADE (FINISHED / EXISTING)	89.31	90.25	88.77	90.50	89.00	90.88	90.55	90.48	90.32
SANITARY SEWER INVERT	83.35 / 83.38	PROP. 94.90m 900mmØ SANITARY SEWER @ 0.51%						83.86 / 83.99	



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
WILMOTT STREET SANITARY
STA. X+XXX TO STA. X+XXX

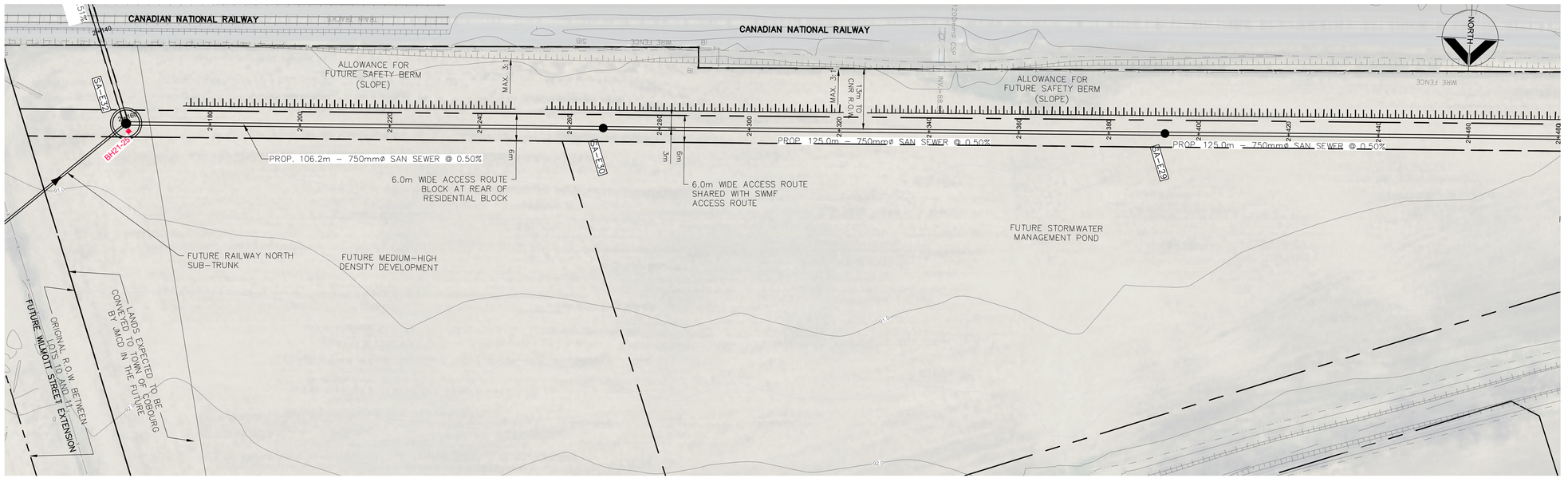
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

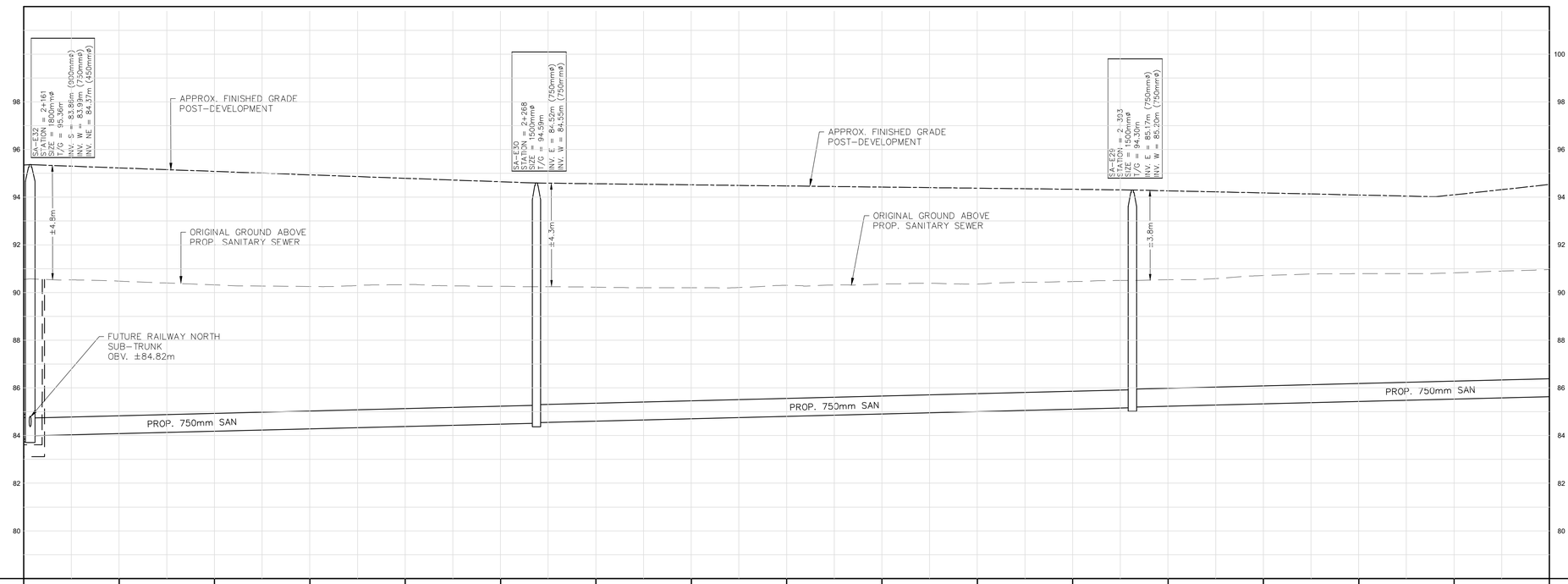
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–4
DATE: August, 2021
SHEET No: ---- OF ----

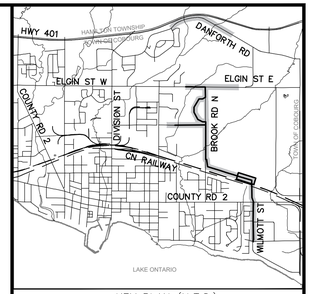
Jan. 27, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext.-Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION		2+180	2+200	2+220	2+240	2+260	2+280	2+300	2+320	2+340	2+360	2+380	2+400	2+420	2+440	2+460	2+480	STATION
CENTERLINE GRADE	FINISHED ELEVATION	90.55	90.48	90.32	90.25	90.33	90.26	90.22	90.20	90.30	90.35	90.36	90.46	90.54	90.71	90.79	90.82	CENTERLINE GRADE
SANITARY SEWER INVERT	83.76 / 83.99	PROP. 106.18m 750mmØ SANITARY SEWER @ 0.50%					84.52 / 84.55	PROP. 125.00m 750mmØ SANITARY SEWER @ 0.50%					85.17 / 85.20	PROP. 125.00m 750mmØ SANITARY SEWER @ 0.50%				SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
RAILWAY SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

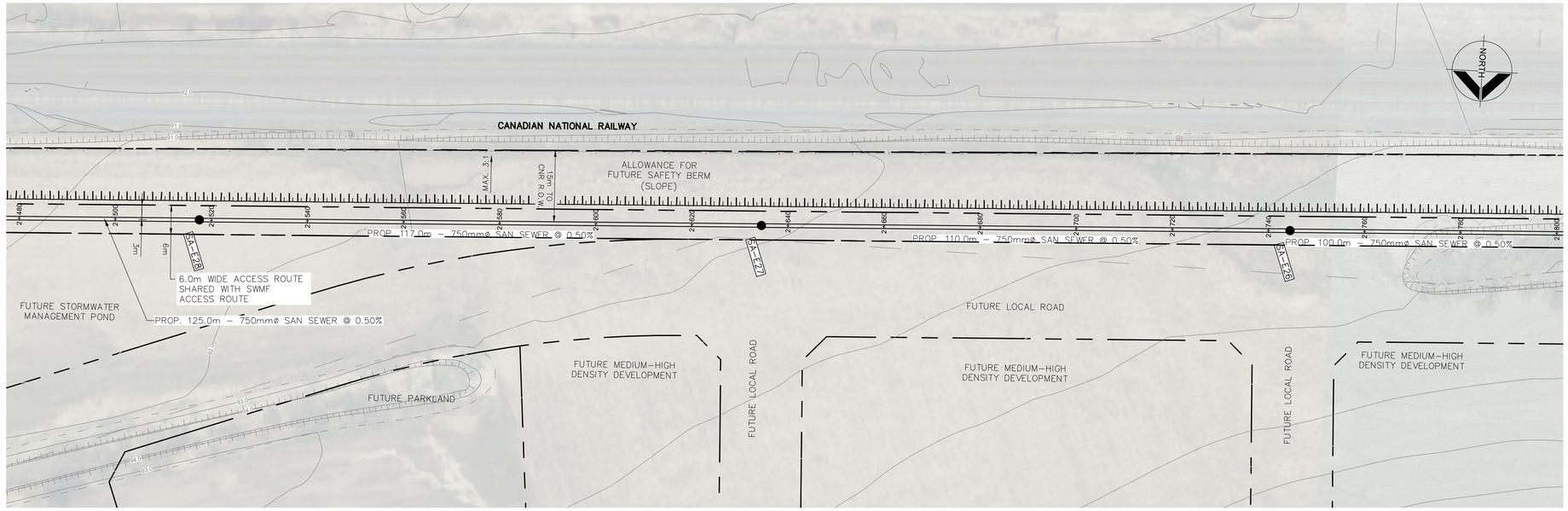
SCALE:
HORIZONTAL: 1:500 (–10m 0 10m 20m)
VERTICAL: 1:100 (–2m 0 2m 4m)

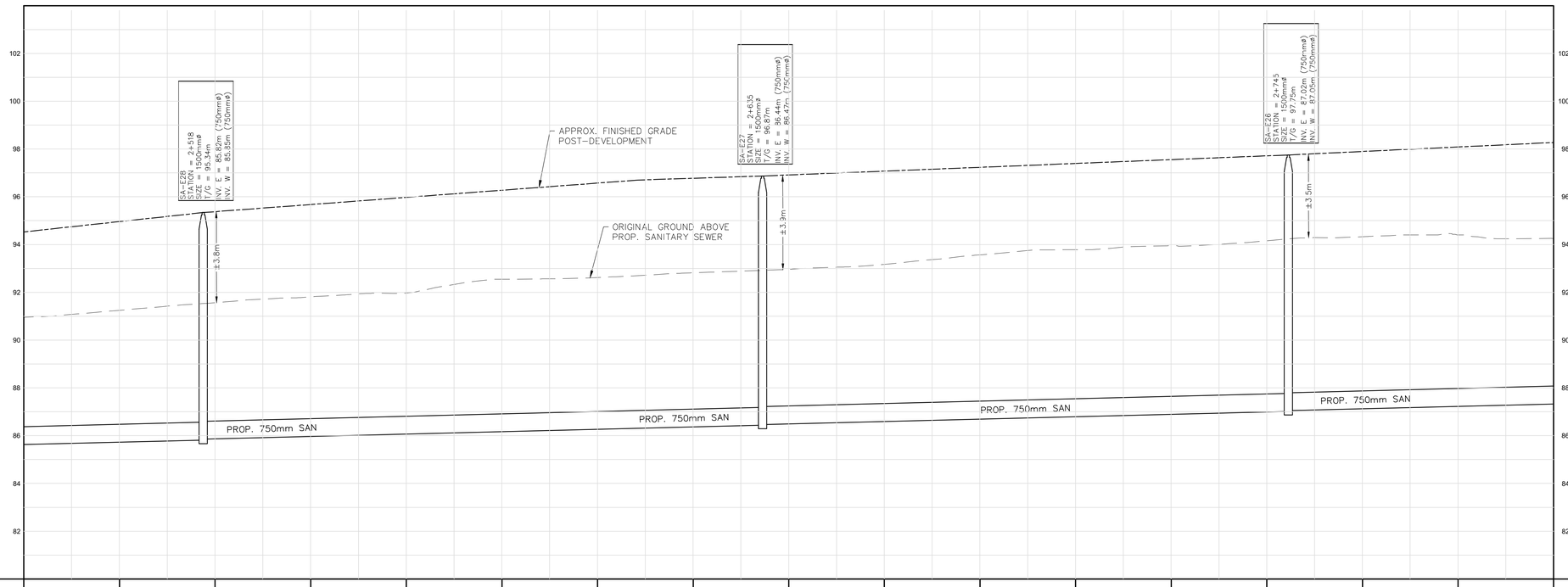
PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–5
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 21, 22

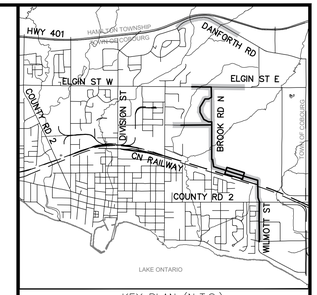
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg

Jan 27, 22





STATION	2+500	2+520	2+540	2+560	2+580	2+600	2+620	2+640	2+660	2+680	2+700	2+720	2+740	2+760	2+780	2+800	STATION
CENTERLINE GRADE (FINISHED)	90.96	91.25	91.57	91.81	91.97	92.55	92.62	92.82	92.96	93.17	93.57	93.79	93.96	94.16	94.33	94.40	CENTERLINE GRADE (FINISHED)
SANITARY SEWER INVERT	85.82	85.88	PROP. 117.00m 750mmØ SANITARY SEWER @ 0.50%					86.44	86.47	PROP. 110.00m 750mmØ SANITARY SEWER @ 0.50%				87.02	87.05	PROP. 100.00m 750m SANITARY SEWER @	SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
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01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

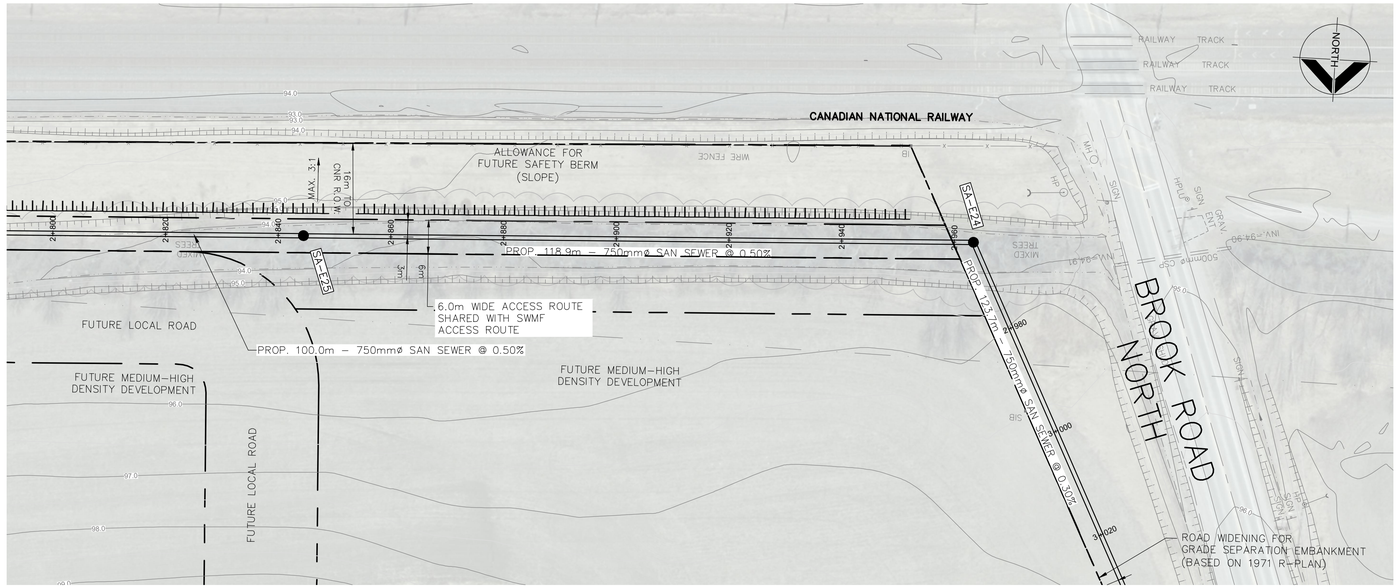
PLAN AND PROFILE
RAILWAY SANITARY
STA. X+XXX TO STA. X+XXX

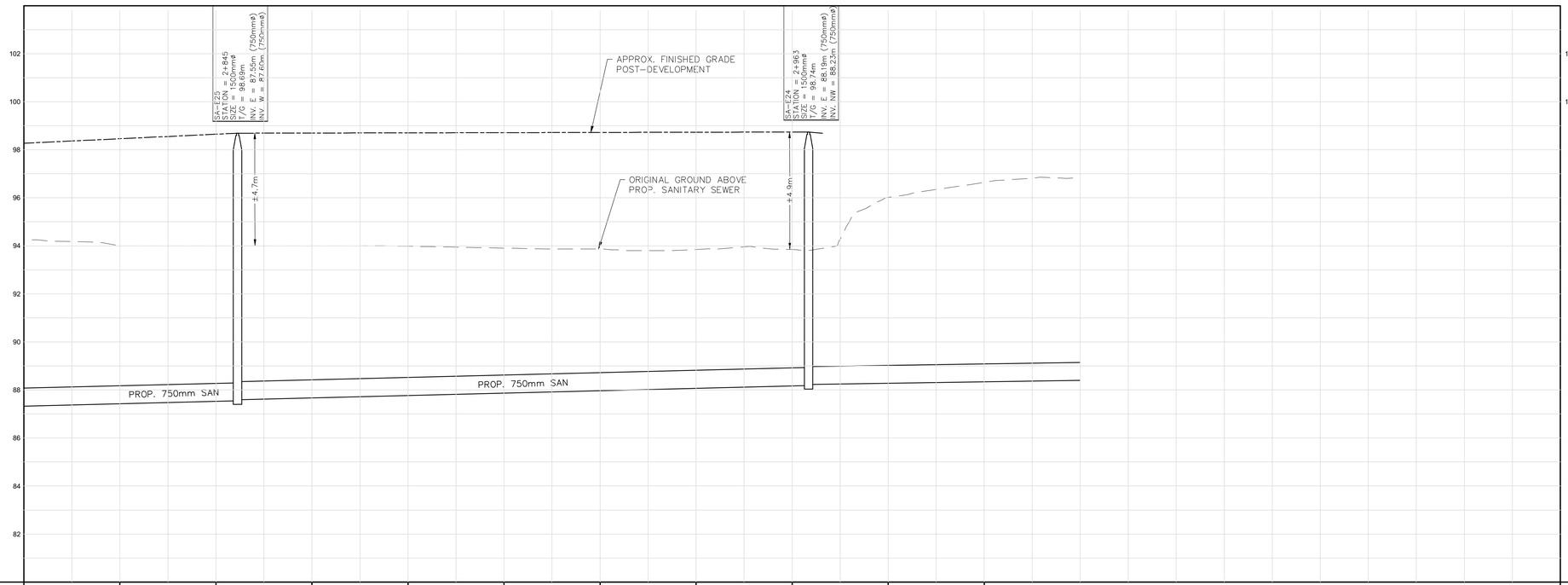
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–6
DATE: August, 2021
SHEET No: ---- OF ----

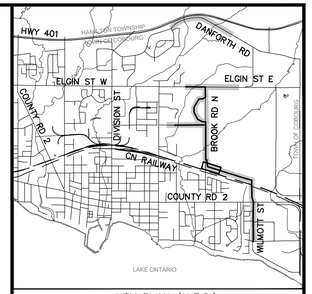
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext.-Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION	2+820	2+840	2+860	2+880	2+900	2+920	2+940	2+960	2+980	3+000	3+020
CENTERLINE GRADE (FINISHED GROUND)	94.26	94.00	94.00	94.00	93.98	93.91	93.87	93.85	93.95	96.02	96.64
SANITARY SEWER INVERT	mø @ 0.50%	87.35 87.60	PROP. 118.90m 750mmø SANITARY SEWER @ 0.50%						88.19 88.23	PRO SANIT	

STATION
CENTERLINE GRADE (FINISHED GROUND)
SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
xxxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
RAILWAY SANITARY
STA. X+XXX TO STA. X+XXX

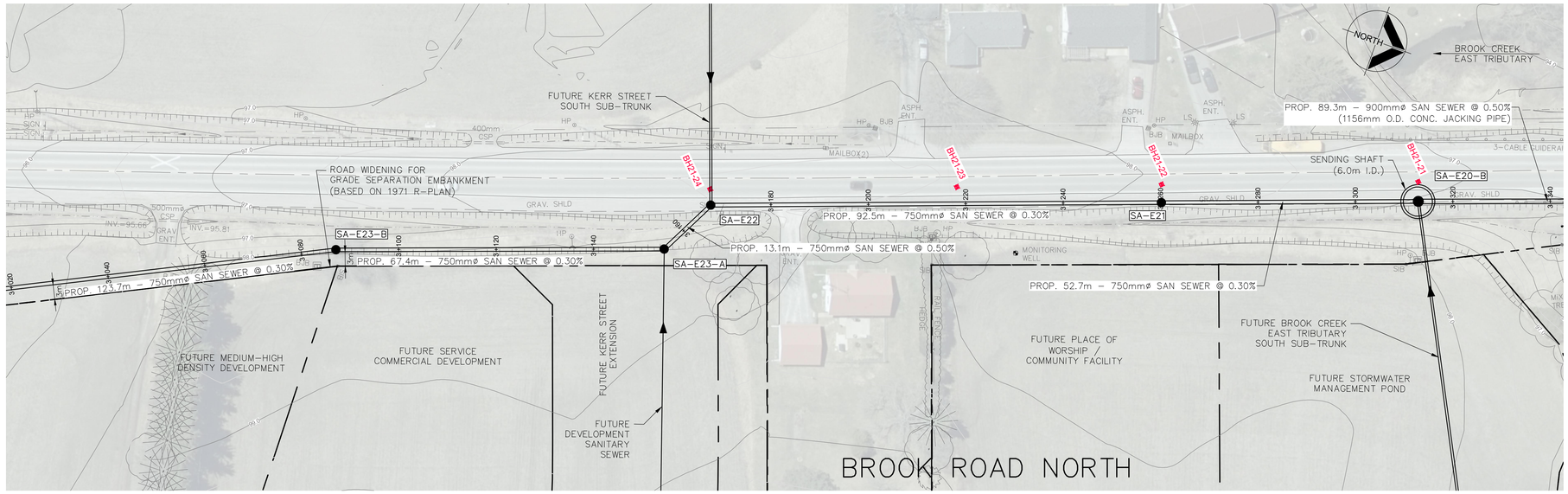
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

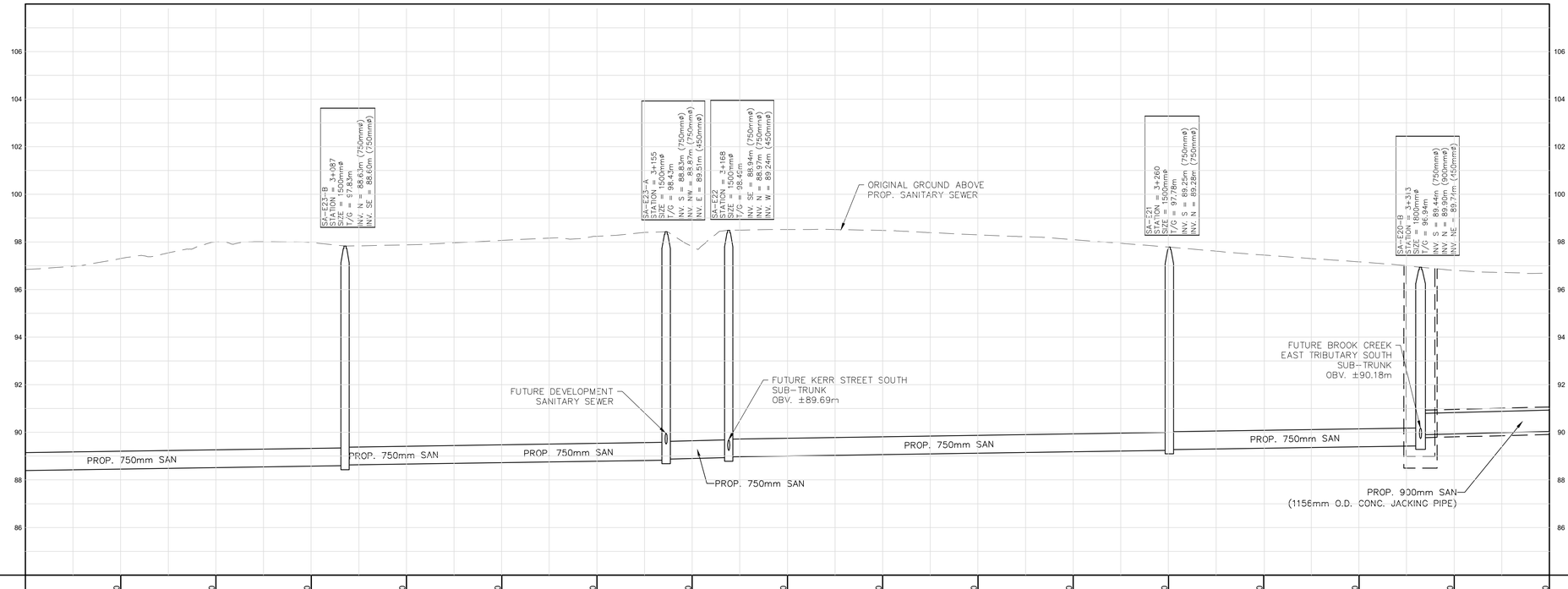
SCALE:
HORIZONTAL: 1:500 (–10m 0 10m 20m)
VERTICAL: 1:100 (–2m 0 2m 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP–7
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 21, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\41D-WIP\AutoCAD\C14-0454-TributeServicing SHEETS-PP.dwg





STATION	3+040	3+060	3+080	3+100	3+120	3+140	3+160	3+180	3+200	3+220	3+240	3+260	3+280	3+300	3+320	3+340
CENTERLINE GRADE (FINISHED / EXISTING)	96.84	97.30	98.00	97.97	97.88	98.06	98.24	97.80	98.52	98.49	98.30	98.10	97.79	97.45	97.16	96.81
SANITARY SEWER INVERT	P. 123.71m 750mmØ ARY SEWER @ 0.30%	88.60	PROP. 67.41m 750mmØ SANITARY SEWER @ 0.30%	88.83	88.87	PROP. 13.15m 750mmØ SANITARY SEWER @ 0.50%	88.94	88.97	PROP. 92.51m 750mmØ SANITARY SEWER @ 0.30%			89.25	PROP. 52.74m 750mmØ SANITARY SEWER @ -0.30%	89.44	89.90	

KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
BROOK RD N SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

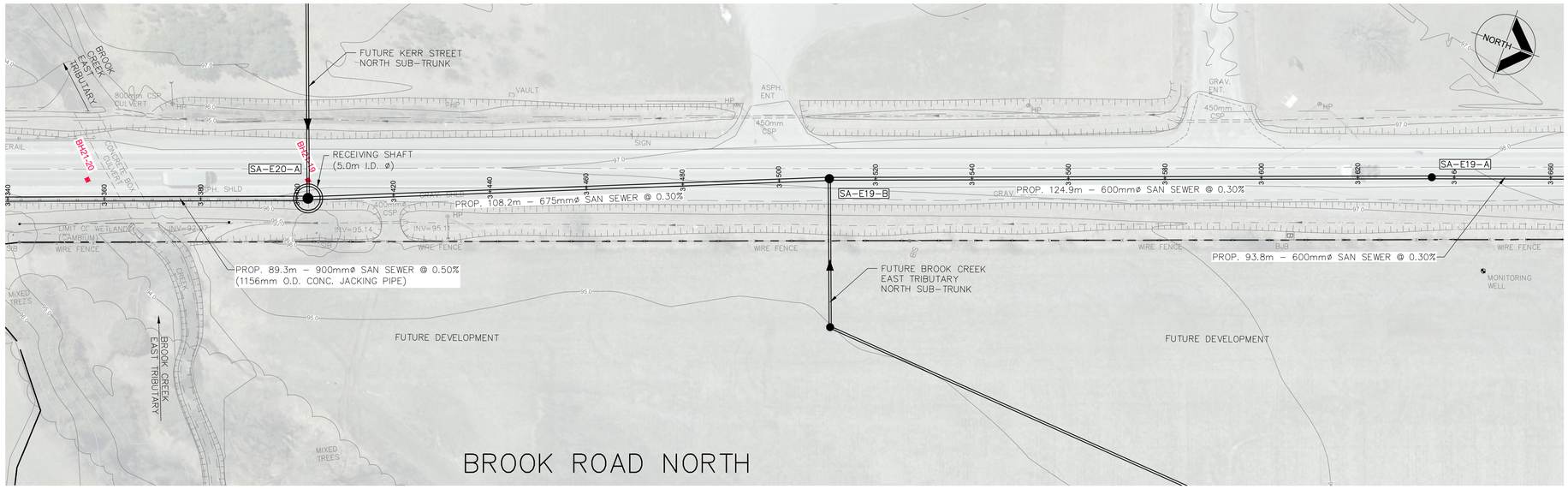
SCALE:
HORIZONTAL: 1:500 (−10m 0 10m 20m)
VERTICAL: 1:100 (−2m 0 2m 4m)

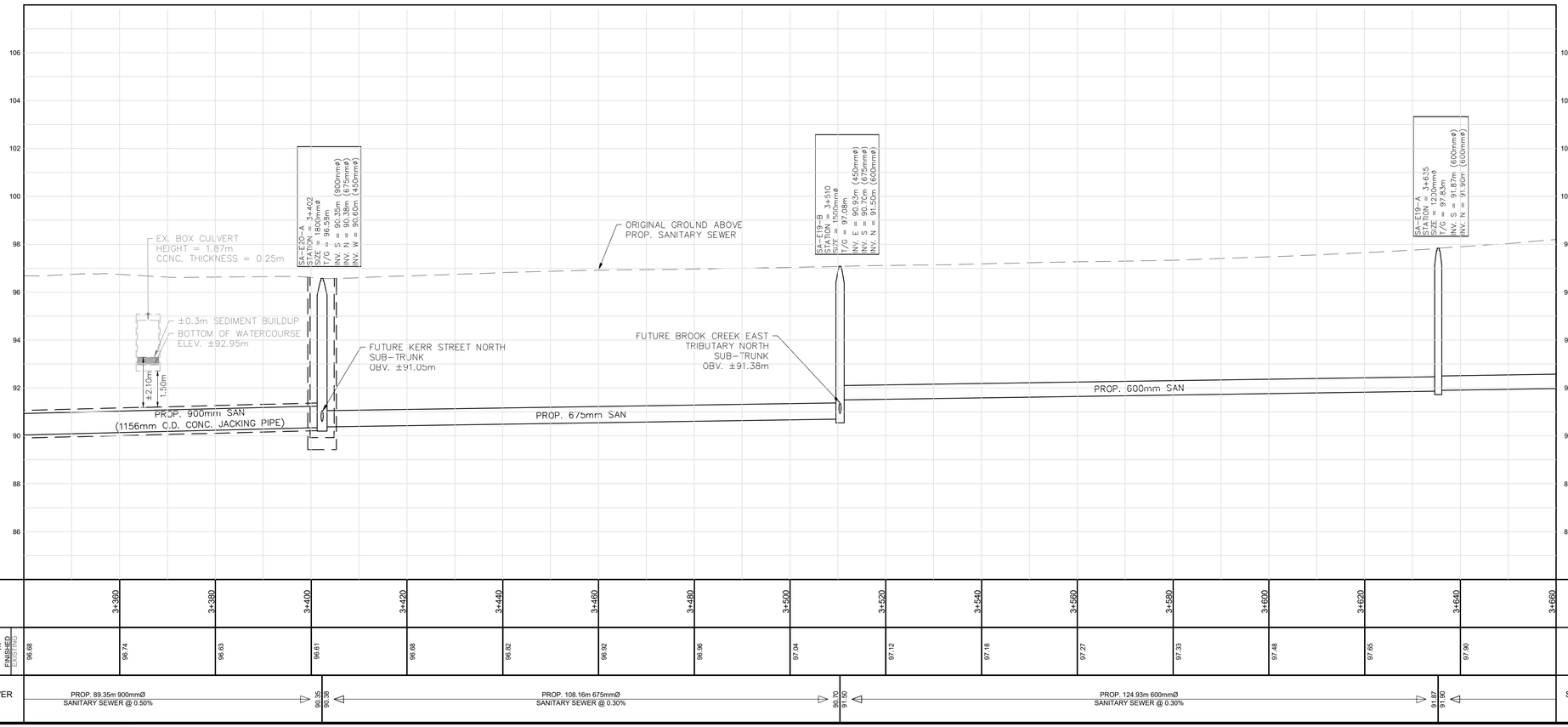
PROJECT No: C14-0454 | CLIENT File No: –
DRAFTER: G.M. | DESIGNER: M.C.
CHECKER: D.C. | APPROVER: D.C.
DRAWING No: PP-8
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 21, 22

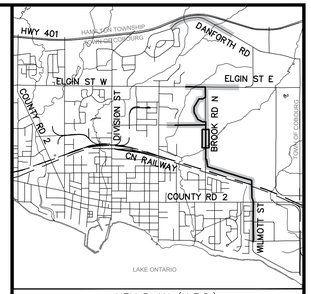
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg

Jan. 27, 22





STATION	3+360	3+380	3+400	3+420	3+440	3+460	3+480	3+500	3+520	3+540	3+560	3+580	3+600	3+620	3+640	3+660	STATION
CENTERLINE GRADE FINISHED	96.68	96.74	96.63	96.61	96.68	96.82	96.92	96.96	97.04	97.12	97.18	97.27	97.33	97.48	97.65	97.90	CENTERLINE GRADE FINISHED
SANITARY SEWER INVERT	PROP. 89.35m 900mmø SANITARY SEWER @ 0.50%			90.35	90.38	PROP. 108.16m 675mmø SANITARY SEWER @ 0.30%			90.70	91.50	PROP. 124.93m 600mmø SANITARY SEWER @ 0.30%				91.87	91.90	SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
BROOK RD N SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m 0 10m 20m)
VERTICAL: 1:100 (–2m 0 2m 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–9
DATE: August, 2021
SHEET No: ---- OF ----

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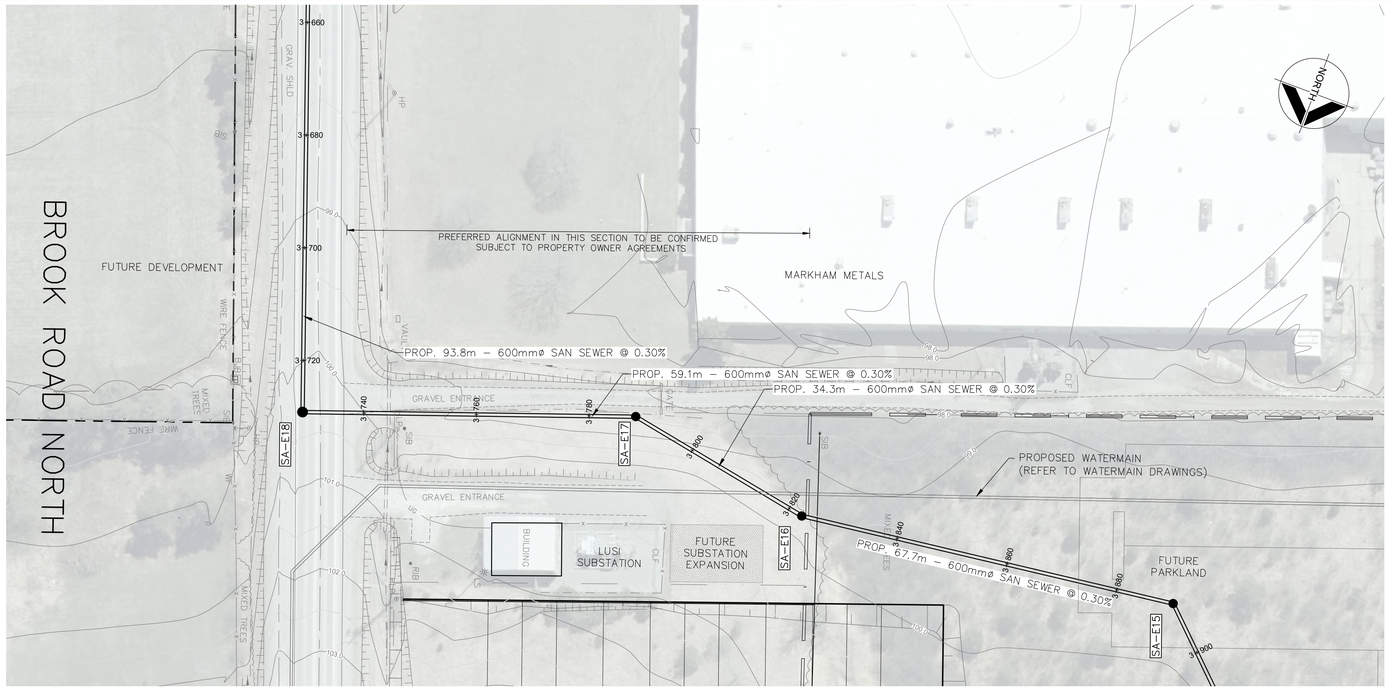
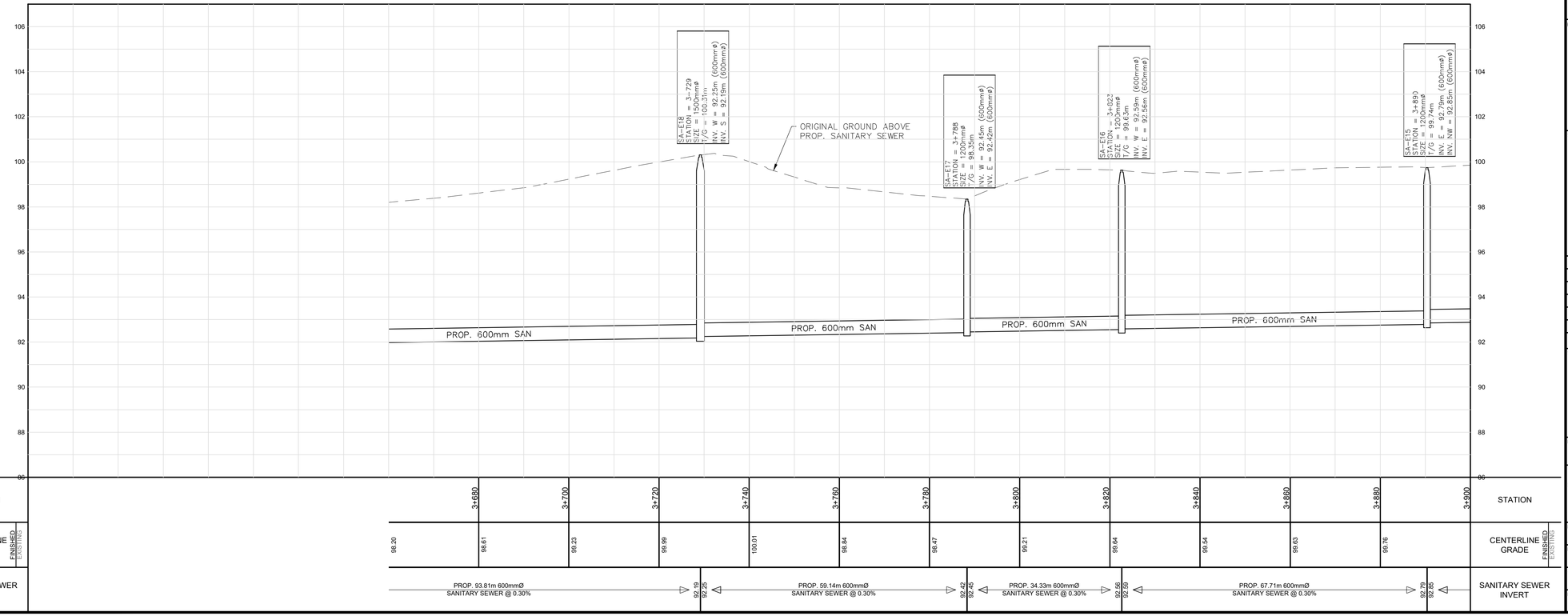
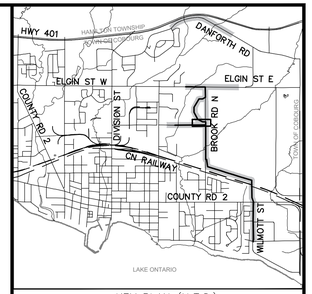
Jan. 21, 22





STATION	3+680	3+700	3+720	3+740	3+760	3+780	3+800	3+820	3+840	3+860	3+880	3+900	STATION
CENTERLINE GRADE FINISHED / EXISTING	98.20	98.61	99.23	99.99	100.01	98.84	98.47	99.21	99.64	99.54	99.63	99.76	CENTERLINE GRADE FINISHED / EXISTING
SANITARY SEWER INVERT	PROP. 93.81m 600mmØ SANITARY SEWER @ 0.30% 92.19 92.25				PROP. 59.14m 600mmØ SANITARY SEWER @ 0.30% 92.42 92.48			PROP. 34.33m 600mmØ SANITARY SEWER @ 0.30% 92.56 92.59				PROP. 67.71m 600mmØ SANITARY SEWER @ 0.30% 92.79 92.85	SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT:

Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
COBOURG TRAILS SANITARY
STA. X+XXX TO STA. X+XXX

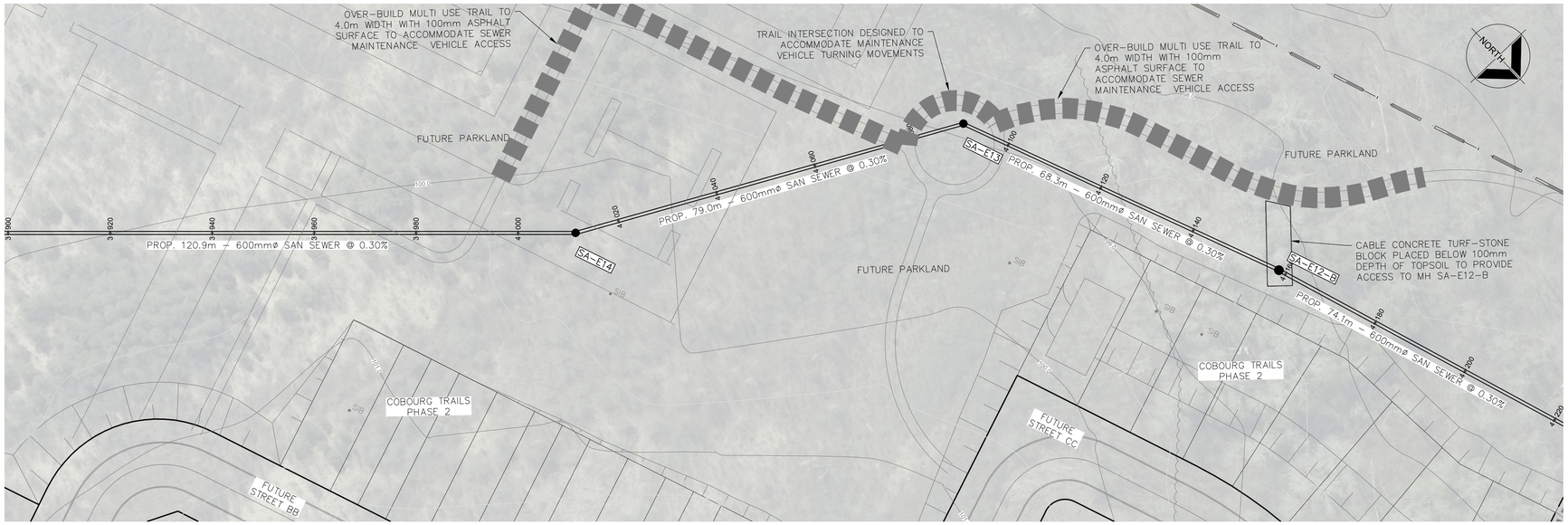
DISCIPLINE:

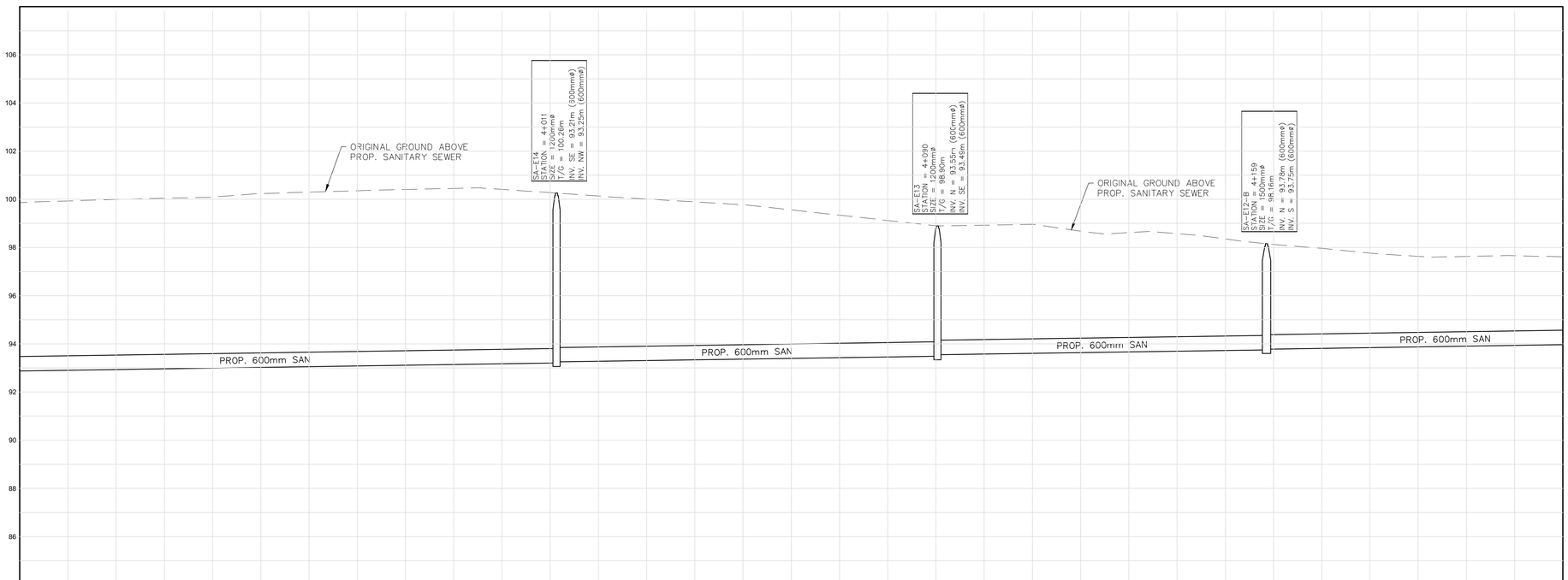
MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

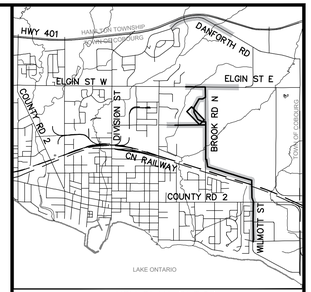
PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–10
DATE: August, 2021
SHEET No: ---- OF ----

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION	3+920	3+940	3+960	3+980	4+000	4+020	4+040	4+060	4+080	4+100	4+120	4+140	4+160	4+180	4+200	4+220
CENTERLINE GRADE (FINISHED / EXISTING)	99.86	99.99	100.09	100.30	100.41	100.41	100.14	99.89	99.56	99.12	98.93	98.67	98.58	98.13	97.77	97.63
SANITARY SEWER INVERT	PROP. 120.94m 600mmØ SANITARY SEWER @ 0.30%					93.21 / 93.25	PROP. 79.00m 600mmØ SANITARY SEWER @ 0.30%				93.49 / 93.55	PROP. 68.25m 600mmØ SANITARY SEWER @ 0.30%			93.78 / 93.75	PROP. 74.09m 600mmØ SANITARY SEWER @ 0.30%



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

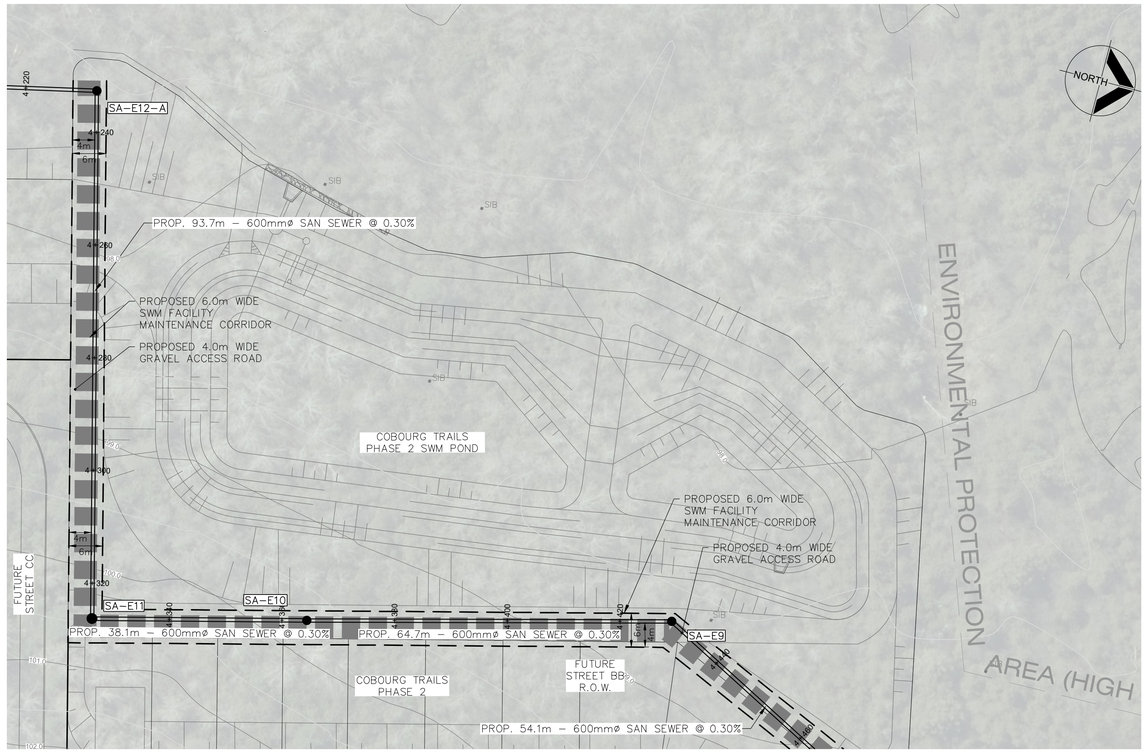
PLAN AND PROFILE
COBOURG TRAILS SANITARY
STA. X+XXX TO STA. X+XXX

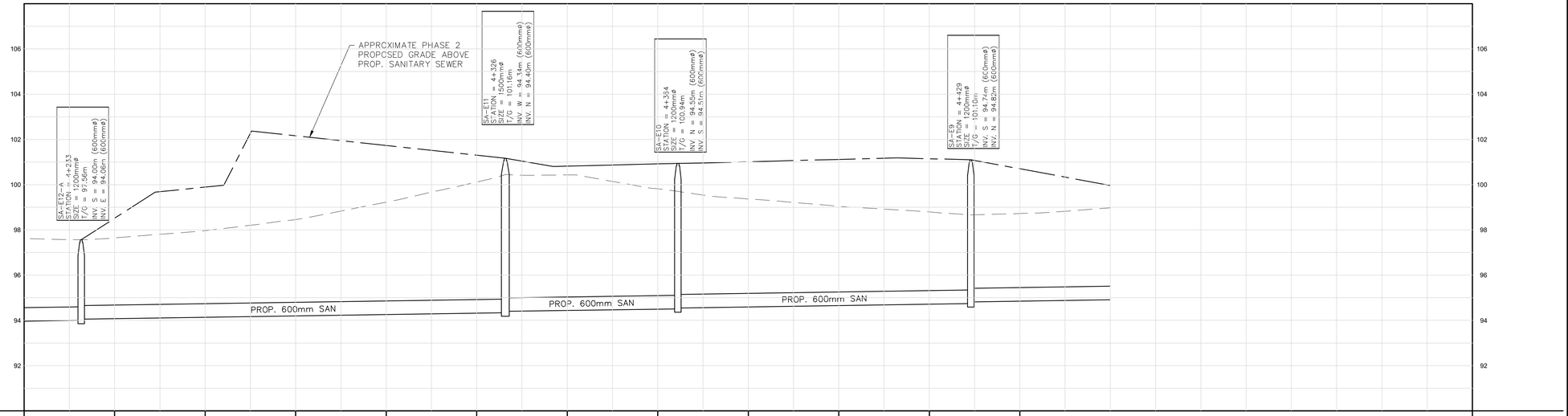
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP–11
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

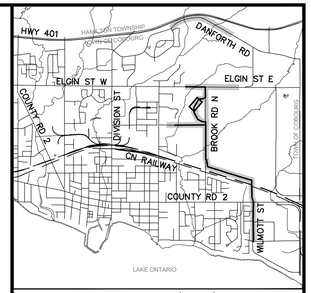
Jan. 27, 22





STATION	4+240	4+260	4+280	4+300	4+320	4+340	4+360	4+380	4+400	4+420	4+440	4+460
CENTERLINE GRADE FINISHED / EXISTING	97.61	97.65	97.96	98.46	99.23	100.11	100.43	99.81	99.37	99.04	98.80	98.72
SANITARY SEWER INVERT	94.00 / 94.06	PROP. 93.69m 600mmØ SANITARY SEWER @ 0.30%				94.34 / 94.40	PROP. 38.13m 600mmØ SANITARY SEWER @ 0.30%	94.51 / 94.55	PROP. 64.73m 600mmØ SANITARY SEWER @ 0.30%		94.62 / 94.74	PROP. 54.13m 60 SANITARY SEWER

STATION
CENTERLINE GRADE FINISHED / EXISTING
SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT:

Tribute communities SINCE 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

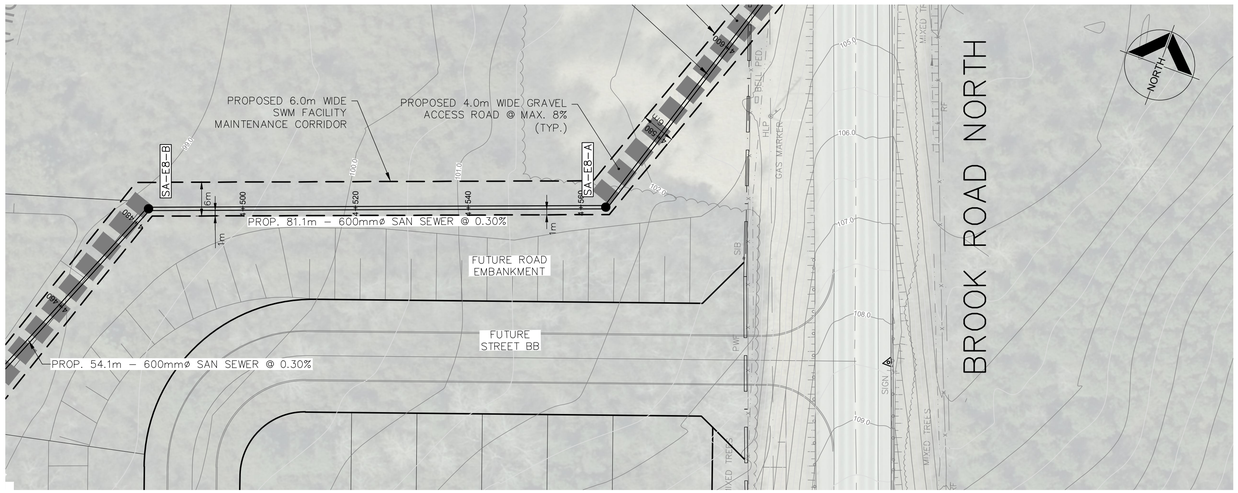
PLAN AND PROFILE
COBOURG TRAILS SANITARY
STA. X+XXX TO STA. X+XXX

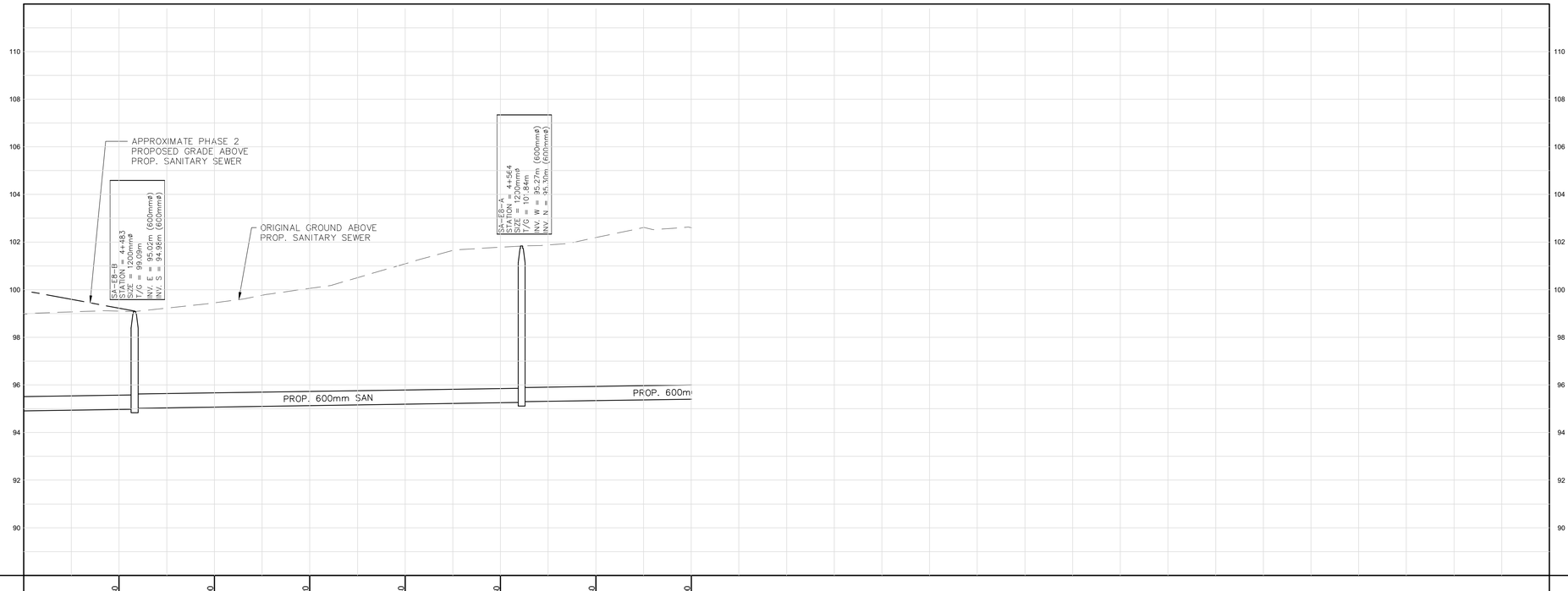
DISCIPLINE:
MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–12
DATE: August, 2021
SHEET No: ---- OF ----

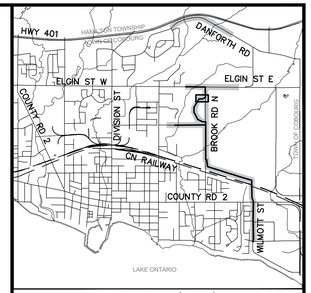
Z:\Cima C\14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400 Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing SHEETS-PP.dwg





STATION		4+480	4+500	4+520	4+540	4+560	4+580	4+600
CENTERLINE GRADE	FINISHED	98.86	99.10	99.45	100.06	101.09	101.78	102.19
	EXISTING							
SANITARY SEWER INVERT		mmØ @ 0.30%	94.98 / 95.02	PROP. 81.13m 600mmØ SANITARY SEWER @ 0.30%			95.27 / 95.32	PROP. 65.50m 6 SANITARY SEWER

STATION		4+480	4+500	4+520	4+540	4+560	4+580	4+600
CENTERLINE GRADE	FINISHED	98.86	99.10	99.45	100.06	101.09	101.78	102.19
	EXISTING							
SANITARY SEWER INVERT		mmØ @ 0.30%	94.98 / 95.02	PROP. 81.13m 600mmØ SANITARY SEWER @ 0.30%			95.27 / 95.32	PROP. 65.50m 6 SANITARY SEWER



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
COBOURG TRAILS SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP–13
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 27, 22

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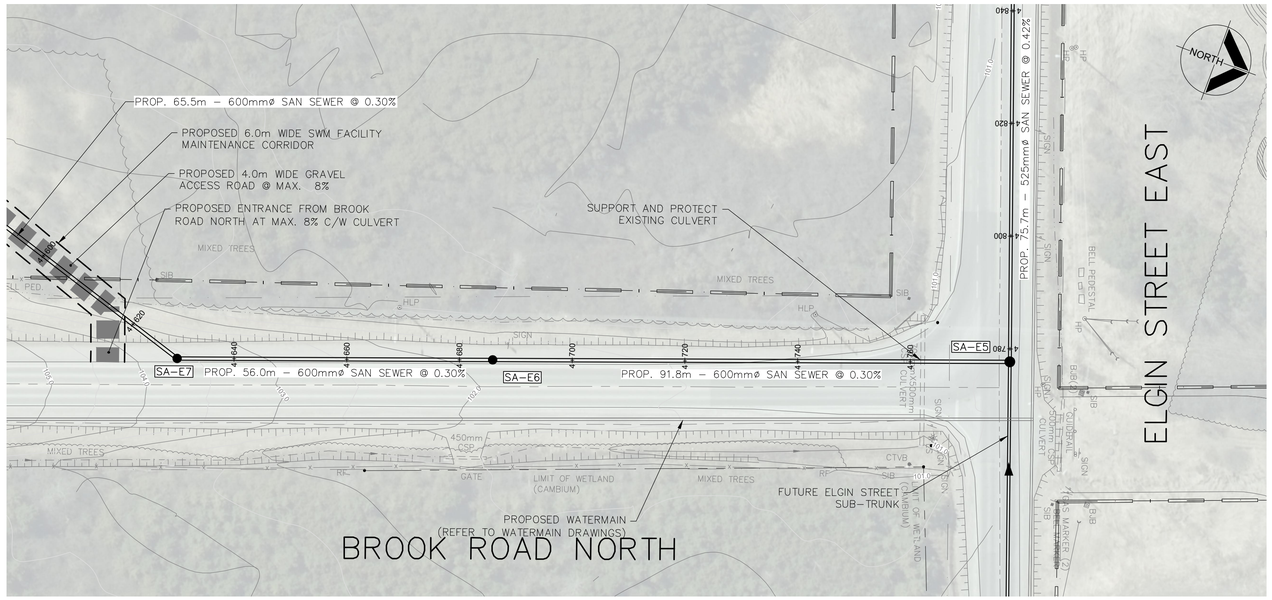
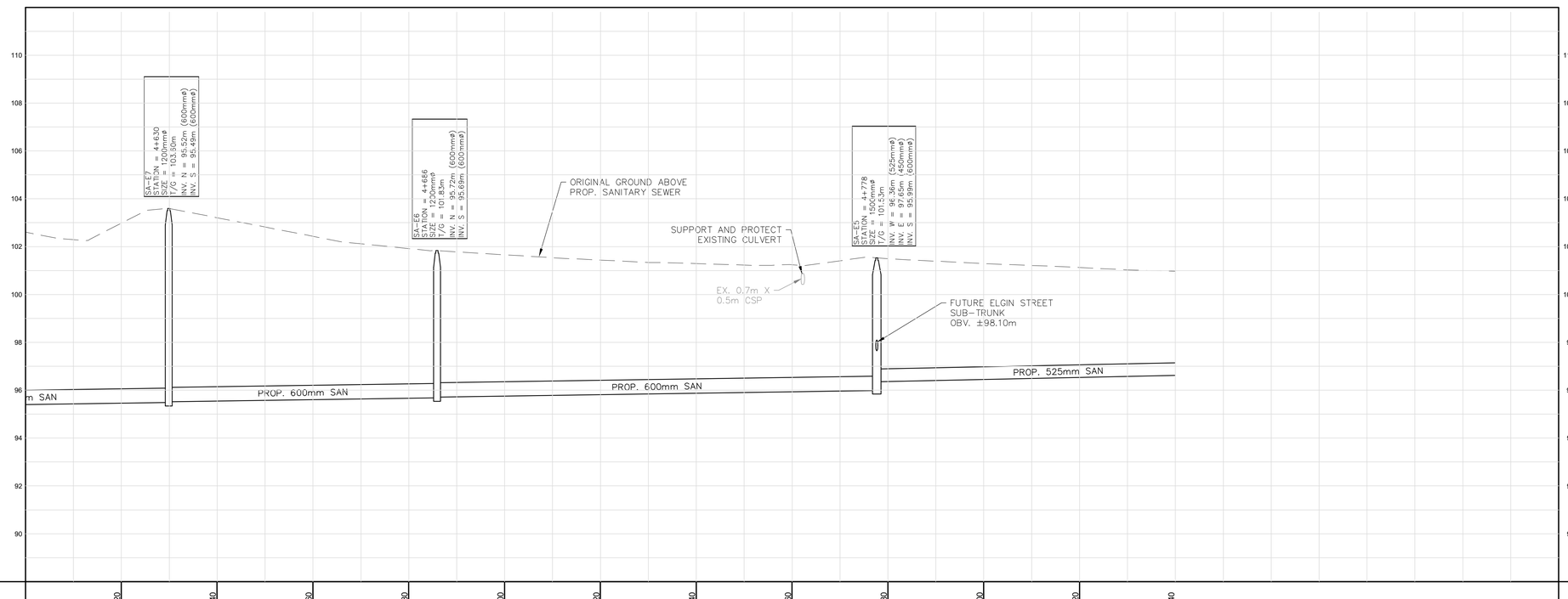
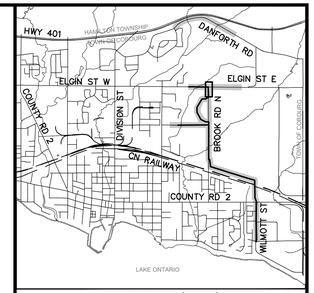
Jan. 21, 22





STATION	4+620	4+640	4+660	4+680	4+700	4+720	4+740	4+760	4+780	4+800	4+820	4+840
CENTERLINE GRADE (FINISHED / EXISTING)	102.61	102.98	103.21	102.43	101.92	101.66	101.44	101.29	101.24	101.50	101.29	101.13
SANITARY SEWER INVERT	00mmØ @ 0.30%	95.49 / 95.52	PROP. 55.98m 600mmØ SANITARY SEWER @ 0.30%	95.69 / 95.72	PROP. 91.77m 600mmØ SANITARY SEWER @ 0.30%				95.59 / 95.36	PROP. 75.72m 525mmØ SANITARY SEWER @ 0.42%		

STATION	4+620	4+640	4+660	4+680	4+700	4+720	4+740	4+760	4+780	4+800	4+820	4+840



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

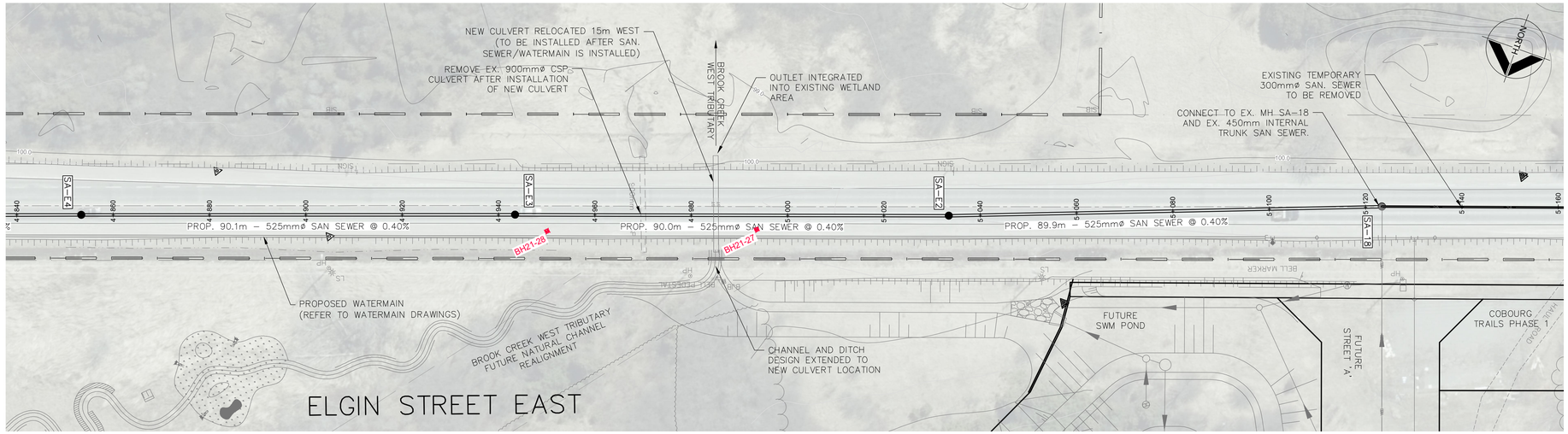
PLAN AND PROFILE
BROOK RD N SANITARY
STA. X+XXX TO STA. X+XXX

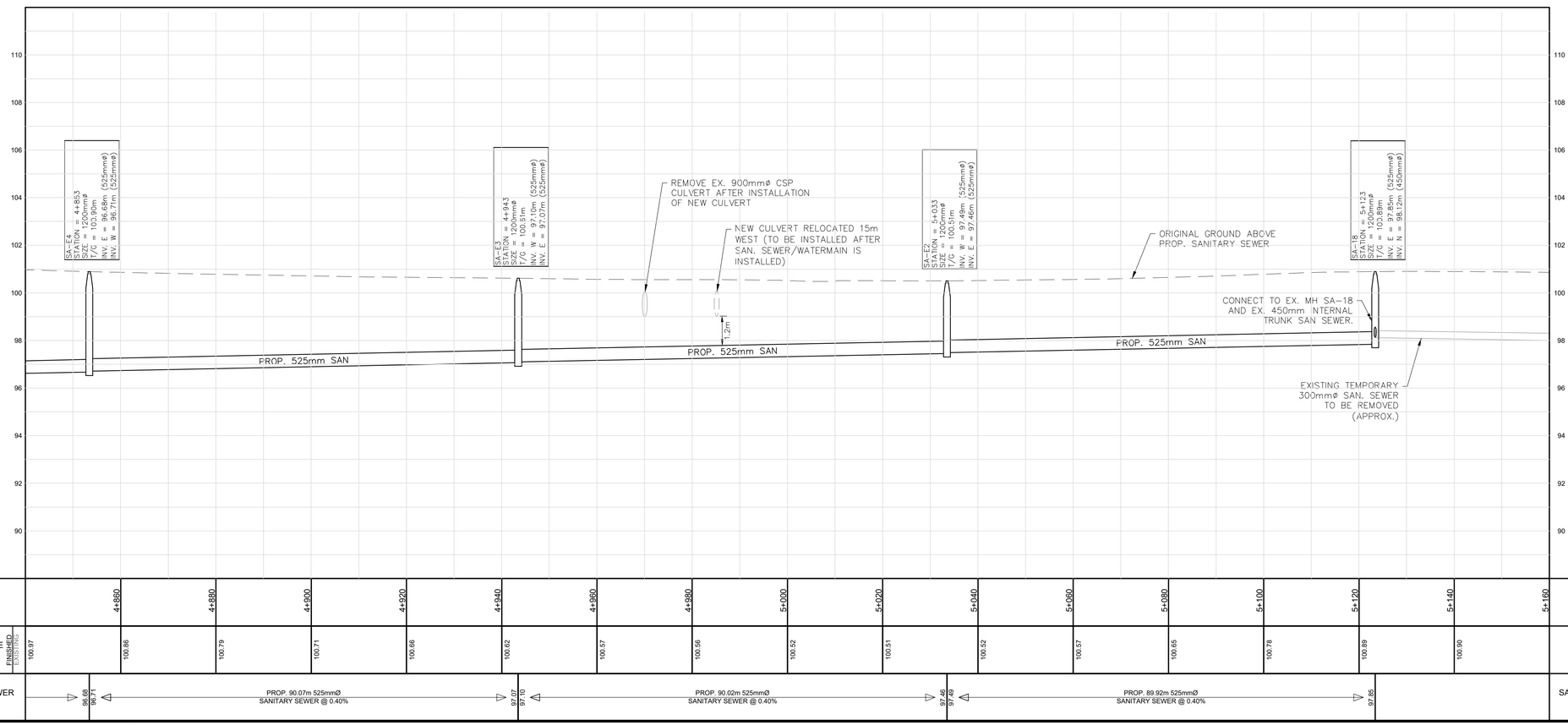
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

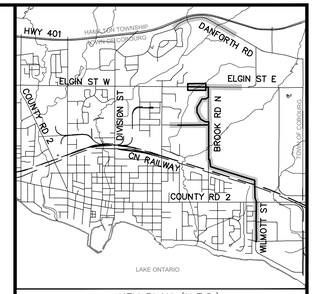
PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP–14
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP.dwg





STATION	4+860	4+880	4+900	4+920	4+940	4+960	4+980	5+000	5+020	5+040	5+060	5+080	5+100	5+120	5+140	5+160	STATION
CENTERLINE GRADE FINISHED / EXISTING	100.97	100.86	100.79	100.71	100.66	100.62	100.57	100.56	100.52	100.51	100.52	100.57	100.65	100.78	100.89	100.90	CENTERLINE GRADE FINISHED / EXISTING
SANITARY SEWER INVERT	96.68 / 96.71	PROP. 90.07m 525mmø SANITARY SEWER @ 0.40%			97.07 / 97.10	PROP. 90.02m 525mmø SANITARY SEWER @ 0.40%			97.46 / 97.49	PROP. 89.92m 525mmø SANITARY SEWER @ 0.40%				97.85			SANITARY SEWER INVERT



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
ELGIN ST E SANITARY
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–15
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 21, 22

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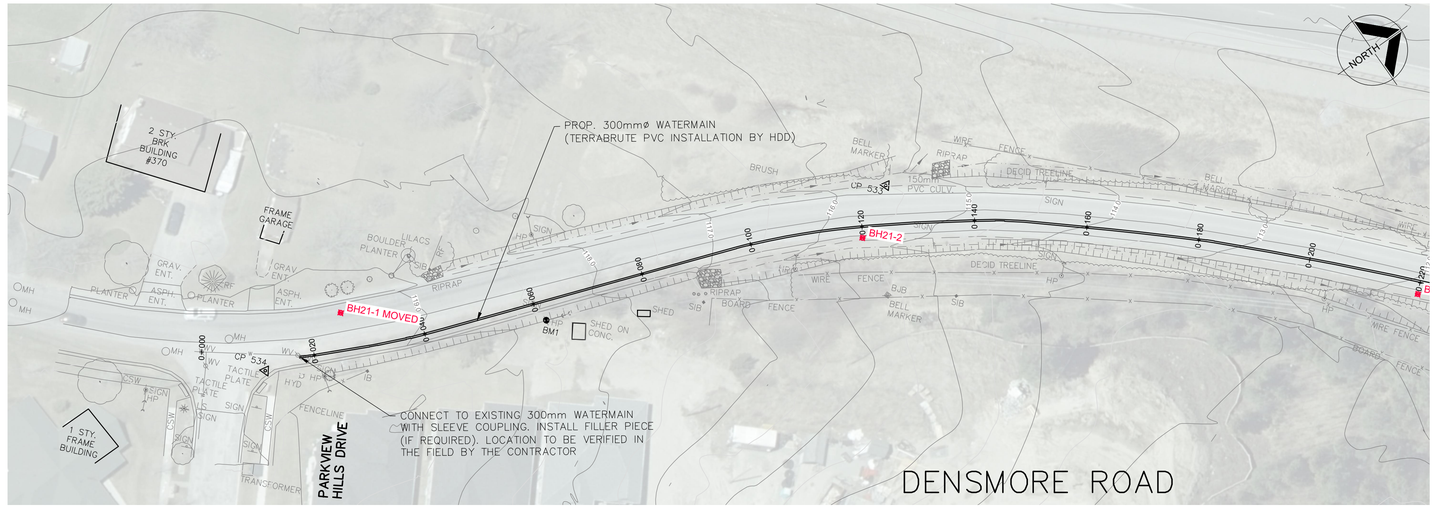
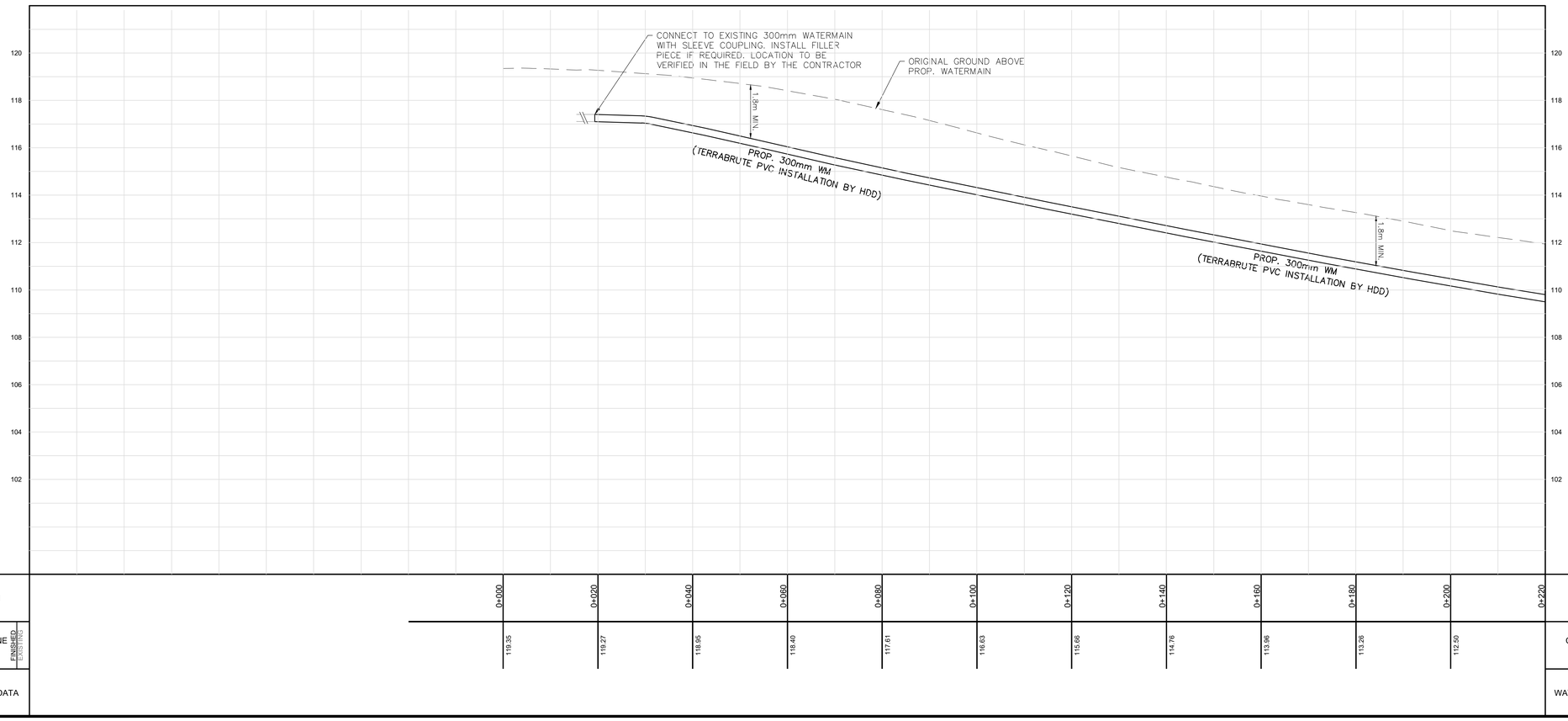
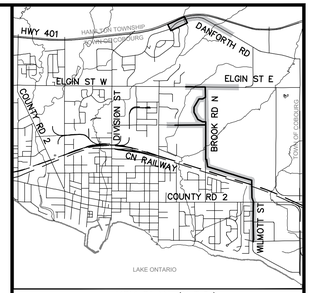




STATION	0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	STATION
CENTERLINE GRADE (FINISHED / EXISTING)	119.35	119.27	118.95	118.40	117.61	116.83	115.99	114.76	113.96	113.26	112.50		CENTERLINE GRADE (FINISHED / EXISTING)
WATERMAIN DATA													WATERMAIN DATA



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
–	–	–	–
01	2021-11-18	REF. FOR GEOTECHNICAL WORKS	D.C.

SHEET TITLE:

PLAN AND PROFILE
DENSMORE ROAD WATERMAIN
STA. X+XXX TO STA. X+XXX

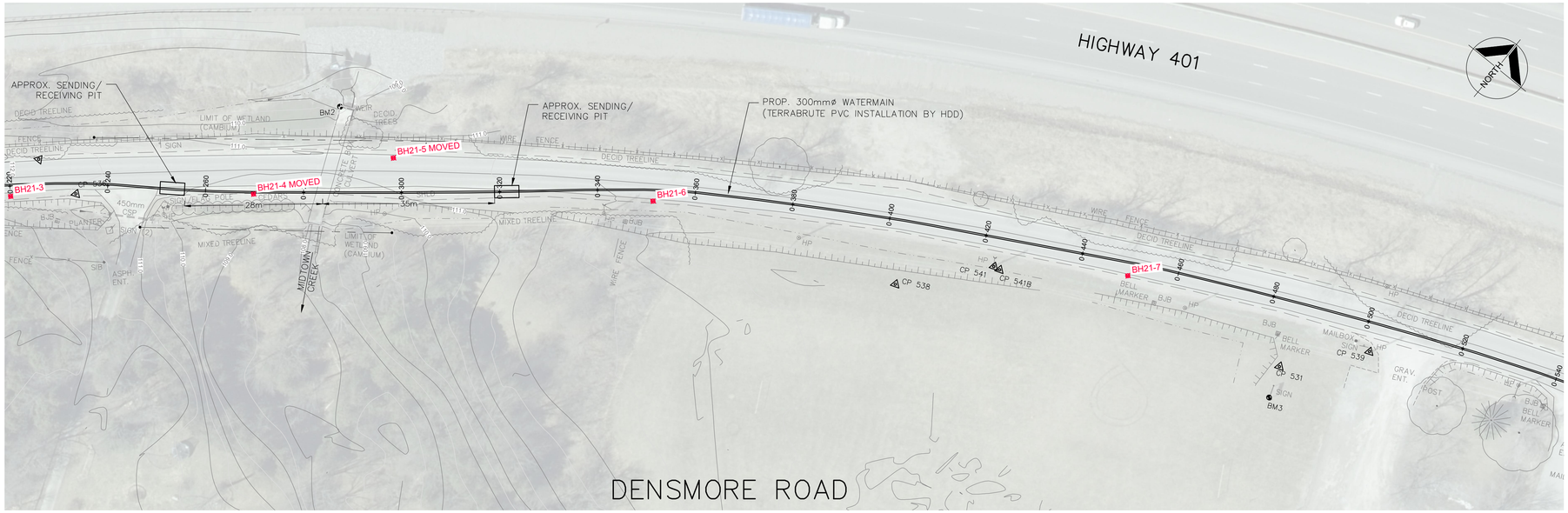
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

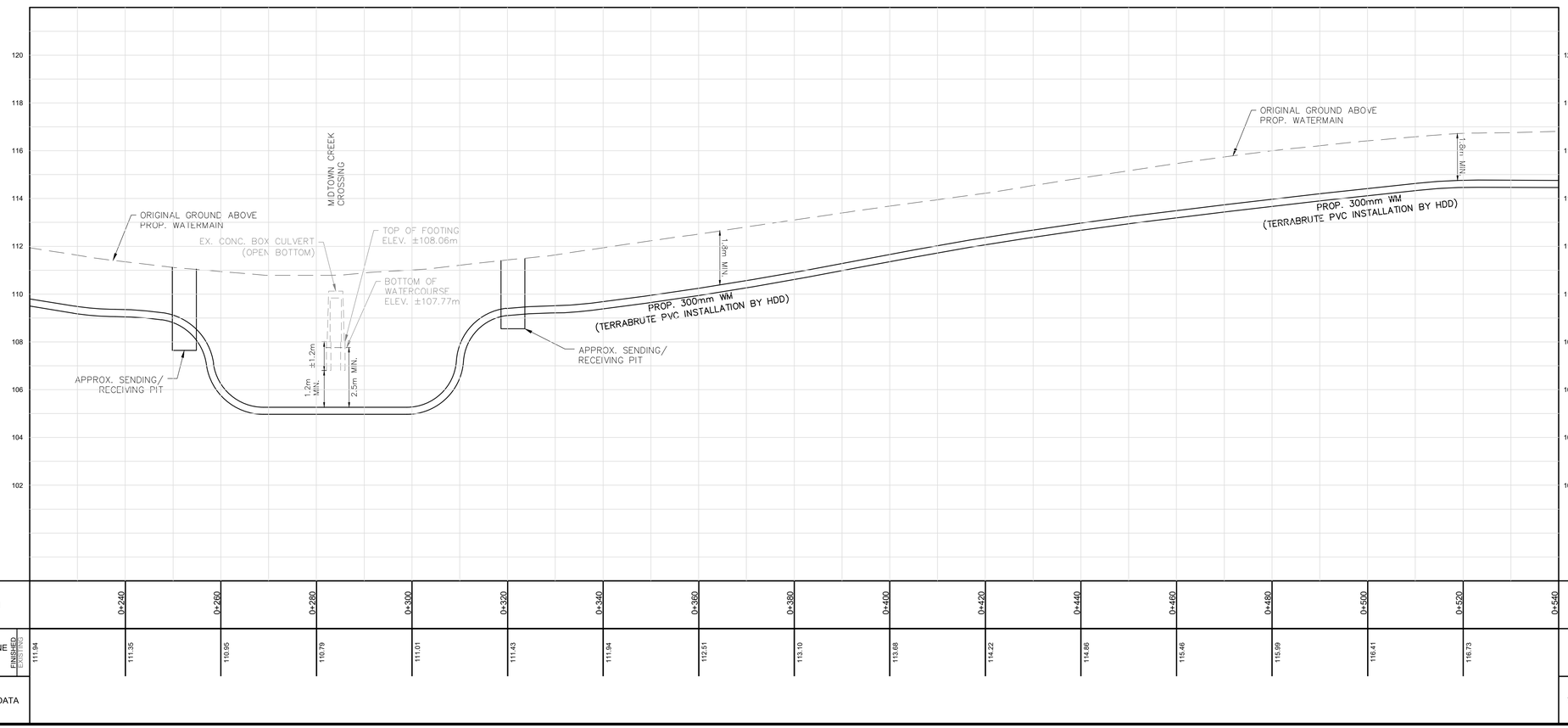
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14-0454
CLIENT File No: –
GRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP-W1
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

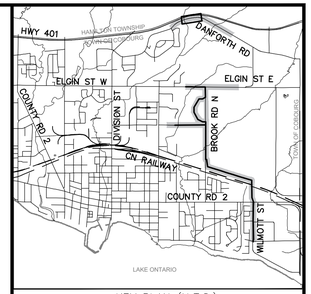
Jan. 21, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext.-Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\[C14-0454-TributeServicing-SHEETS-PP-WW.dwg





STATION	0+240	0+260	0+280	0+300	0+320	0+340	0+360	0+380	0+400	0+420	0+440	0+460	0+480	0+500	0+520	0+540	STATION
CENTERLINE GRADE FINISHED	111.94	111.35	110.95	110.79	111.01	111.43	111.94	112.51	113.10	113.68	114.22	114.86	115.46	115.99	116.41	116.73	CENTERLINE GRADE FINISHED
CENTERLINE GRADE EXISTING																	
WATERMAIN DATA																	WATERMAIN DATA



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	2021-11-18	REF. FOR GEOTECHNICAL WORKS	D.C.

SHEET TITLE:

PLAN AND PROFILE
DENSMORE ROAD WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

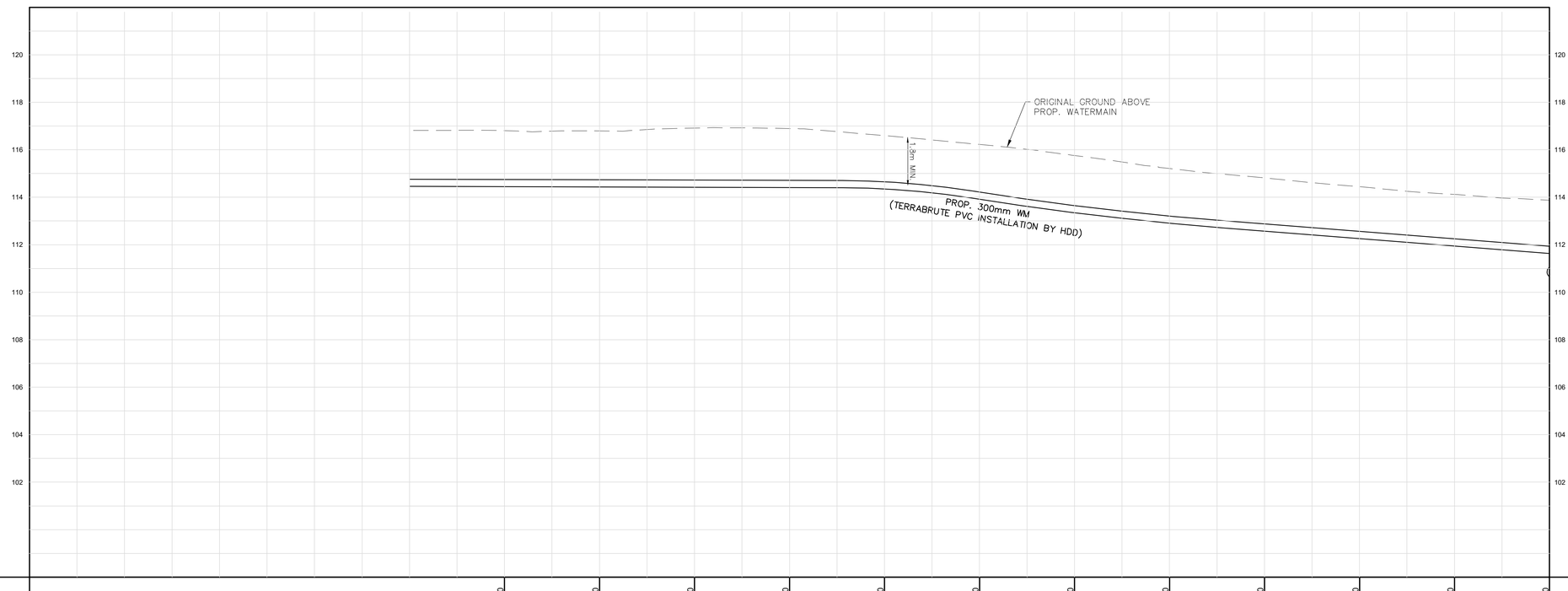
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W2
DATE: August, 2021
SHEET No: ---- OF ----

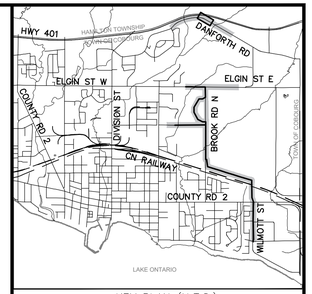
Jan. 21, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\A1stB\WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WW.dwg

Jan. 21, 22



STATION	0+560	0+580	0+600	0+620	0+640	0+660	0+680	0+700	0+720	0+740	0+760	0+780
CENTERLINE GRADE FINISHED / EXISTING	116.81	116.80	116.79	116.91	116.89	116.59	116.22	115.76	115.21	114.81	114.44	114.12
WATERMAIN DATA												



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx — xxx.xxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	2021-11-18	REF. FOR GEOTECHNICAL WORKS	D.C.

SHEET TITLE:

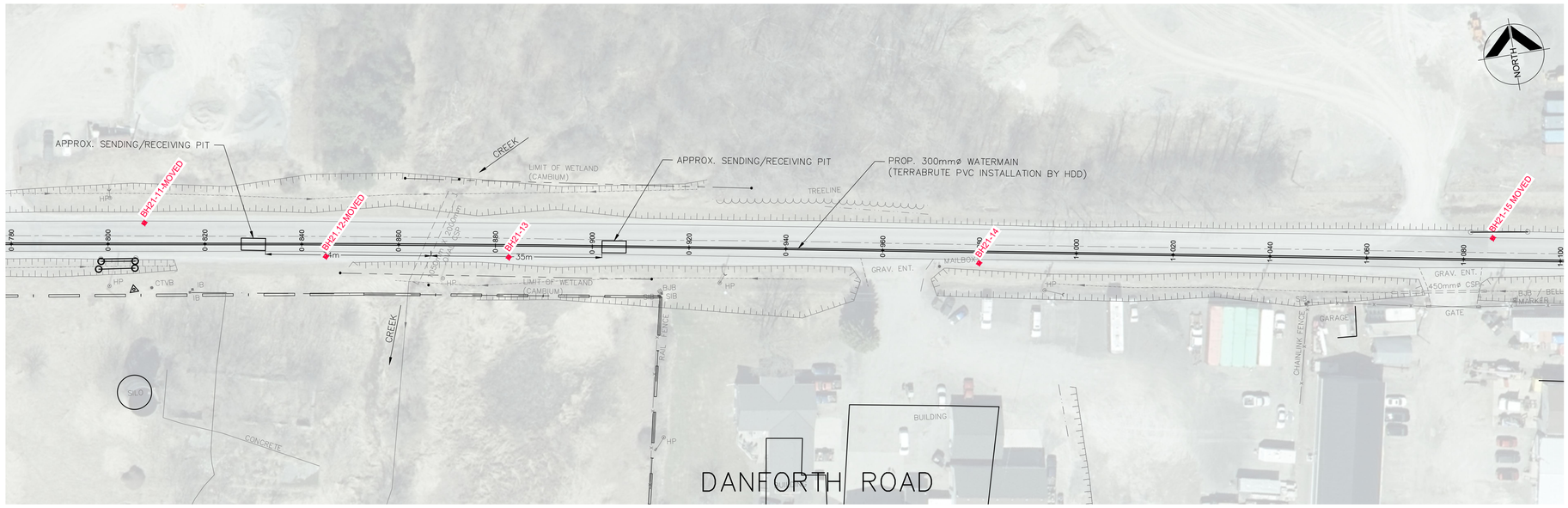
PLAN AND PROFILE
DENSMORE ROAD WATERMAIN
STA. X+XXX TO STA. X+XXX

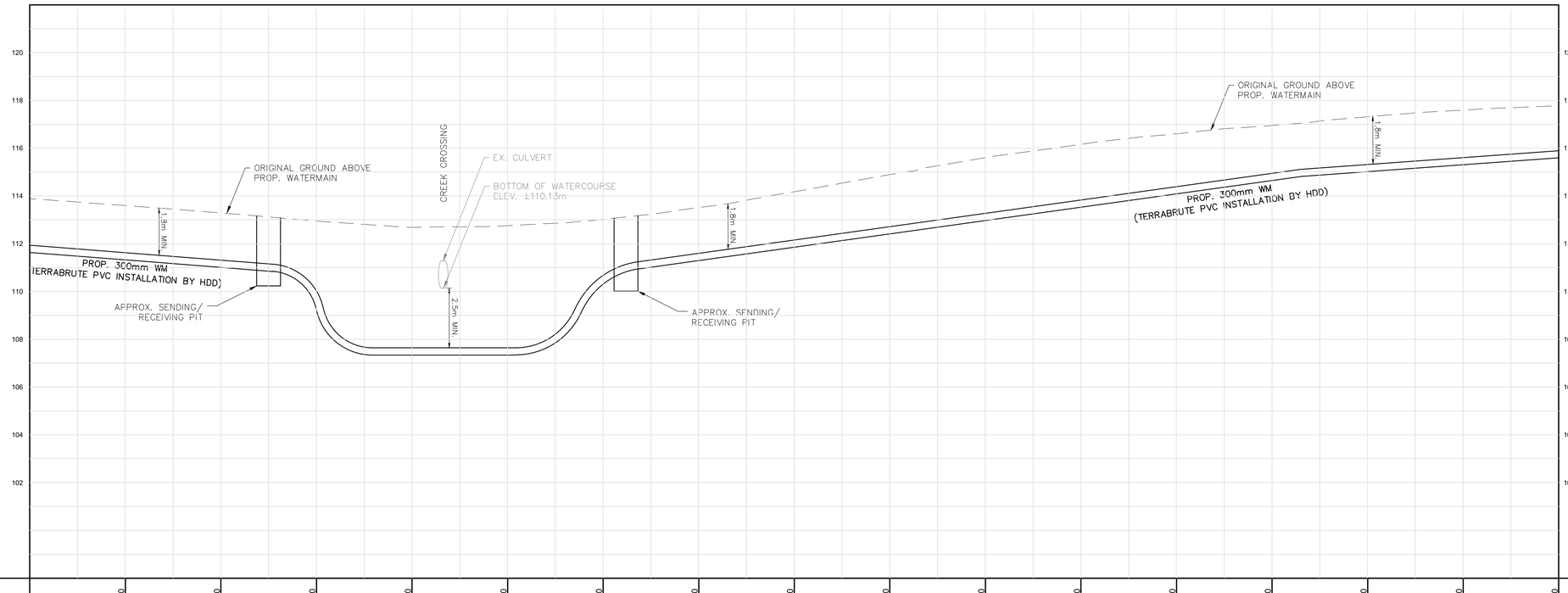
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (−10m 0 10m 20m)
VERTICAL: 1:100 (−2m 0 2m 4m)

PROJECT No: C14-0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP-W3
DATE: August, 2021
SHEET No: ---- OF ----

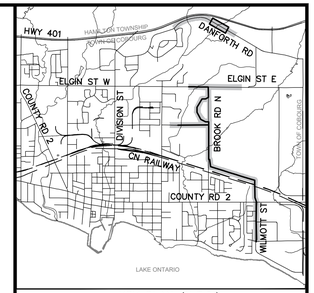
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WW.dwg





STATION	0+800	0+820	0+840	0+860	0+880	0+900	0+920	0+940	0+960	0+980	1+000	1+020	1+040	1+060	1+080	1+100	STATION
CENTERLINE GRADE (FINISHED / EXISTING)	113.88	113.60	113.29	112.95	112.69	112.76	113.02	113.52	114.18	114.90	115.60	116.16	116.60	116.95	117.31	117.69	CENTERLINE GRADE (FINISHED / EXISTING)
WATERMAIN DATA																	WATERMAIN DATA

2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO INFORM THEMSELVES OF THE EXACT LOCATION OF, AND ASSUME ALL LIABILITY FOR DAMAGE TO ALL UTILITIES SERVICES AND STRUCTURES WHETHER ABOVE GROUND OR BELOW GRADE BEFORE COMMENCING THE WORK. SUCH INFORMATION IS NOT NECESSARILY SHOWN ON THE DRAWING, AND WHERE SHOWN, THE ACCURACY CANNOT BE GUARANTEED.

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CLIENT:

Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
–	–	–	–
01	2021-11-18	REF. FOR GEOTECHNICAL WORKS	D.C.

SHEET TITLE:

PLAN AND PROFILE
DANFORTH ROAD WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE:

MUNICIPAL INFRASTRUCTURE

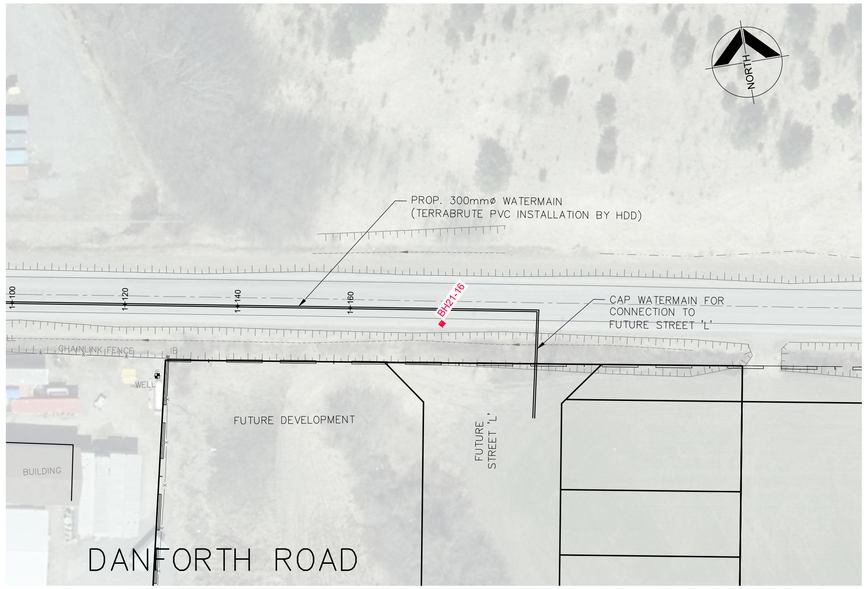
SCALE:
HORIZONTAL: 1:500 (–10m 0 10m 20m)
VERTICAL: 1:100 (–2m 0 2m 4m)

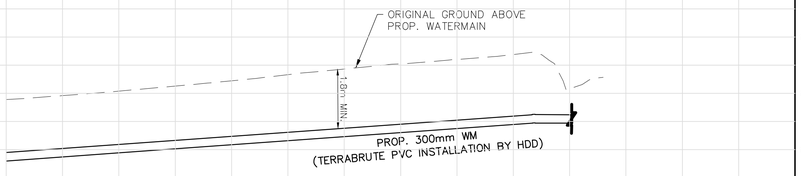
PROJECT No: C14-0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP-W4
DATE: August, 2021
SHEET No: ---- OF ----

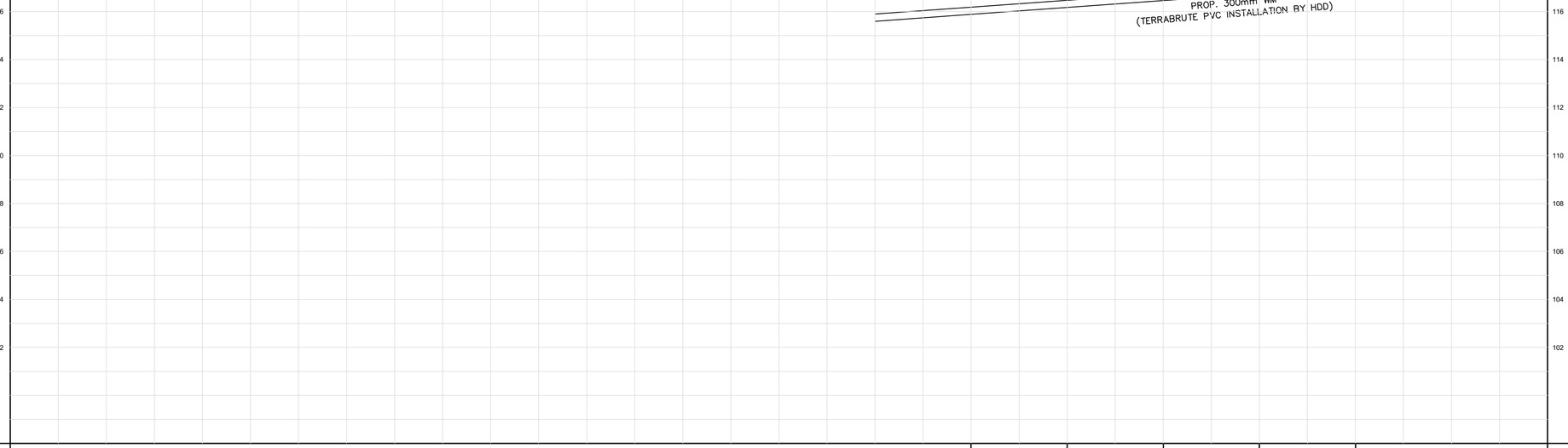
Jan. 27, 22

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext.-Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WW.dwg

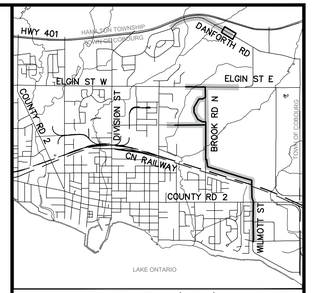
Jan. 27, 22







STATION		1+120	1+140	1+160	1+180	1+200
CENTERLINE GRADE	FINISHED	118.07	118.44	118.86	119.20	
	EXISTING	117.78				
WATERMAIN DATA						



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT:

Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
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–	–	–	–
–	–	–	–
–	–	–	–
01	2021-11-18	REF. FOR GEOTECHNICAL WORKS	D.C.

SHEET TITLE:

PLAN AND PROFILE
DANFORTH ROAD WATERMAIN
STA. X+XXX TO STA. X+XXX

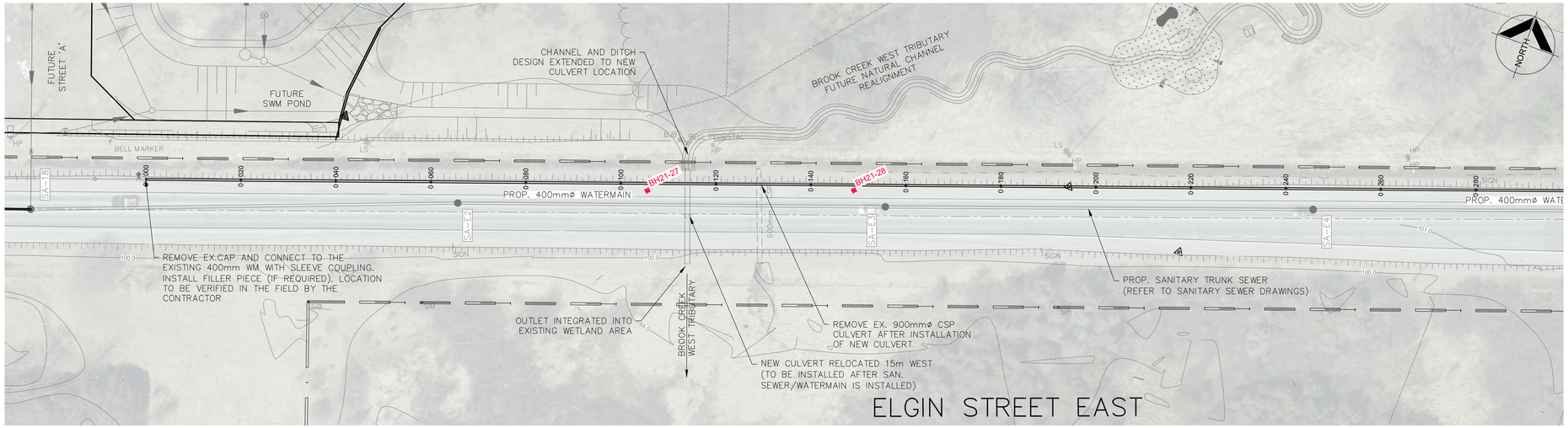
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

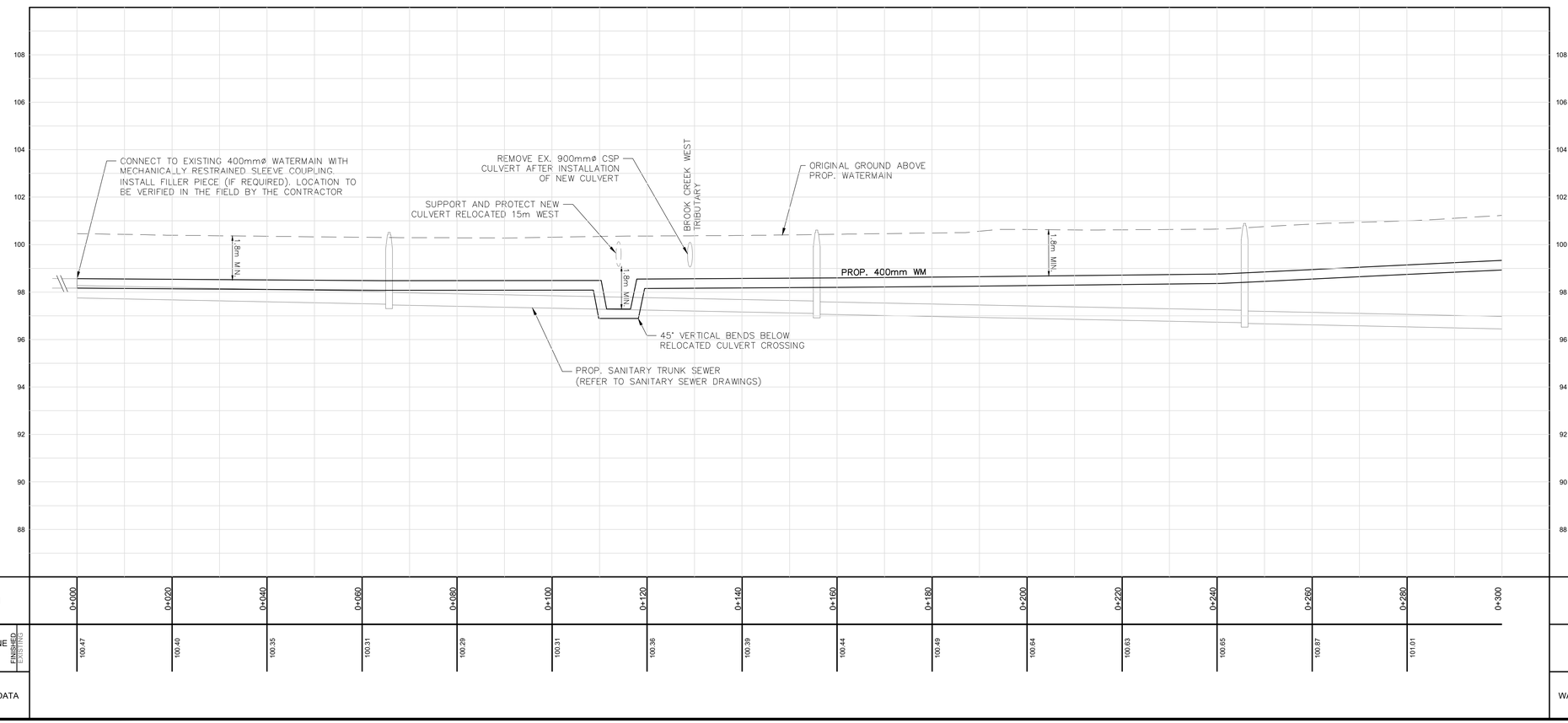
SCALE:
HORIZONTAL: 1:500 (−10m, 0, 10m, 20m)
VERTICAL: 1:100 (−2m, 0, 2m, 4m)

PROJECT No: C14-0454	CLIENT File No: –
DRAFTER: G.M. / DESIGNER: M.C.	DRAWING No: PP-W5
CHECKER: D.C. / APPROVER: D.C.	
DATE: August, 2021	SHEET No: ---- OF ----

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WM.dwg

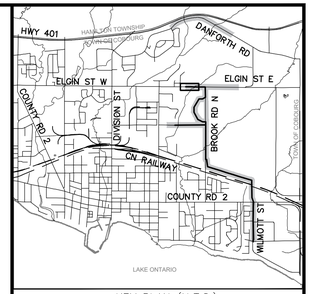
Jan. 27, 22





STATION	0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220	0+240	0+260	0+280	0+300
CENTERLINE GRADE FINISHED / EXISTING	100.47	100.40	100.35	100.31	100.29	100.31	100.36	100.39	100.44	100.49	100.64	100.63	100.65	100.67	101.01	
WATERMAIN DATA																

STATION
CENTERLINE GRADE FINISHED / EXISTING
WATERMAIN DATA



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
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–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

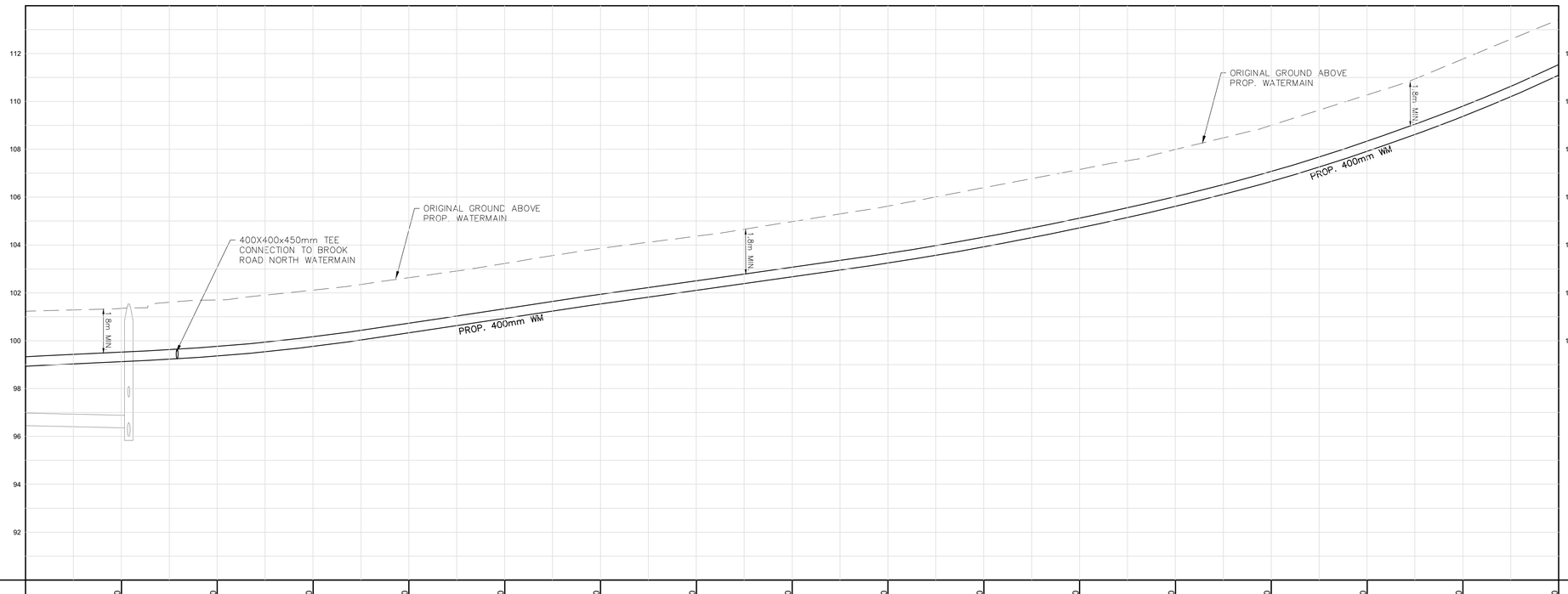
PLAN AND PROFILE
ELGIN ST E WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (−10m 0 10m 20m)
VERTICAL: 1:100 (−2m 0 2m 4m)

PROJECT No: C14-0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP-W6
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WW.dwg



STATION	0+320	0+340	0+360	0+380	0+400	0+420	0+440	0+460	0+480	0+500	0+520	0+540	0+560	0+580	0+600	0+620
CENTERLINE GRADE (FINISHED / EXISTING)	101.23	101.35	101.71	102.12	102.64	103.23	103.86	104.37	104.98	105.62	106.40	107.16	107.99	109.00	110.27	111.77
WATERMAIN DATA																

HWY 401 · DANFORTH RD · ELGIN ST W · ELGIN ST E · COUNTY RD 2 · DIVISION ST · BROCK RD N · CN RAILWAY · WILMOTT ST · LAKE ONTARIO

KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
ELGIN ST E WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAWN BY: G.M.
DESIGNED BY: M.C.
DRAWING No: PP–W7
CHECKED BY: D.C.
APPROVED BY: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 27, 22

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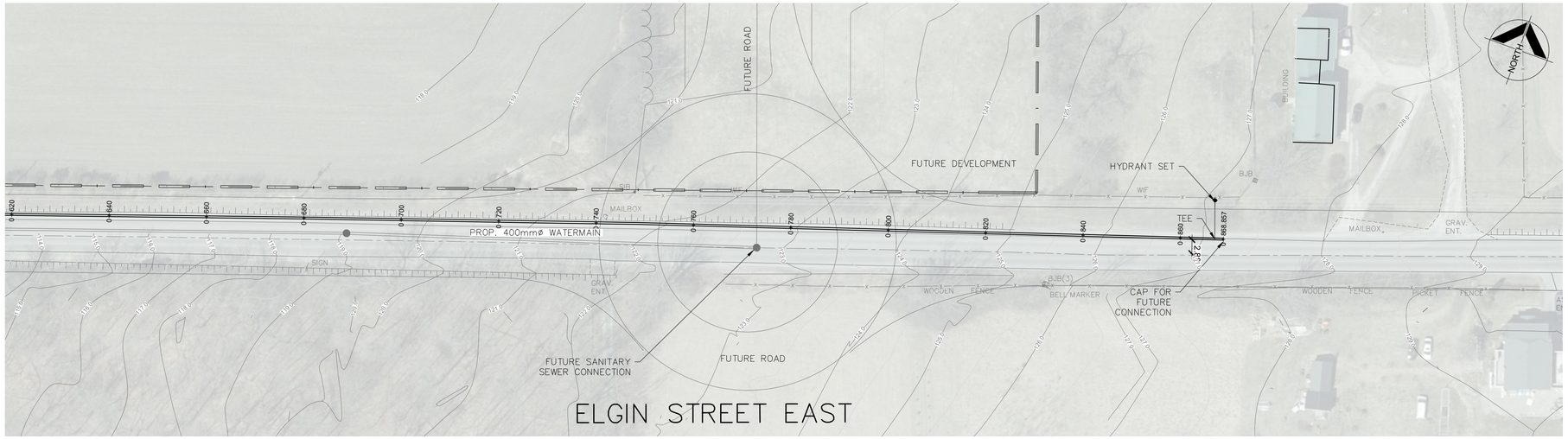
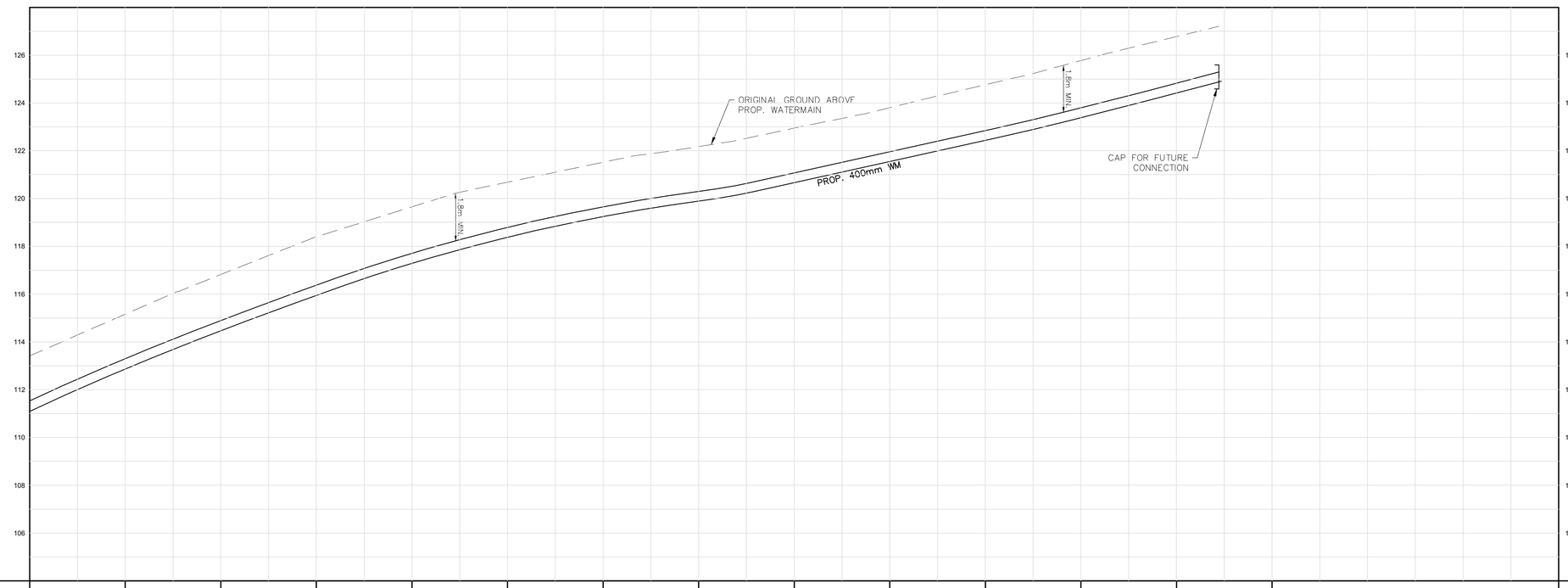
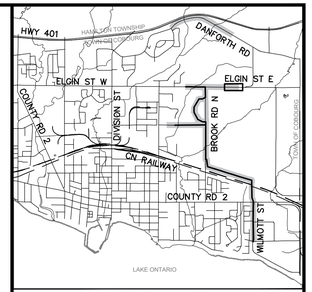




STATION	0+640	0+660	0+680	0+700	0+720	0+740	0+760	0+780	0+800	0+820	0+840	0+860	0+880
CENTERLINE GRADE FINISHED (EXISTING)	113.42	115.16	116.82	118.40	119.65	120.68	121.52	122.17	122.95	123.80	124.76	125.77	126.77
WATERMAIN DATA													

STATION
CENTERLINE GRADE FINISHED (EXISTING)
WATERMAIN DATA



KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
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–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
ELGIN ST E WATERMAIN
STA. X+XXX TO STA. X+XXX

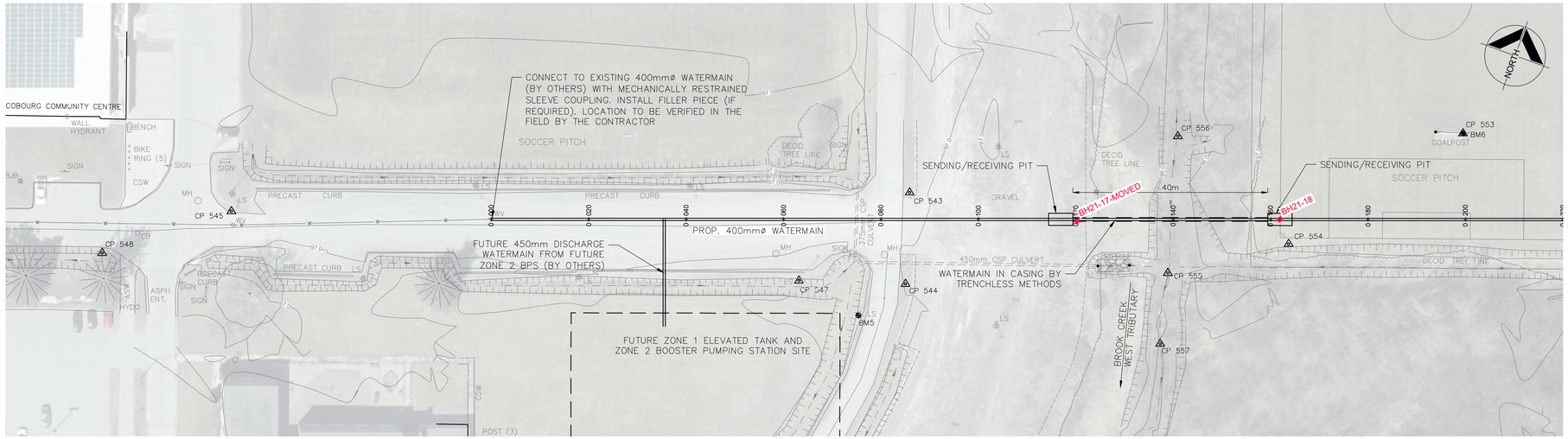
DISCIPLINE: MUNICIPAL INFRASTRUCTURE

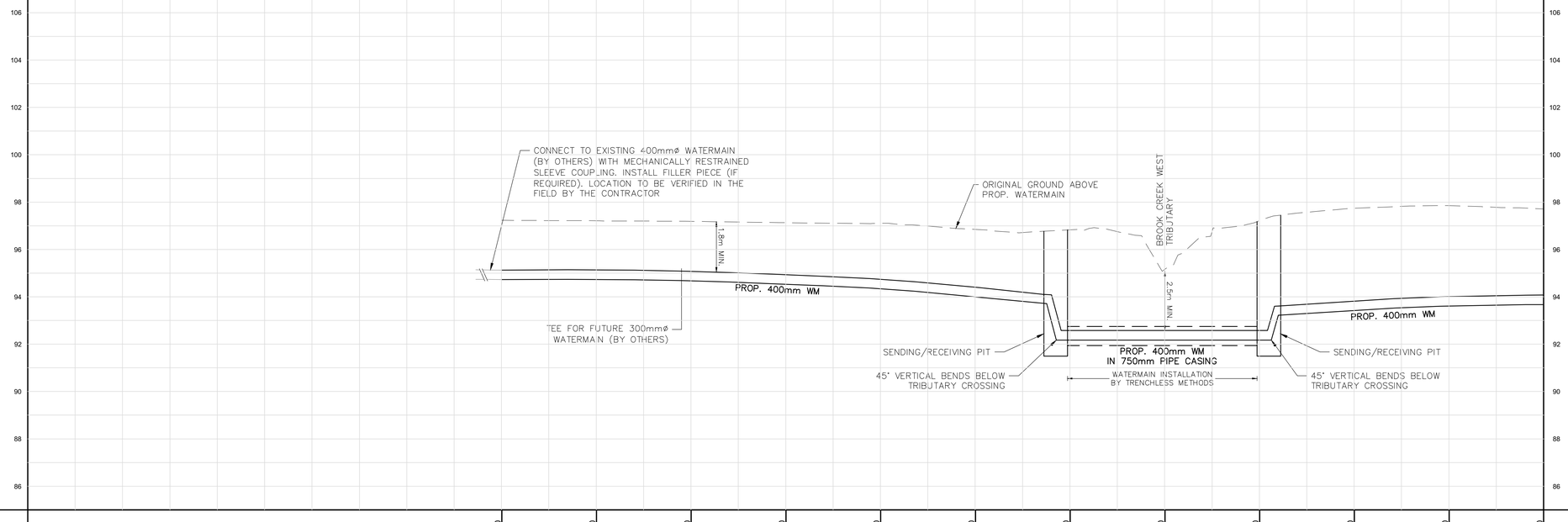
SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
DRAWING No: PP–W8
CHECKER: D.C.
APPROVER: D.C.
DATE: August, 2021
SHEET No: ---- OF ----

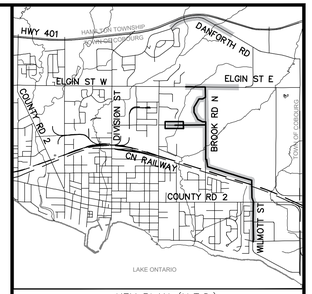
Jan. 27, 22

Z:\Cima C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WIP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WM.dwg





STATION	0+000	0+020	0+040	0+060	0+080	0+100	0+120	0+140	0+160	0+180	0+200	0+220
CENTERLINE GRADE FINISHED	97.23	97.21	97.19	97.13	97.11	96.85	96.83	95.17	97.22	97.74	97.86	
WATERMAIN DATA												



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx — xxx.xxx

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
COBOURG TRAILS WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

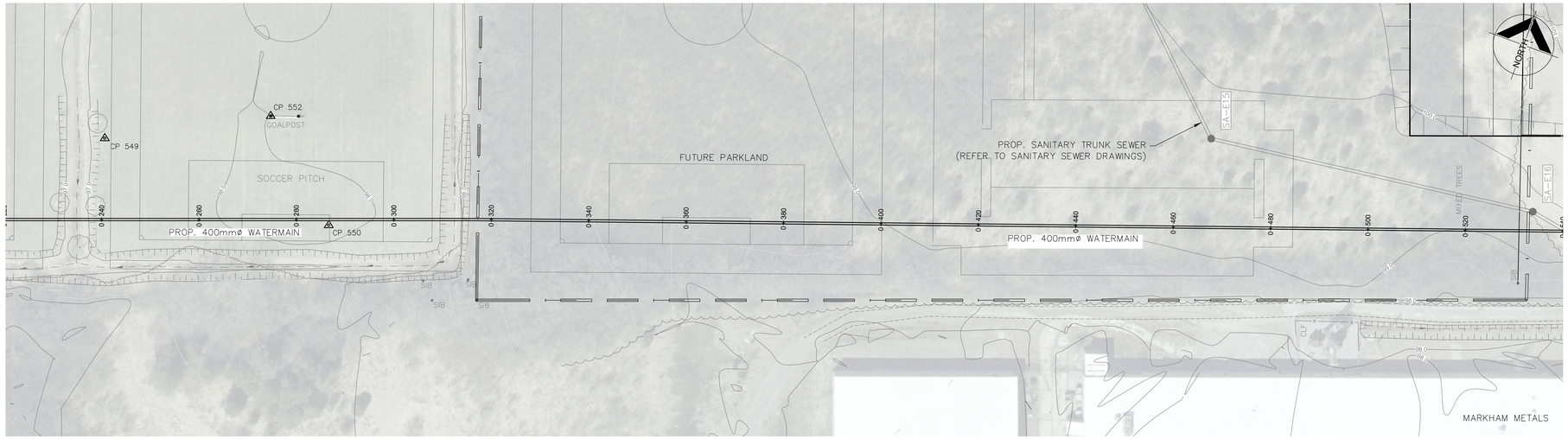
SCALE:
HORIZONTAL: 1:500 (–10m 0 10m 20m)
VERTICAL: 1:100 (–2m 0 2m 4m)

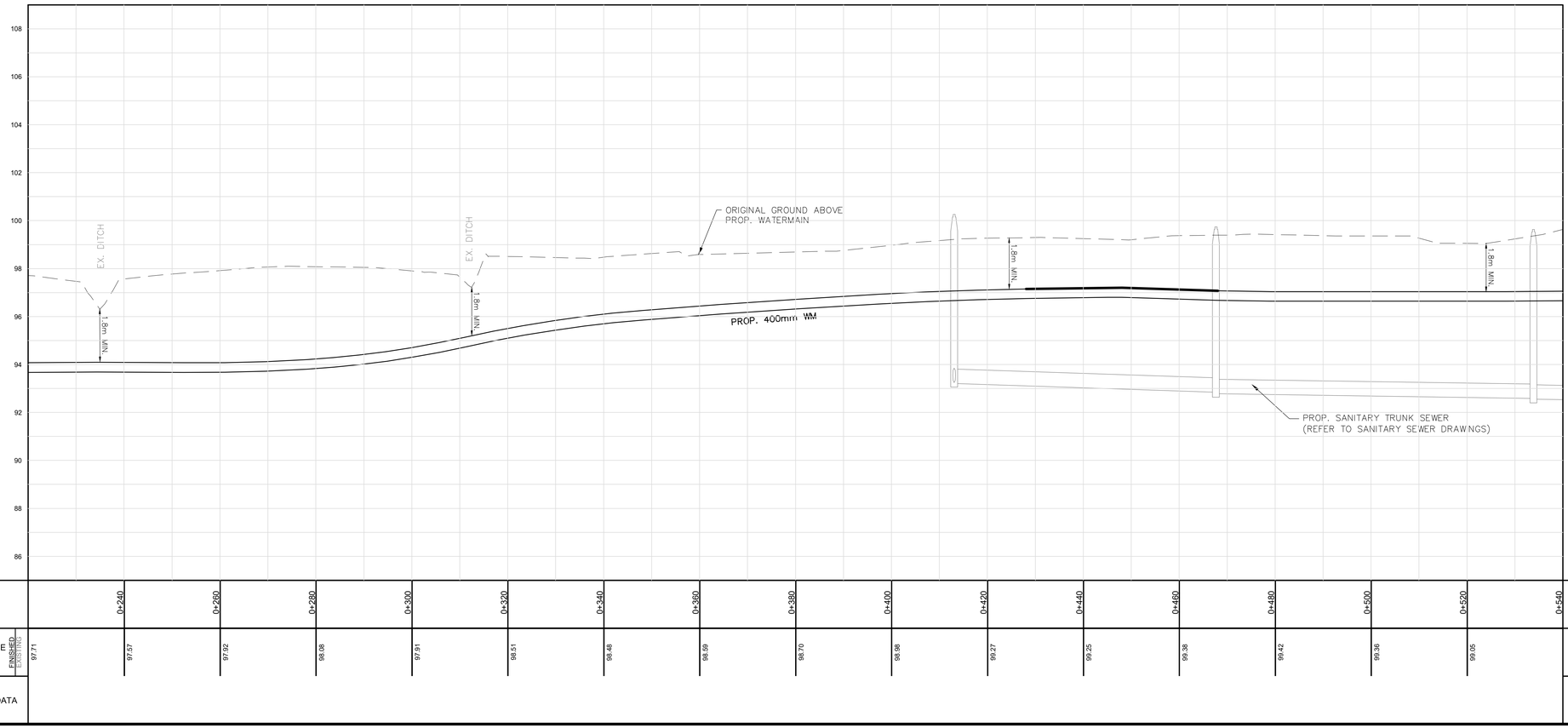
PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W9
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 27, 22

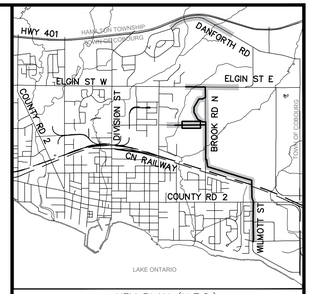
Z:\Cima-C14\Projects\C14-0454-Tribute Cobourg E. Ext. Servicing (Tribute Communities)\400-Drawings and Sketches\410-WP\AutoCAD\C14-0454-TributeServicing-SHEETS-PP-WW.dwg

Jan. 27, 22





STATION	0+240	0+260	0+280	0+300	0+320	0+340	0+360	0+380	0+400	0+420	0+440	0+460	0+480	0+500	0+520	0+540	STATION
CENTERLINE GRADE FINISHED / EXISTING	97.71	97.57	97.92	98.08	97.91	98.51	98.48	98.59	98.70	98.98	99.27	99.25	99.38	99.42	99.36	99.05	CENTERLINE GRADE FINISHED / EXISTING
WATERMAIN DATA																	WATERMAIN DATA



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxx.xxx
xxxx

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2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT:

Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
–	–	–	–
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–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
COBOURG TRAILS WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE:

MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W10
DATE: August, 2021
SHEET No: ---- OF ----

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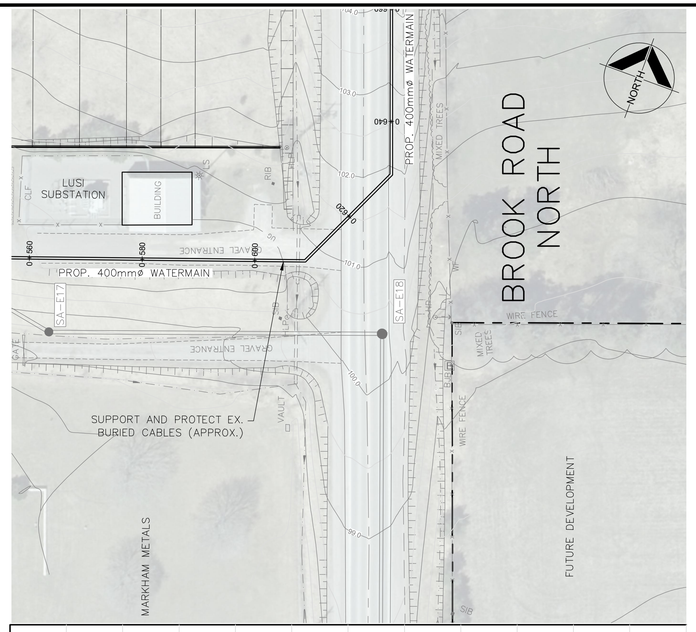
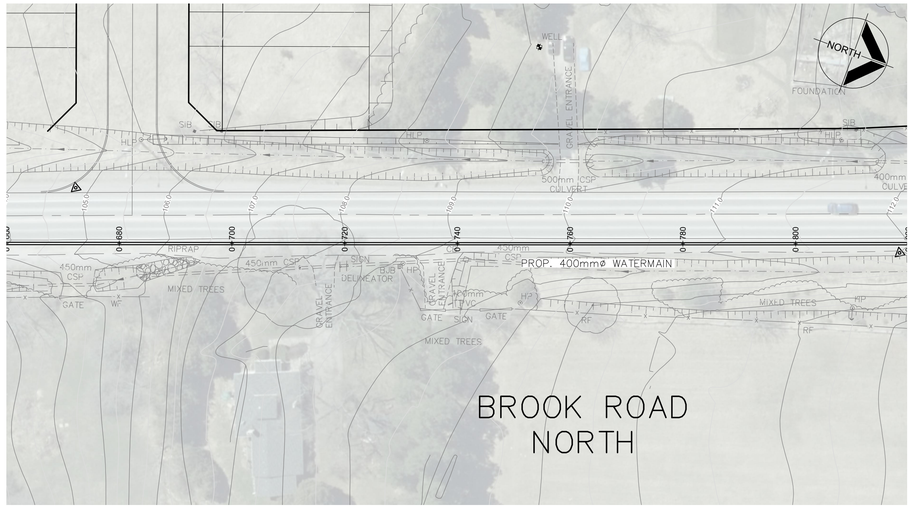
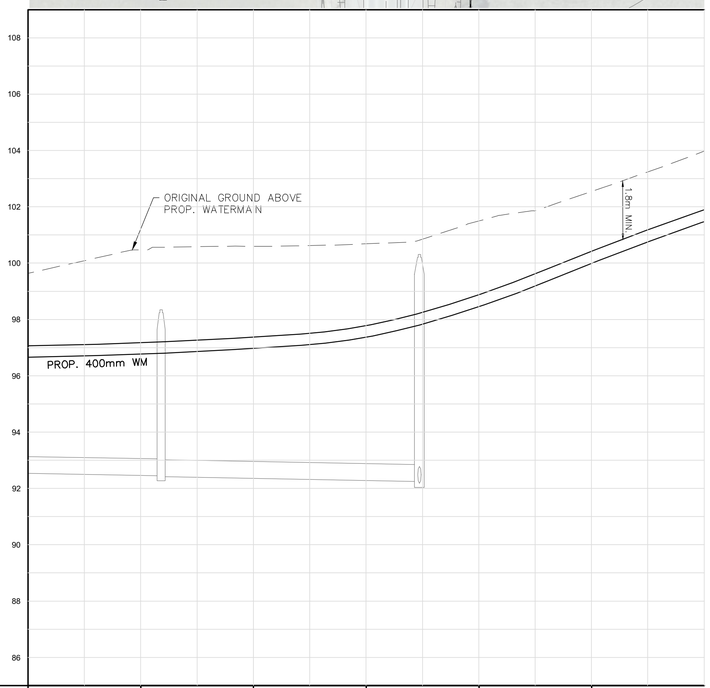
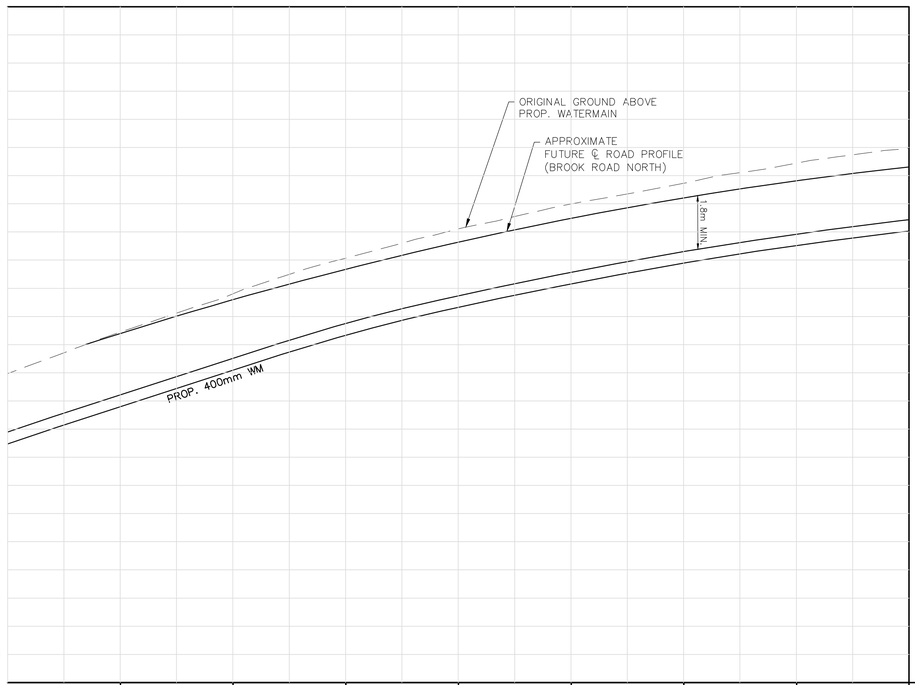
Jan. 27, 22



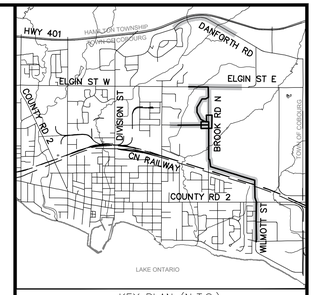






STATION	0+560	0+580	0+600	0+620	0+640	0+660
CENTERLINE GRADE (FINISHED)	99.64	100.47	100.60	100.69	101.50	102.55
WATERMAIN DATA						

STATION	0+680	0+700	0+720	0+740	0+760	0+780	0+800	0+820
CENTERLINE GRADE (FINISHED)	103.98	105.44	106.81	108.07	109.11	109.99	110.73	111.44
WATERMAIN DATA								



KEY PLAN (N.T.S.)

BENCHMARK:

BMx xxxx.xxx
xxxx

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CIMA+
2nd Floor - 415 Baseline Road West, Bowmanville, ON L1C 5M2
Phone: 905-697-4464
www.cima.ca

CLIENT: Tribute communities (OVER 35 YEARS)

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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–	–	–	–
–	–	–	–
–	–	–	–
01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
COBOURG TRAILS WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W11
DATE: August, 2021
SHEET No: ---- OF ----

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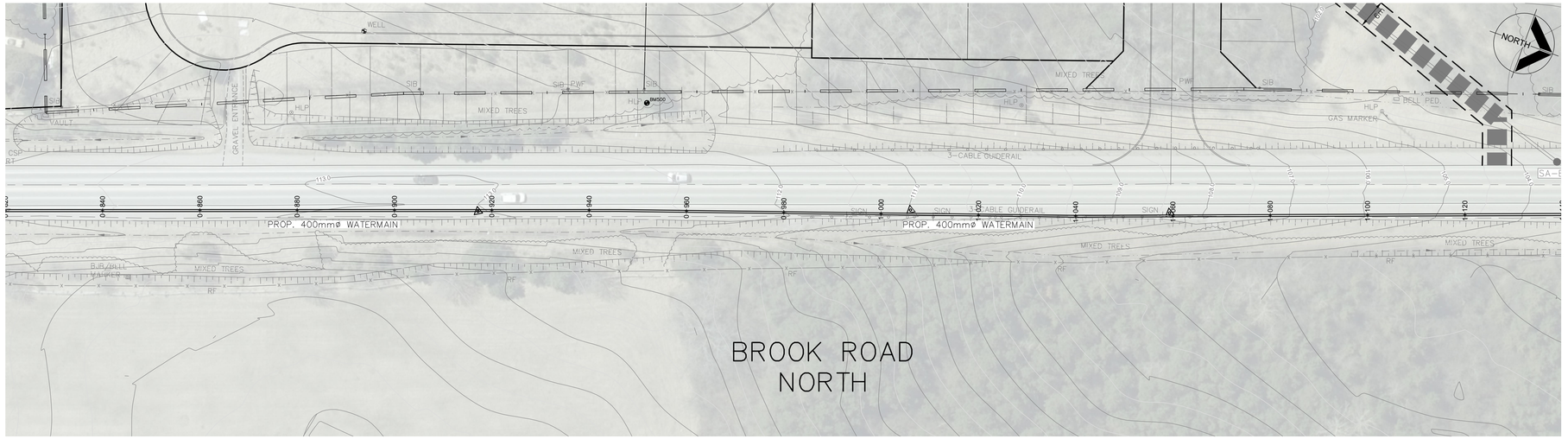

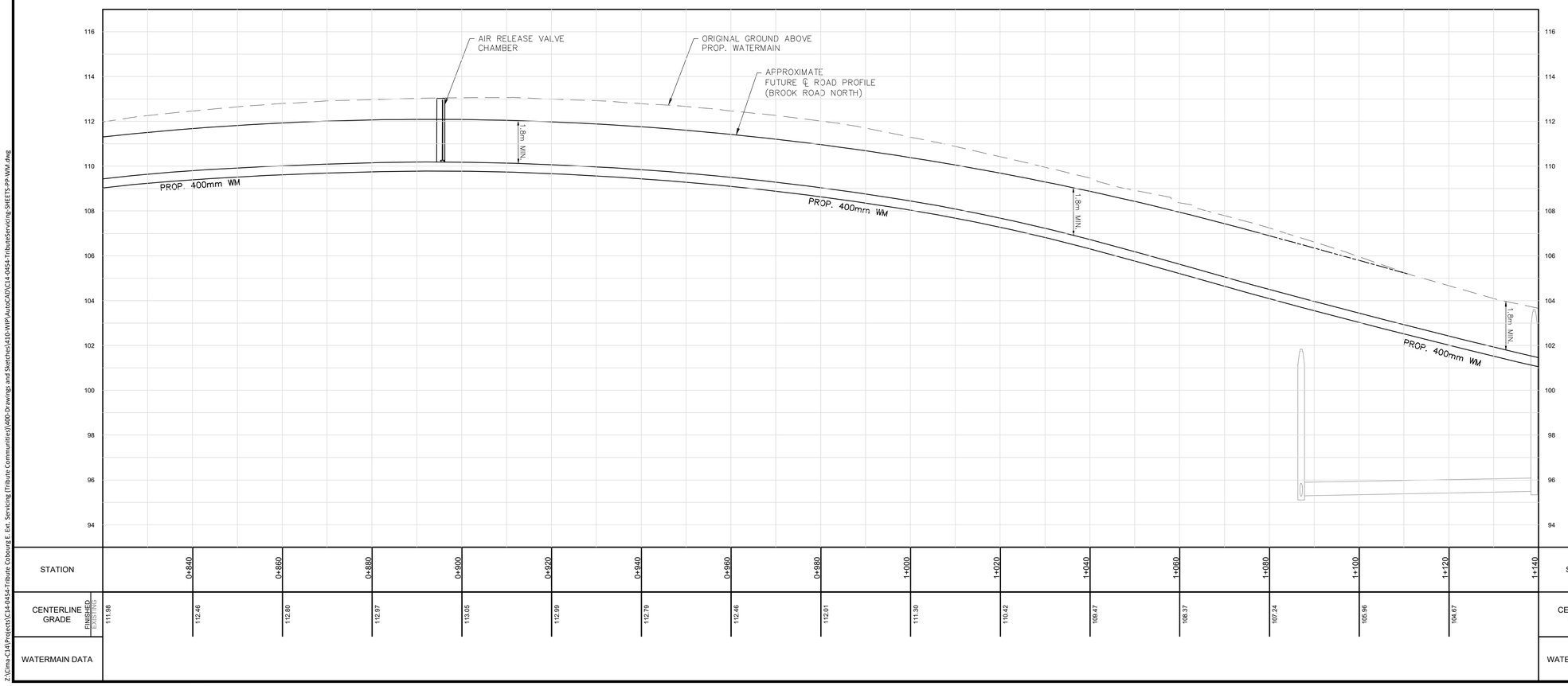

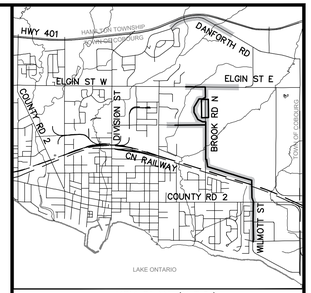

KEY PLAN (N.T.S.)

BENCHMARK:

BMx — xxx.xxx
xxxx

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www.cima.ca

CLIENT:

Tribute communities — OVER 35 YEARS

PROJECT NAME:

COBOURG TRAILS EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
BROOK RD N WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE:

MUNICIPAL INFRASTRUCTURE

SCALE:
HORIZONTAL: 1:500 (–10m, 0, 10m, 20m)
VERTICAL: 1:100 (–2m, 0, 2m, 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W12
DATE: August, 2021
SHEET No: ---- OF ----

Jan. 27, 22

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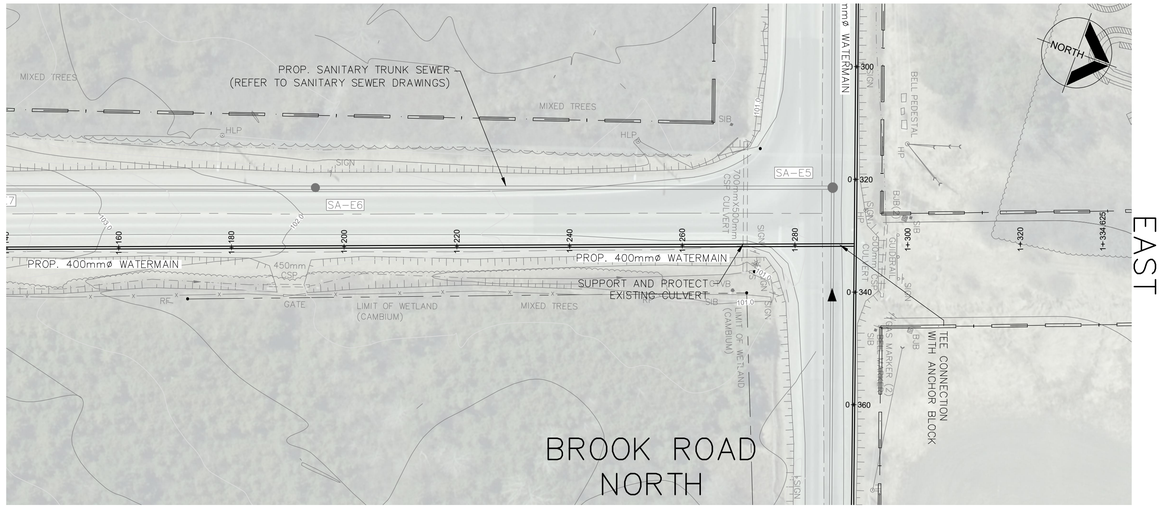
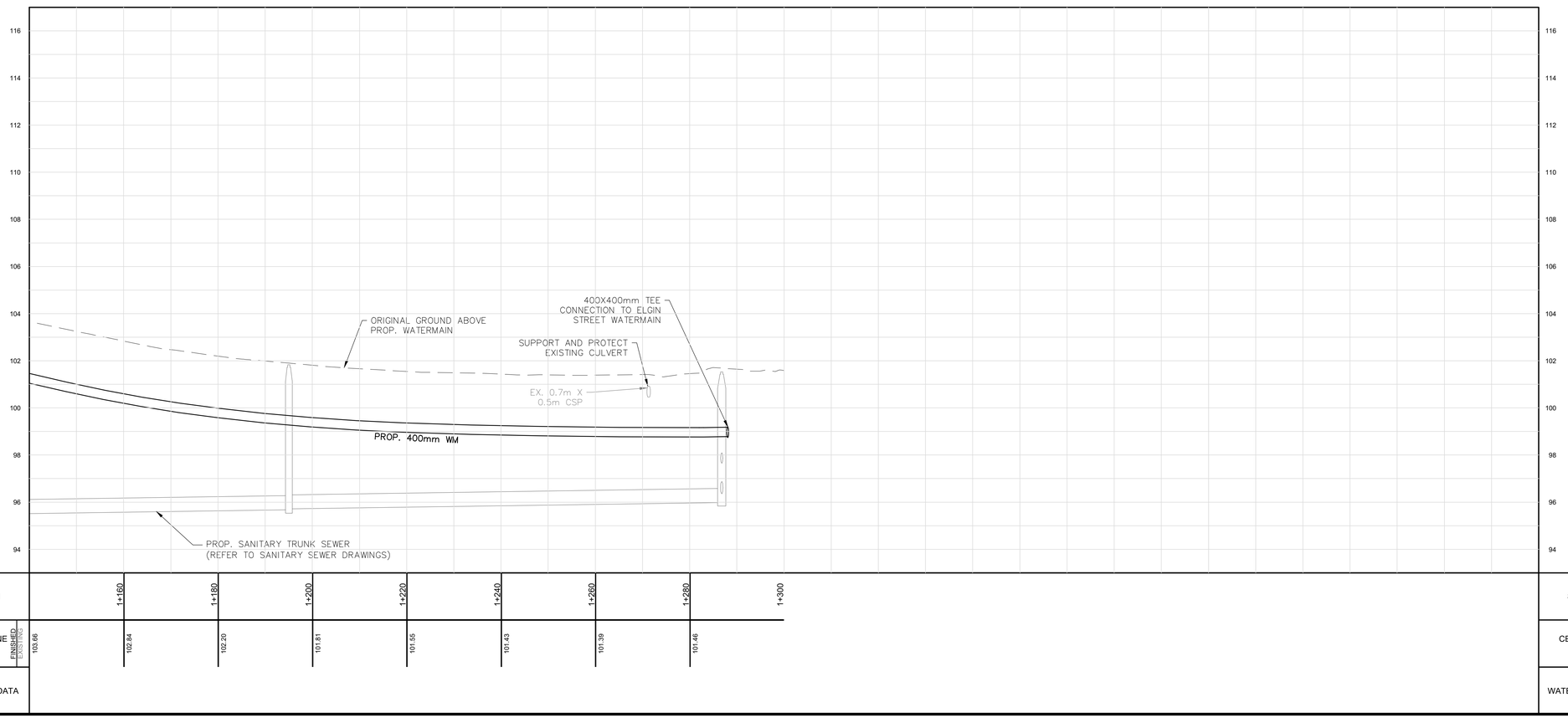
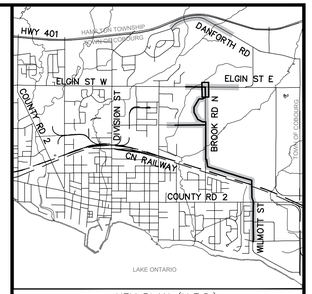
Jan. 27, 22







KEY PLAN (N.T.S.)

BENCHMARK:

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CLIENT: Tribute communities 35 YEARS

PROJECT NAME:

COBOURG TRAILS
EXTERNAL SERVICING

–

STAMPS:

DESIGNED BY | APPROVED BY

No.	Date	Description	By
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01	–	FUNCTIONAL SERVICING REPORT	D.C.

SHEET TITLE:

PLAN AND PROFILE
BROOK RD N WATERMAIN
STA. X+XXX TO STA. X+XXX

DISCIPLINE: MUNICIPAL INFRASTRUCTURE

SCALE:
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VERTICAL: 1:100 (–2m 0 2m 4m)

PROJECT No: C14–0454
CLIENT File No: –
DRAFTER: G.M.
DESIGNER: M.C.
CHECKER: D.C.
APPROVER: D.C.
DRAWING No: PP–W13
DATE: August, 2021
SHEET No: ---- OF ----

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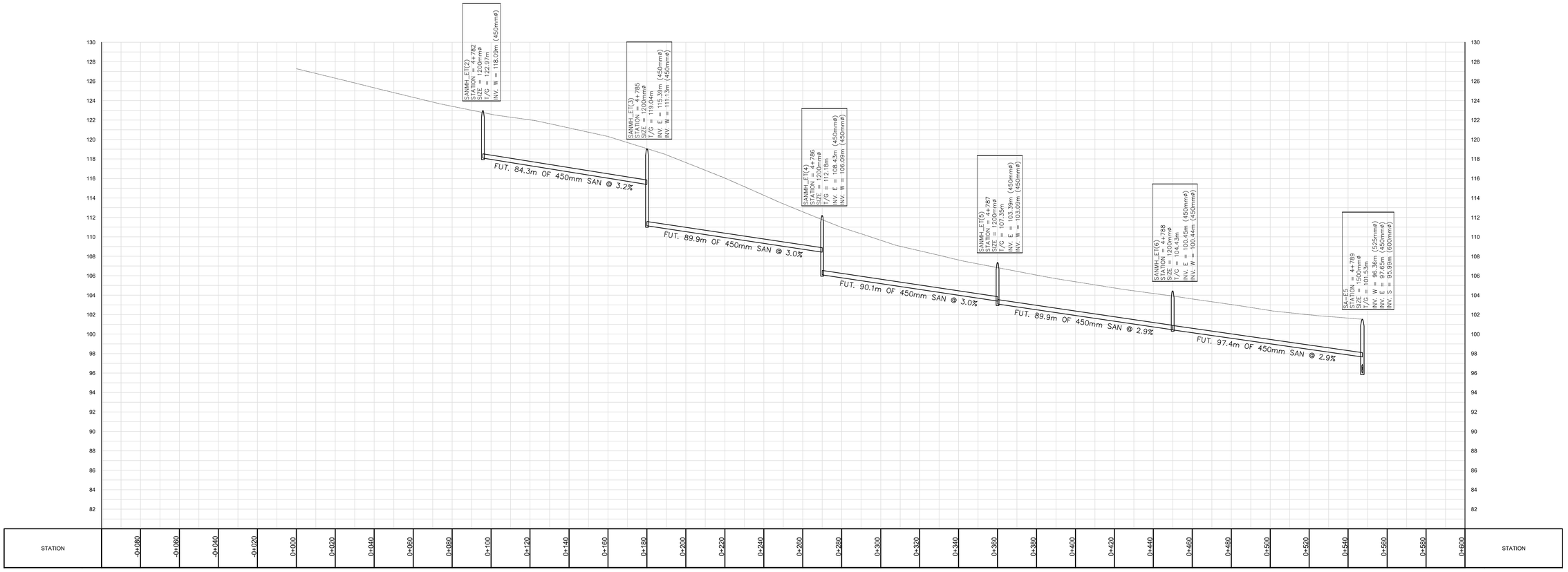
B

Appendix B: Conceptual Design of Sub-Trunk Sewers, CIMA+

SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: ELGIN STREET
CATCHMENT ID: E, I

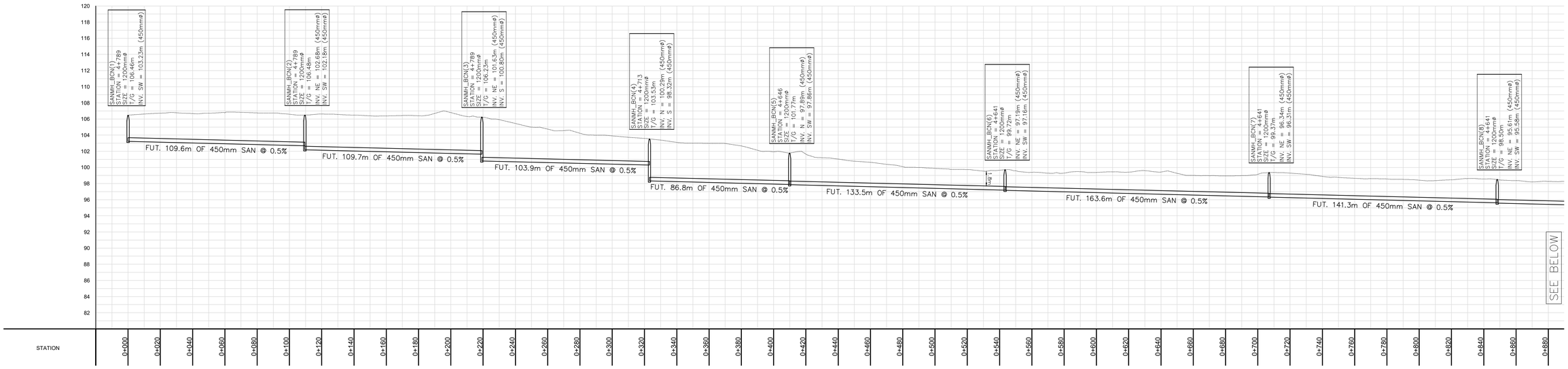
SCALE: AS NOTED
DATE: NOVEMBER, 2021

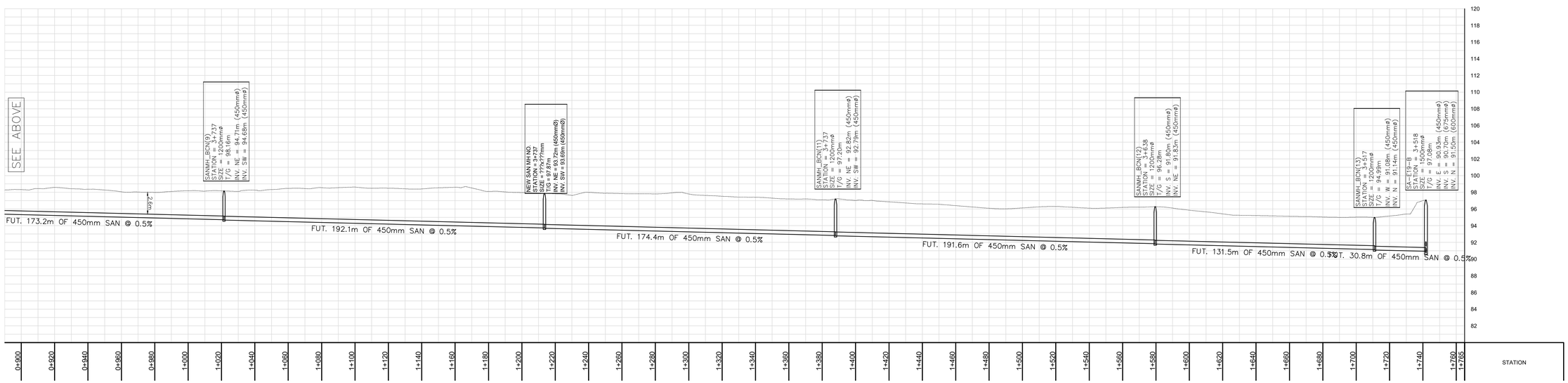


SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: BROOK CREEK EAST TRIBUTARY NORTH
CATCHMENT ID: K

SCALE: AS NOTED
DATE: NOVEMBER, 2021

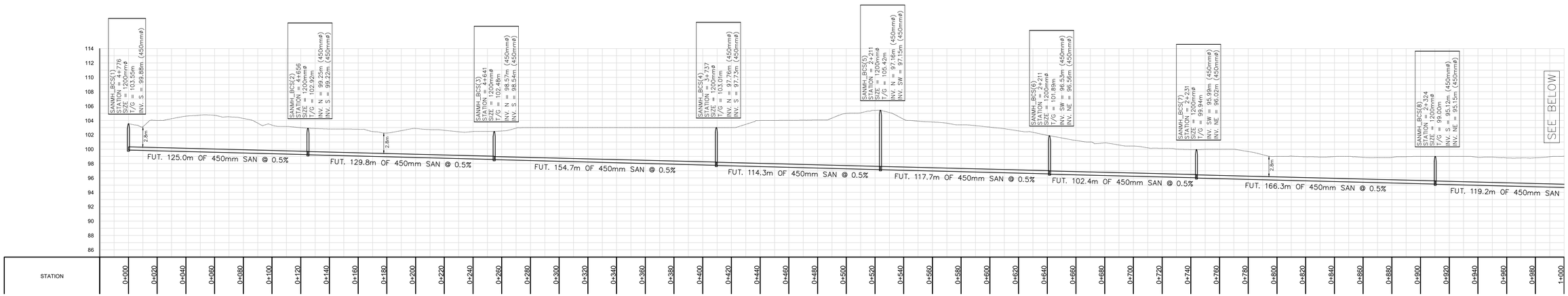


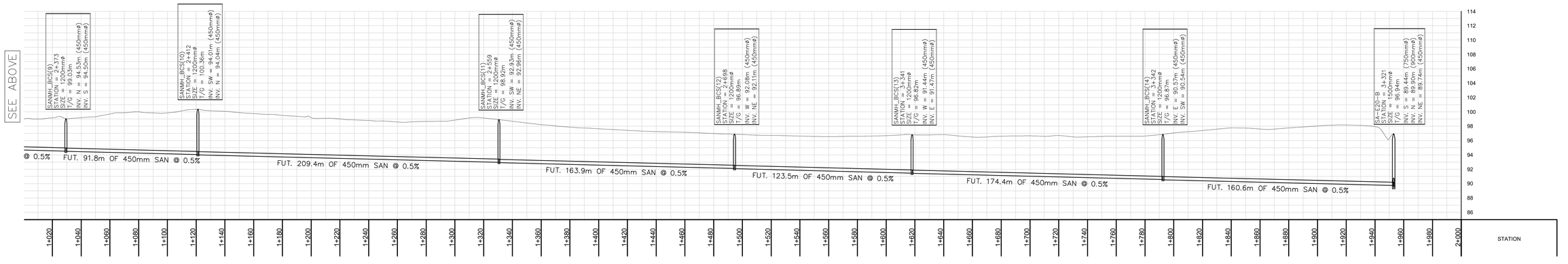


SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: BROOK CREEK EAST TRIBUTARY SOUTH
CATCHMENT ID: L

SCALE: AS NOTED
DATE: NOVEMBER, 2021

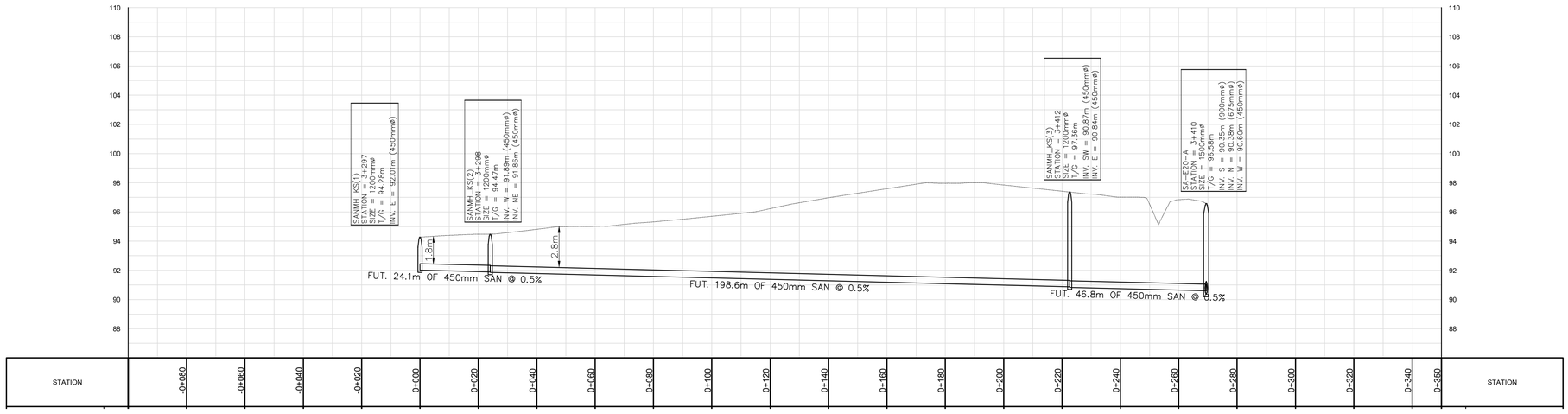




SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: KERR STREET TRIBUTARY NORTH
CATCHMENT ID: O

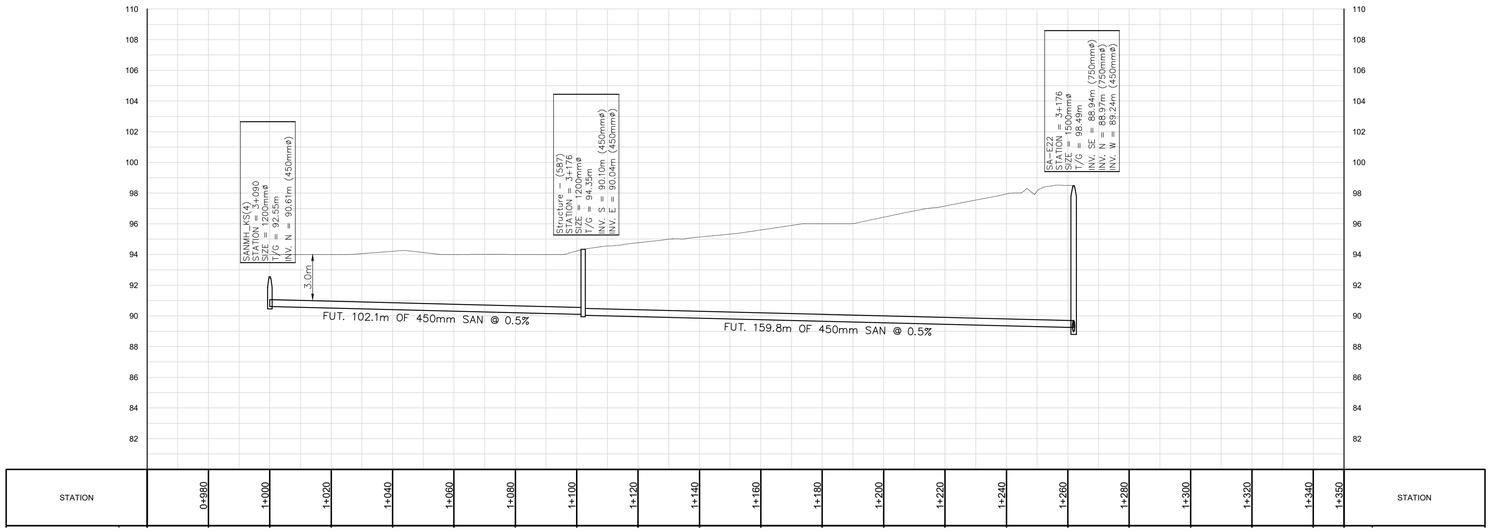
SCALE: AS NOTED
DATE: NOVEMBER, 2021



SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: KERR SREET TRIBUTARY SOUTH
CATCHMENT ID: N

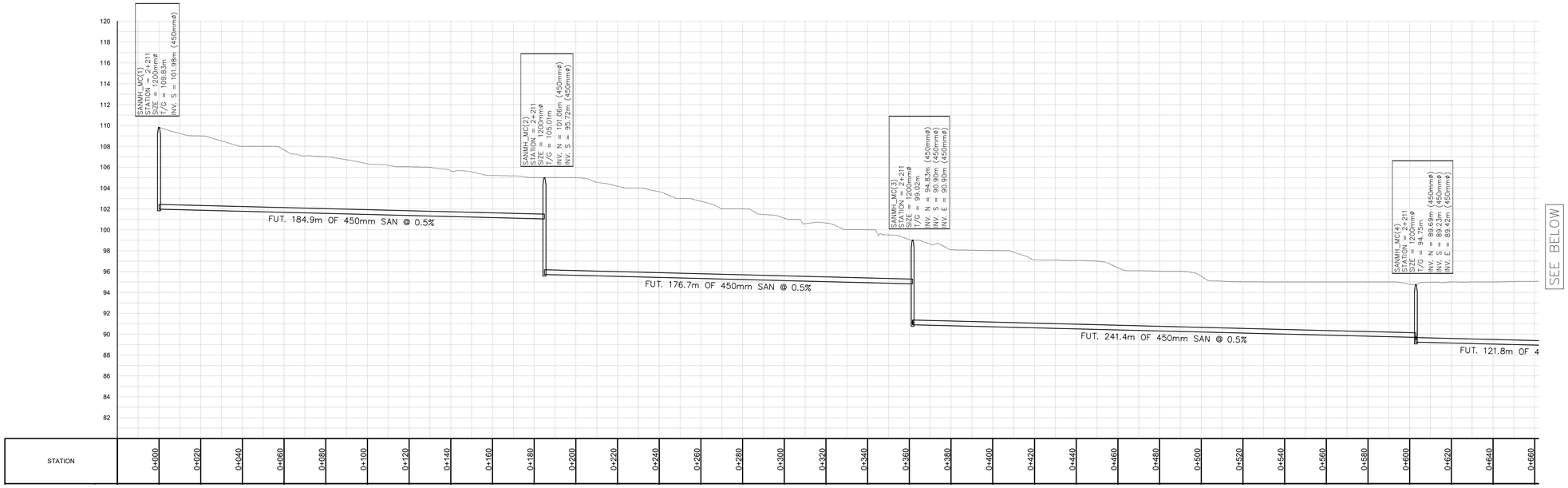
SCALE: AS NOTED
DATE: NOVEMBER, 2021

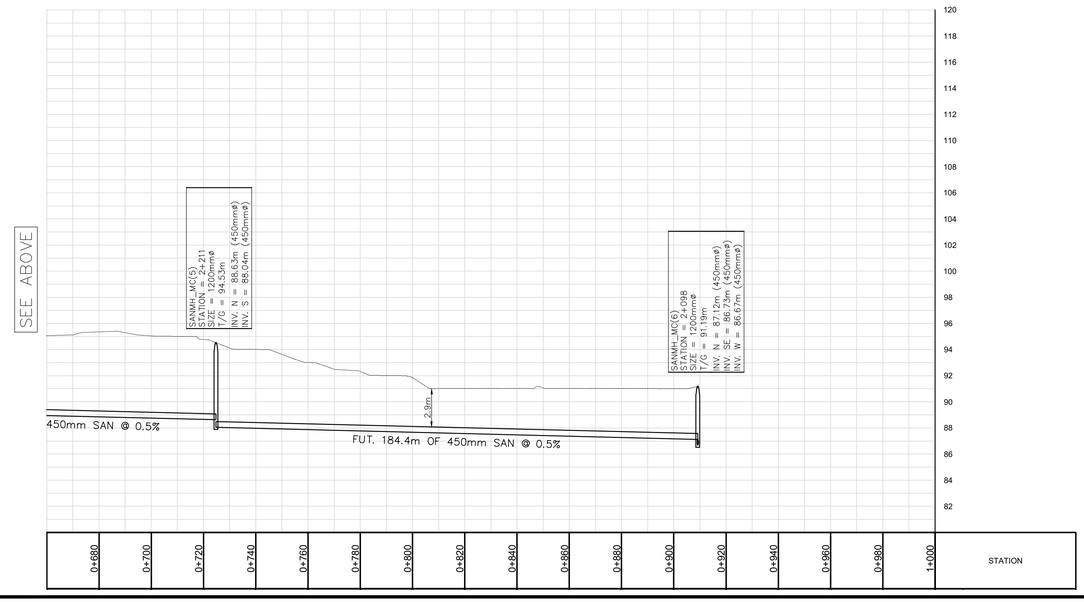


SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: MASSEY CREEK TRIBUTARY
CATCHMENT ID: Q

SCALE: AS NOTED
DATE: NOVEMBER, 2021

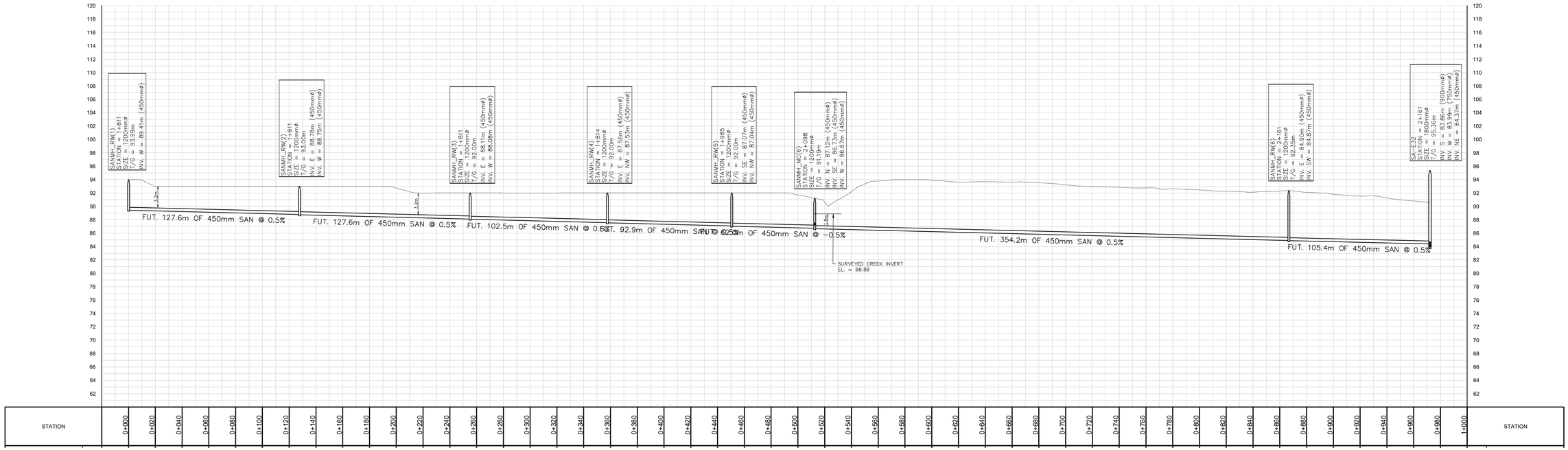




SCHEMATIC PROFILE OF FUTURE SUB-TRUNK SANITARY SEWER

SUB-TRUNK NAME: RAILWAY TRIBUTARY
CATCHMENT ID: P

SCALE: AS NOTED
DATE: JANUARY 2022



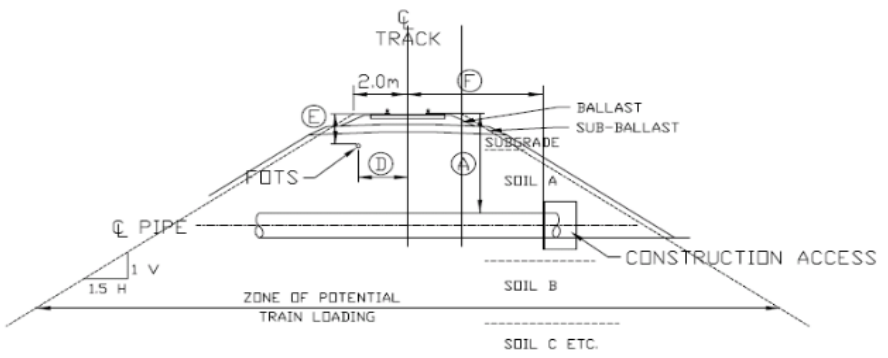
C

Appendix C: Summary of Design Criteria for Preliminary Design, CIMA+

Summary of Design Criteria Used for External Servicing Design

Description	Reference	Proposed Standards
SANITARY SEWER DESIGN CRITERIA		
DESIGN FLOW		
Design Flow	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	New Residential: Average Flow - 364 L/person/day Infiltration - 22.5 m^3 /gross/ha/day Harmon Peaking Factor (K_h) = 1 + (14 / (4+P^(1 / 2))), where P is population in thousands K_h Maximum - 3.8 K_h Minimum - 1.5 Commericial: Design Flow - Site Specific or to MECP Standards (180m^3/gross ha/day incl. Infiltration and Peaking Effect) Floor Space Index - 0.50 gross lot area unless known Industrial: Design Flow - 180 m^3 /gross ha/day incl. Infiltration and Peaking Effect for Local Sewers Institutional: Flow - 112 m^3 /gross ha/day incl. Infiltration and Peaking Effect
Sewage Flow Velocity	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Minimum - 0.6 m/s Maximum - 3.0 m/s
ALIGNMENT AND PROFILE		
Location	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Sewers shall be located at centerline and minimum 3.0m from storm sewers.
	F-6-1 Procedures to Govern Separation of Sewers and Watermains, Ministry of Environment, Conservation and Parks, Revised July 2021	Minimum 2.5m horizontal separation from watermain. Where not possible, 0.5m vertical separation is required (measured from invert of watermain to crown of sanitary sewer).
Minimum Slope	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	NPS- 21 (525mm) 0.10% NPS-24 (600mm) 0.08% NPS-27 (675mm) 0.067% NPS-30 (750mm) 0.058% NPS-36 (900mm) 0.046%
Minimum Depth	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Residential, Commercial, Institutional - 2.75m Industrial - 2.15m *Measured from final centerline road elevation to the top of the sewer.
Minimum Depth at Creek Crossing	*Design Guidelines for Sewage Works, Ministry of the Environment, 2008 (Section 5.12)*	0.9m of cover, where the sewer is not located in rock 0.3 m of cover, where the sewer is located in rock
Alignment	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	All sanitary sewers shall be laid in a straight line between maintenance holes.
Alignment (Stream Crossing)	*Design Guidelines for Sewage Works, Ministry of the Environment, 2008 (Section 5.12)*	As nearly perpendicular to the stream flow as possible and should not change grade. Sewer systems should be designed to minimize the number of stream crossings
Maintenance Hole Frequency	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	At each change in alignment, grade, pipe material and at all junctions.

Description	Reference	Proposed Standards
Maintenance Hole Spacing	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	200 - 750mm Diameter - 90m Max Spacing 825 - 1200mm Diameter - 125m Max Spacing
Maximum Maintenance Hole Change in Direction	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	90 Degrees
Drop Structure	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	If the inlet and outlet elevation difference is greater than 0.25m, then a drop structure shall be required.
	Regional Municipality of Durham, Revised April 2017	S-100.080 - Drop Structures for Maintenance Holes
Drop Across Maintenance Hole	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Where pipe size doesn't change through a maintenance hole and the upstream flow velocity does not exceed 1.5m/s, the following allowances shall be made to compensate for hydraulic losses: Alignment Change — Drop Required straight run — grade of sewer 15-45 degrees — 0.03m 45-90 degrees — 0.06m The obvert(s) on the upstream side of a maintenance hole shall not be lower than the obvert(s) on the downstream side of the maintenance hole.
Safety Gratings	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Required in all maintenance holes greater than 5.0m deep. Maximum grate spacing, 5.0m. OPSD 404.020 - Aluminum Safety Platform for Circular Maintenance Holes OPSD 404.022 - Aluminum Safety Platform for 1800 mm Diameter Circular Maintenance Holes with Drop Pipe
Pipe Material	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Non-Industrial Areas: 200 - 600mm Diameter - PVC Greater than 600mm Diameter - RCP OPSD 807.010 Height of Fill Table for RCP
	Design Guidelines for Sewage Works, Ministry of the Environment, 2008 (Section 5.12)	Sewers entering or crossing streams should be constructed of ductile iron pipe with mechanical joints; otherwise, they should be constructed to remain watertight without changes in alignment or grade. Material used to backfill the trench should be stone, coarse aggregate, washed gravel, or other materials which will not readily erode, cause siltation, damage pipe during placement, or corrode the pipe.
PIPELINE CROSSINGS AT RAILWAY		
Canadian Pacific Rail - Angle of Crossings	*CPR Utility Specification and Application Process - P. 5*	Approximately 90 degrees. Preferably not less than 45 degrees.
Canadian Pacific Rail - Location	*CPR Utility Specification and Application Process - P. 5*	Not in culverts or under railway bridges.
Canadian Pacific Rail - Allowed Concrete Pipe Material	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.1.2 Reinforced Concrete Carrier Pipelines*	Uncased Class IV or V Reinforced Concrete Pipe - When designed for external applied pressures and installed in accordance with TCE-10 Section 6, may be used under mainline tracks for non-pressure sewer crossings.
Canadian Pacific Rail - Minimum RCP Cover for Mainline Tracks	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.1.2 Reinforced Concrete Carrier Pipelines*	The greater of the depth below frost line, 1.68m below bottom of rail within 7.6m of the track centerline (measured perpendicular to the track centerline), and 0.91m below grade or bottom of ditch within all portions of the ROW where the pipe is not directly under the track.

Description	Reference	Proposed Standards
Canadian Pacific Rail - Minimum Length of Casing Pipe for RCP Carrier Pipelines	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.1.2 Reinforced Concrete Carrier Pipelines*	The greater of 0.60m beyond the toe of slope, 1.0m beyond ditch, and 7.6m beyond centerline of nearest track.
Canadian National Rail - Minimum Depth Below Bottom of Rail	*CN - Sanitary Pipeline Crossing Application*	Minimum 5.5ft (1.68m) or Below Frost Line
CN - Minimum Depth Below Ditch Bottom	*CN - Sanitary Pipeline Crossing Application*	Minimum 3ft or Below Frost Line
CN - Minimum Concrete Pipe Class	*CN - Sanitary Pipeline Crossing Application*	Class V
CN - Closest Allowed Point of Excavation	*CN - Sanitary Pipeline Crossing Application*	Point Location - Starting 10ft from the inside of the nearest rail, measured perpendicular to the rail, sloped to the bottom of the proposed pipe at 1.5 : 1 slope.  Figure 3 – Section of Track along centerline of proposed pipe
CN - Casing Requirements	*CN - Sanitary Pipeline Crossing Application*	Sewer pipelines shall be encased in a casing pipe except for non-pressure sewer crossings where the strength of the pipe and its joints are capable of withstanding railway loading, as approved by an Engineer.
CN - Carrier and Casing Design Loadings	*CN - Sanitary Pipeline Crossing Application*	Designed for cooper E90 loading.
TC - Carrier and Casing Design Requirements	*TC E-10*	Conform to the applicable requirements of AREMA Ch. 1 Section 5.3 with materials in conformance with CSA standards. Joints of carrier pipe shall be leakproof mechanical or welded type. Steel carrier/casing least nominal wall thickness in accordance with CSA Z662-99 as amended in Section 5 of TC E-10.
TC - Casing Pipe Material	*TC E-10*	RCP conforming to AREMA Manual for Railway Engineering Chapter 8 "Concrete Structures and Foundations", Part 10 "Reinforced Concrete Culvert Pipe" or Corrugated Metal Pipe conforming to AREMA Manual Chapter 1, Part 4 are acceptable where carrier pipe pressures are under 700 kPa.
LONGITUDINAL PIPELINES / PIPELINES ADJACENT TO THE RAILWAY		
Canadian Pacific - Longitudinal Pipes	*CPR Utility Specification and Application Process - P. 5*	Longitudinal pipelines within 7.62m of the track centerline or important structure shall be encased. Length of casing shall be full length of pipe falling within 7.62m of the track or important structure. Minimum thicknesses for steel casing pipes provided on P. 6 of the CPR Utility Specification document. Casings to be designed for E80 Loading.
Canadian Pacific - RCP Design Requirements	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.2.1 Steel and Reinforced Concrete Carrier Pipelines*	In accordance with Road Crossings in CSA Standard Z662, latest edition.

Description	Reference	Proposed Standards
Canadian Pacific - Minimum Cover for Adjacent Pipelines Less Than 15.4m from Nearest Track Centerline	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.2.1 Steel and Reinforced Concrete Carrier Pipelines*	Greater of 1.22m or Depth Below Frost Line
Canadian Pacific - Minimum Cover for Adjacent Pipelines More Than 15.4m from Nearest Track Centerline	*CPR Specification No. SP-TS-2.39: Pipeline and Utility Installations Buried within Canadian Pacific Railway Right-of-Way; Appendix A2 - Design and Installation of Buried Non-Flammable Substance Pipelines; A2.2.1 Steel and Reinforced Concrete Carrier Pipelines*	Greater of 0.91m or Depth Below Frost Line
WATERMAIN DESIGN CRITERIA		
OPERATING PRESSURES		
System Pressures	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Maximum Sustained Operating Pressures - 700 kPa Under Maximum Day + Fire Flow Demands: 20 PSI Minimum Pressure Under Normal Operating Conditions: 40 PSI Minimum Pressure
Pressure Reducing Valve Requirement	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Pressure Reducing Valves shall be used to limit maximum static pressure to not more than 550 kPa in areas that may be occupied.
ALIGNMENT AND PROFILE		
Minimum Size of Pipe	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Residential - 200mm Diameter Industrial, Commercial, Institutional - 300mm Diameter
Minimum Depth of Pipe	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Minimum 1.80m cover measured from top of pipe to finished centerline grade.
Dead Ends	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Wherever possible, distribution systems should be designed to loop. Where dead-ends cannot be avoided, fire hydrants shall be provided for flushing purposes.
Location	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	- 4.25m from Property Line - Located on North or East Side of the Road Hydrants located minimum 1.0m from centerline of the hydrant secondary valve and 1.5m from centerline of the watermain. Hydrants to be located in the boulevard a minimum 1.0m from all utilities. No other utilities shall be located between the hdyrant and the watermain.
Horizontal Separation	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	2.50m minimum horizontal separation from any sewer or sewer maintenance hole, measured from the nearest edge.
Sewer Crossings	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Watermains shall cross above sewers with minimum 0.3m vertical clearence.
Utility Crossings	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Where watermains cross over or under utilities other than sewers, the clearance and type of crossing provided shall conform to the requirements of the particular utility involved and provide proper bedding and structural support of the watermain and utility.
Mainline Valves	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	300mm Diameter or Less - Use Resilient Seat Gate Valves 400mm Diameter or Larger - Use Butterfly Valves
Number of Valves	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Tee Intersection - 3 Valves Minimum Cross Intersection - 4 Valves Minimum Valves shall be located at the point where the projection of the street linte intersects the watermain.
Air/Vaccum Valves	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Required at significant high points on feedermains.

Description	Reference	Proposed Standards
Drain Valves	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Required at low points for watermains 450mm diameter or greater.
Valve Boxes	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	400mm Diameter or Smaller - Installation of Valves Required in Valve Boxes Larger Than 400mm Diameter - Installation of Valves in Valve Chambers
Hydrant Spacing	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	Residential - 150m Maximum Industrial, Commercial, Institutional - 75m Maximum
Materials	*Design Guidelines for the Corporation of the Town of Cobourg, Revised April 2015*	150-200mm Diameter - PVC 400mm Diameter and Larger - Reinforced Concrete Pressure Pipe 200-400mm Diameter - Ductile Iron

D

Appendix D: Cobourg Trails External Servicing Sanitary Sewer Design Sheet, CIMA+

Tribute Rondeau Limited Partnership - Cobourg Trails External Servicing

SANITARY SEWER DESIGN SHEET

(METRIC)

MUNICIPALITY: **Town of Cobourg**
PROJECT: **Cobourg Trails External Servicing - External Trunk Sewer**
FROM: Elgin Street at Future Street 'A' Cobourg Trails Phase 1
TO: Willmott Street at Thompson Street (Connect to Existing Trunk)
PROJECT NO.: C14-0454

DESIGNED: CWS
CHECKED: MC
MANNING'S "n" : 0.013
DATE: 01/26/22 TIME: 04:10 PM

NOTES:

1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.00 m/s
3) RESIDENTIAL INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
RESIDENTIAL INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation Draln Connections)
4) INDUSTRIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USING NOMINAL METRIC PIPE DIAMTER (mm)
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN
8) SLOPES IN RED TEXT ARE USED FOR CAPACITY CALCULATIONS AND ARE FLATTER THAN SLOPES SHOWN ON DESIGN DRAWINGS TO PROVIDE FLEXIBILITY FOR FUTURE ADJUSTMENT OF SEWER ALIGNMENT

Contributing Catchment Area and Sewer Section Identification					RESIDENTIAL				COMMERCIAL			INDUST.	INSTIT.	ENVIRO.	FLOW IN LITRES PER SECOND								PROPOSED SEWER					
					GROSS AREA (Ha)	POP. DENSITY (PERSONS/ PER Ha)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX see note 7	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW INFIL. 0.26 l/s see note 3	RESIDENTIAL FLOW SEWAGE 0.004213 l/s/person	COMM. 2.08 l/s	INDUS. 2.08 l/s	INSTIT. 1.3 l/s	ENVIRO. INFIL. 0.26 l/s	PUMPING STATION FLOW l/s	TOTAL FLOW l/s	ACT. PIPE SIZE (mm)	SLOPE %	Q l/s	V FULL m/s	V ACTUAL m/s	% CAPACITY
Street Name / Location	Catachment Area	ID	Maintenance Hole U/S	Maintenance Hole D/S																								
Elgin Street	External and Internal Areas to Tribute Phases 1, 3-7 (Summed to SA-18 - E2)	A	Midtown Creek SPS		*4.66*	*90.29*	*421*		*0.00*	*50%*	*0.00*	*8.91*	*0*	*0*														
		B	East External Through Cobourg Trails Ph1,3-7 Sub-Trunk		*11.66*	*90.29*	*1053*		*0.00*	*50%*	*0.00*	*0*	*0*	*0*														
		C	North East External Through Cobourg Trails Ph1,3-7 Sub-Trunk		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*19.21*	*0*	*0*														
		D	North External Through Cobourg Trails Ph1,3-7 Sub-Trunk		*2.52*	*90.29*	*228*		*0.00*	*50%*	*0.00*	*9.59*	*0*	*0*														
		E	South External Through Cobourg Trails Ph1,3-7 Sub-Trunk		*2.27*	*90.29*	*205*		*0.00*	*50%*	*0.00*	*0*	*0*	*0*														
		F1	Cobourg Trails Internal Sub-Trunk (Phase 1, 3-6)		*52.78*		*3001*		*0.95*	*50%*	*0.48*	*0*	*2.63*	*0*														
		G	West External Through Cobourg Trails Ph1,3-7 Sub-Trunk		*1.54*	*90.29*	*139*		*0.00*	*50%*	*0.00*	*0*	*0*	*0*														
			SA-18	SA-E2	75.43		5,046	3.24	0.95		0.48	37.71	2.63	0.00	19.61	68.91	0.99	78.44	3.42	0.00	0.00	171.36	525	0.40	272.15	1.26	1.32	63%
			SA-E2	SA-E3	75.43		5,046	3.24	0.00		0.48	37.71	2.63	0.00	19.61	68.91	0.99	78.44	3.42	0.00	0.00	171.36	525	0.40	272.00	1.26	1.32	63%
			SA-E3	SA-E4	75.43		5,046	3.24	0.00		0.48	37.71	2.63	0.00	19.61	68.91	0.99	78.44	3.42	0.00	0.00	171.36	525	0.40	271.84	1.26	1.32	63%
			SA-E4	SA-E5	75.43		5,046	3.24	0.00		0.48	37.71	2.63	0.00	19.61	68.91	0.99	78.44	3.42	0.00	0.00	171.36	525	0.42	279.58	1.29	1.35	61%
Brook Road	External Sub-Catchments (Summed to E5 - E6)	H	Brook Road East Side Direct to Trunk		*6.55*	*90.29*	*591*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.10*														
		I	Elgin Street Sub-Trunk		*5.13*	*90.29*	*463*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*3.02*														
		F2	Cobourg Trails Ph 7 via Elgin Street Sub Trunk		*6.98*		*1,938*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.00*														
			SA-E5	SA-E6	94.09		8,039	3.05	0.00		0.48	37.71	2.63	3.12	24.46	103.23	0.99	78.44	3.42	0.81	0.00	211.35	600	0.29	333.05	1.18	1.24	63%
			SA-E6	SA-E7	94.09		8,039	3.05	0.00		0.48	37.71	2.63	3.12	24.46	103.23	0.99	78.44	3.42	0.81	0.00	211.35	600	0.30	338.36	1.20	1.25	62%
	External Sub-Catchments (Summed to E7 - E8)	J	Cobourg Trails Phase 2 Direct to Trunk		*5.30*		*301*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.25*														
			SA-E7	SA-E8-A	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.29	330.70	1.17	1.24	65%
Phase 2 Internal Routing			SA-E8-A	SA-E8-B	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.31	340.84	1.21	1.27	63%
			SA-E8-B	SA-E9	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	333.82	1.18	1.25	65%
			SA-E9	SA-E10	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.29	332.66	1.18	1.24	65%
			SA-E10	SA-E11	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	333.69	1.18	1.25	65%
			SA-E11	SA-E12-A	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	335.67	1.19	1.25	64%
			SA-E12-A	SA-E12-B	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	334.59	1.18	1.25	65%

Tribute Rondeau Limited Partnership - Cobourg Trails External Servicing

SANITARY SEWER DESIGN SHEET

(METRIC)

MUNICIPALITY: **Town of Cobourg**
PROJECT: **Cobourg Trails External Servicing - External Trunk Sewer**
FROM: Elgin Street at Future Street 'A' Cobourg Trails Phase 1
TO: Willmott Street at Thompson Street (Connect to Existing Trunk)
PROJECT NO.: C14-0454

DESIGNED CWS
CHECKED MC
MANNING'S "n" : 0.013
DATE: 01/26/22 TIME: 04:10 PM

NOTES:

1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.00 m/s
3) RESIDENTIAL INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
RESIDENTIAL INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation DraIn Connections)
4) INDUSTRIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USING NOMINAL METRIC PIPE DIAMTER (mm)
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN
8) SLOPES IN RED TEXT ARE USED FOR CAPACITY CALCULATIONS AND ARE FLATTER THAN SLOPES SHOWN ON DESIGN DRAWINGS TO PROVIDE FLEXIBILITY FOR FUTURE ADJUSTMENT OF SEWER ALIGNMENT

Contributing Catchment Area and Sewer Section Identification					RESIDENTIAL				COMMERCIAL			INDUST.	INSTIT.	ENVIRO.	FLOW IN LITRES PER SECOND								PROPOSED SEWER					
					GROSS AREA (Ha)	POP. DENSITY (PERSONS/ PER Ha)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX see note 7	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW INFIL. 0.26 l/s see note 3	RESIDENTIAL FLOW SEWAGE 0.004213 l/s/person	COMM. 2.08 l/s	INDUS. 2.08 l/s	INSTIT. 1.3 l/s	ENVIRO. INFIL. 0.26 l/s	PUMPING STATION FLOW l/s	TOTAL FLOW l/s	ACT. PIPE SIZE (mm)	SLOPE %	Q l/s	V FULL m/s	V ACTUAL m/s	% CAPACITY
Street Name / Location	Catachment Area	ID	Maintenance Hole U/S	Maintenance Hole D/S																								
Phase 2 Internal Routing			SA-E12-B	SA-E13	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.29	332.38	1.18	1.25	65%
			SA-E13	SA-E14	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	338.43	1.20	1.26	64%
			SA-E14	SA-E15	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	335.00	1.18	1.25	65%
			SA-E15	SA-E16	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	333.71	1.18	1.25	65%
			SA-E16	SA-E17	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.32	347.56	1.23	1.29	62%
			SA-E17	SA-E18	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.29	329.20	1.16	1.23	66%
Brook Road			SA-E18	SA-E19-A	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.31	341.39	1.21	1.27	63%
			SA-E19-A	SA-E19-B	99.39		8,340	3.03	0.00		0.48	37.71	2.63	3.37	25.84	106.55	0.99	78.44	3.42	0.88	0.00	216.11	600	0.30	334.15	1.18	1.25	65%
	External Sub-Catchments (Summed to E19-B - E20-A)	K	Brook Creek East Tributary North Sub-Trunk		*47.60*	*90.29*	*4,298*		*0.00*	*50%*	*0.00*	*8.66*	*0.00*	*12.18*														
			SA-E19-B	SA-E20-A	146.99		12,637	2.85	0.00		0.48	46.37	2.63	15.55	38.22	151.90	0.99	96.45	3.42	4.04	0.00	295.02	675	0.30	457.22	1.28	1.35	65%
	External Sub-Catchments (Summed to E20-A - E20-B)	N	Brook Road West Side Sub-Trunk		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*16.97*	*0.00*	*0.00*														
			SA-E20-A	SA-E20-B	146.99		12,637	2.85	0.00		0.48	63.34	2.63	15.55	38.22	151.90	0.99	131.75	3.42	4.04	0.00	330.31	900	0.30	991.55	1.56	1.36	33%
	External Sub-Catchments (Summed to E20-B - E21)	L1	Brook Creek East Tributary South Sub-Trunk		*50.19*	*90.29*	*4,532*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*16.25*														
		L2	East Village North - Northern Portion		*16.06*		*1,499*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.00*														
			SA-E20-B	SA-E21	213.24		18,668	2.68	0.00		0.48	63.34	2.63	31.80	55.44	210.98	0.99	131.75	3.42	8.27	0.00	410.84	750	0.30	613.19	1.39	1.48	67%
			SA-E21	SA-E22	213.24		18,668	2.68	0.00		0.48	63.34	2.63	31.80	55.44	210.98	0.99	131.75	3.42	8.27	0.00	410.84	750	0.30	612.47	1.39	1.48	67%
	External Sub-Catchments (Summed to E22- E23-A)	O	Future Kerr Street Sub-Trunk		*0.04*	*90.29*	*3*		*5.33*	*50%*	*2.66*	*0.00*	*0.00*	*2.51*														
			SA-E22	SA-E23-A	213.27		18,671	2.68	5.33		3.14	63.34	2.63	34.31	55.45	211.01	6.53	131.75	3.42	8.92	0.00	417.07	750	0.53	812.25	1.84	1.85	51%
	External Sub-Catchments (Summed to E23-A- E23-B)	M1	East Village North - Southern Portion		*24.21*		*2,322*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.00*														
		M2	Allowance for Potential Non-Residential Flows from Sub-Catchment M1 / M2		*0.00*		*0.00*		*0.00*	*50%*	*0.00*	*0.00*	*1.00*	*0.00*														
			SA-E23-A	SA-E23-B	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	606.40	1.37	1.50	74%
			SA-E23-B	SA-E24	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	608.84	1.38	1.50	73%
Internal Mistral Developments Inc. Land			SA-E24	SA-E25	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
			SA-E25	SA-E26	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
			SA-E26	SA-E27	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%

Tribute Rondeau Limited Partnership - Cobourg Trails External Servicing

SANITARY SEWER DESIGN SHEET

(METRIC)

MUNICIPALITY: **Town of Cobourg**
PROJECT: **Cobourg Trails External Servicing - External Trunk Sewer**
FROM: Elgin Street at Future Street 'A' Cobourg Trails Phase 1
TO: Willmott Street at Thompson Street (Connect to Existing Trunk)
PROJECT NO.: C14-0454

DESIGNED: CWS
CHECKED: MC
MANNING'S "n" : 0.013
DATE: 01/26/22 TIME: 04:10 PM

NOTES:

1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.00 m/s
3) RESIDENTIAL INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
RESIDENTIAL INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation Drain Connections)
4) INDUSTRIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USING NOMINAL METRIC PIPE DIAMTER (mm)
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN
8) SLOPES IN RED TEXT ARE USED FOR CAPACITY CALCULATIONS AND ARE FLATTER THAN SLOPES SHOWN ON DESIGN DRAWINGS TO PROVIDE FLEXIBILITY FOR FUTURE ADJUSTMENT OF SEWER ALIGNMENT

Contributing Catchment Area and Sewer Section Identification					RESIDENTIAL				COMMERCIAL			INDUST.	INSTIT.	ENVIRO.	FLOW IN LITRES PER SECOND								PROPOSED SEWER					
					GROSS AREA (Ha)	POP. DENSITY (PERSONS/ PER Ha)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX see note 7	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW INFIL. 0.26 l/s see note 3	RESIDENTIAL FLOW SEWAGE 0.004213 l/s/person	COMM. 2.08 l/s	INDUS. 2.08 l/s	INSTIT. 1.3 l/s	ENVIRO. INFIL. 0.26 l/s	PUMPING STATION FLOW l/s	TOTAL FLOW l/s	ACT. PIPE SIZE (mm)	SLOPE %	Q l/s	V FULL m/s	V ACTUAL m/s	% CAPACITY
Street Name / Location	Catachment Area	ID	Maintenance Hole U/S	Maintenance Hole D/S																								
Internal Mistral Developments Inc. Land			SA-E27	SA-E28	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
			SA-E28	SA-E29	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
			SA-E29	SA-E30	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
			SA-E30	SA-E32	237.48		20,993	2.63	0.00		3.14	63.34	3.63	34.31	61.75	232.73	6.53	131.75	4.72	8.92	0.00	446.39	750	0.30	609.77	1.38	1.51	73%
Railway Crossing	External Sub-Catchments (Summed to E30 - E32)	P	Railway Sub-Trunk		*9.78*	*90.29*	883		*0.00*	*50%*	0.00	*10.59*	*0.00*	*0.76*														
		Q	Massey Creek Sub-Trunk		*38.88*	*90.29*	3,510		*0.00*	*50%*	0.00	*1.63*	*0.00*	*20.03*														
			SA-E32	SA-E33-A	286.14		25,387	2.55	0.00		3.14	75.56	3.63	55.10	74.40	272.62	6.53	157.16	4.72	14.33	0.00	529.75	900	0.30	991.55	1.56	1.58	53%
Unopened Willmott Street ROW			SA-E33-A	SA-E33-B	286.14		25,387	2.55	0.00		3.14	75.56	3.63	55.10	74.40	272.62	6.53	157.16	4.72	14.33	0.00	529.75	825	0.29	779.07	1.46	1.56	68%
			SA-E33-B	SA-E34	286.14		25,387	2.55	0.00		3.14	75.56	3.63	55.10	74.40	272.62	6.53	157.16	4.72	14.33	0.00	529.75	825	0.30	787.89	1.47	1.57	67%
			SA-E34	SA-E35	286.14		25,387	2.55	0.00		3.14	75.56	3.63	55.10	74.40	272.62	6.53	157.16	4.72	14.33	0.00	529.75	825	0.30	782.11	1.46	1.56	68%
Willmott Street	External Sub-Catchments (Summed to E35 - E36)	R	Willmott Street / King Street Northeast Corner		*5.40*	*90.29*	*488*		*0.00*	*50%*	*0.00*	*0.00*	*0.00*	*0.88*														
		S	Willmott Street / King Street Southeast Corner		*0.00*	*90.29*	*0*		*3.96*	*50%*	*1.98*	*0.00*	*0.00*	*0.00*														
			SA-E35	SA-E36	291.54		25,874	2.54	3.96		5.12	75.56	3.63	55.98	75.80	276.96	10.65	157.16	4.72	14.55	0.00	539.84	825	0.30	781.21	1.46	1.57	69%
			SA-E36	SA-E37	291.54		25,874	2.54	0.00		5.12	75.56	3.63	55.98	75.80	276.96	10.65	157.16	4.72	14.55	0.00	539.84	825	0.31	797.13	1.49	1.59	68%
	External Sub-Catchments (Summed to E37- E38)	T	210 Willmott Street		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*4.63*	*0.00*	*0.00*														
			SA-E37	SA-E38	291.54		25,874	2.54	0.00		5.12	80.19	3.63	55.98	75.80	276.96	10.65	166.80	4.72	14.55	0.00	549.47	825	0.30	779.69	1.46	1.58	70%
	External Sub-Catchments (Summed to E38- E39)	U	560 Dodge Street		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*5.71*	*0.00*	*0.32*														
		V	Dodge Street Rear Property		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*2.72*	*0.00*	*0.00*														
			SA-E38	SA-E39	291.54		25,874	2.54	0.00		5.12	88.62	3.63	56.30	75.80	276.96	10.65	184.33	4.72	14.64	0.00	567.09	825	0.29	777.67	1.45	1.58	73%
	External Sub-Catchments (Summed to E39- E40)	W	180 Willmott Street		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*1.53*	*0.00*	*0.00*														
			SA-E39	SA-E40	291.54		25,874	2.54	0.00		5.12	90.15	3.63	56.30	75.80	276.96	10.65	187.51	4.72	14.64	0.00	570.27	825	0.30	786.15	1.47	1.60	73%

Tribute Rondeau Limited Partnership - Cobourg Trails External Servicing

SANITARY SEWER DESIGN SHEET

(METRIC)

MUNICIPALITY: **Town of Cobourg**
PROJECT: **Cobourg Trails External Servicing - External Trunk Sewer**
FROM: Elgin Street at Future Street 'A' Cobourg Trails Phase 1
TO: Willmott Street at Thompson Street (Connect to Existing Trunk)
PROJECT NO.: C14-0454

DESIGNED CWS
CHECKED MC
MANNING'S "n" : 0.013
DATE: 01/26/22 TIME: 04:10 PM

NOTES:

1) MINIMUM VELOCITY = 0.60 m/s
2) MAXIMUM VELOCITY = 3.00 m/s
3) RESIDENTIAL INFILTRATION 0.26 l/s = 22.5 m3/Ha/DAY
RESIDENTIAL INFILTRATION 0.52 l/s = 45.0 m3/Ha/DAY (Foundation DraIn Connections)
4) INDUSTRIAL 2.08 l/s (local sewers) 1.04 l/s (trunk sewers)
5) EXISTING CONDITION INCLUDES COMMITTED DEVELOPMENT
6) USING NOMINAL METRIC PIPE DIAMTER (mm)
7) COMMERCIAL FLOOR SPACE INDEX=50% UNLESS OTHERWISE KNOWN
8) SLOPES IN RED TEXT ARE USED FOR CAPACITY CALCULATIONS AND ARE FLATTER THAN SLOPES SHOWN ON DESIGN DRAWINGS TO PROVIDE FLEXIBILITY FOR FUTURE ADJUSTMENT OF SEWER ALIGNMENT

Contributing Catchment Area and Sewer Section Identification					RESIDENTIAL				COMMERCIAL			INDUST.	INSTIT.	ENVIRO.	FLOW IN LITRES PER SECOND								PROPOSED SEWER					
					GROSS AREA (Ha)	POP. DENSITY (PERSONS/ PER Ha)	POP.	PEAK FLOW FACTOR	LOT AREA (Ha)	FLOOR SPACE INDEX see note 7	FLOOR AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	LOT AREA (Ha)	RESIDENTIAL FLOW INFIL. 0.26 l/s see note 3	RESIDENTIAL FLOW SEWAGE 0.004213 l/s/person	COMM. 2.08 l/s	INDUS. 2.08 l/s	INSTIT. 1.3 l/s	ENVIRO. INFIL. 0.26 l/s	PUMPING STATION FLOW l/s	TOTAL FLOW l/s	ACT. PIPE SIZE (mm)	SLOPE %	Q l/s	V FULL m/s	V ACTUAL m/s	% CAPACITY
Street Name / Location	Catachment Area	ID	Maintenance Hole U/S	Maintenance Hole D/S																								
Willmott Street	External Sub-Catchments (Summed to E40- E41)	Z	Willmott Street / Thompson Street Northeast Corner		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*3.93*	*0.00*	*0.00*														
			SA-E40	SA-E41	291.54		25,874	2.54	0.00		5.12	94.08	3.63	56.30	75.80	276.96	10.65	195.69	4.72	14.64	0.00	578.45	825	0.96	1405.04	2.63	2.44	41%
			SA-E41	SA-E42	291.54		25,874	2.54	0.00		5.12	94.08	3.63	56.30	75.80	276.96	10.65	195.69	4.72	14.64	0.00	578.45	825	0.28	752.89	1.41	1.55	77%
			SA-E42	SA-0651	291.54		25,874	2.54	0.00		5.12	94.08	3.63	56.30	75.80	276.96	10.65	195.69	4.72	14.64	0.00	578.45	825	0.29	777.49	1.45	1.59	74%
Thompson Street (Existing Sewers)	External Sub-Catchments (Summed to SA-0651 - SA-0681)		Brook Road SPS (81 L/s Firm)																		*81.00*							
			McGill Street SPS (246 L/s Firm)																		*246.00*							
		X	Existing Residential West of Willmott Street		*35.15*		*882*		*0.00*	*50%*	*0.00*																	
		Y	East Village Phase 5		*11.88*		*688*		*0.00*	*50%*	*0.00*																	
			SA-0651	SA-0681	338.57		27,444	2.52	0.00		5.12	94.08	3.63	56.30	88.03	290.83	10.65	195.69	4.72	14.64	327.00	931.55	1200	0.13	1405.71	1.24	1.32	66%
			SA-0681	SA-0682	338.57		27,444	2.52	0.00		5.12	94.08	3.63	56.30	88.03	290.83	10.65	195.69	4.72	14.64	327.00	931.55	1200	0.13	1405.71	1.24	1.32	66%
			SA-0682	SA-0683	338.57		27,444	2.52	0.00		5.12	94.08	3.63	56.30	88.03	290.83	10.65	195.69	4.72	14.64	327.00	931.55	1200	0.13	1405.71	1.24	1.32	66%
	External Sub-Catchments (Summed to SA-0683 -SA-1667)	AA	Thompson Street East of Willmott Street		*0.00*	*90.29*	*0*		*0.00*	*50%*	*0.00*	*24.08*	*0.00*	*0.53*														
			SA-0683	SA-1667	338.57		27,444	2.52	0.00		5.12	118.16	3.63	56.83	88.03	290.83	10.65	245.77	4.72	14.78	327.00	981.77	1200	0.13	1405.71	1.24	1.34	70%
			SA-1667	SA-0684	338.57		27,444	2.52	0.00		5.12	118.16	3.63	56.83	88.03	290.83	10.65	245.77	4.72	14.78	327.00	981.77	1200	0.13	1405.71	1.24	1.34	70%
			SA-0684	SA-0685	338.57		27,444	2.52	0.00		5.12	118.16	3.63	56.83	88.03	290.83	10.65	245.77	4.72	14.78	327.00	981.77	1200	0.13	1405.71	1.24	1.34	70%

E

Appendix E: Cobourg Trails Phase 1 General Servicing Plan and Ultimate Condition Design Sheet, D.G. Biddle

SANITARY SEWER DESIGN SHEET

PHASE 1

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

MUNICPALITY TOWN OF COBOURG
PROJECT RONDEAU (COBOURG) LTD.
PROJECT # 114057

DESIGN BY B.C.
CHK'D BY M.B.C.
DATE 14-Jan-22

CRITERIA
n 0.013
SINGLE FAMILY 3.23 persons/unit
TOWNHOUSE 2.68 persons/unit

LOCATION			RESIDENTIAL						COMMERCIAL			INDUS TRIAL	INSTITUT'N	FLOW (l/s)						PIPE DATA			
STREET	FROM MH	TO MH	GROSS AREA (ha)	DEN-SITY	POPU-LATION	PFF	TOTAL POPU-LATION	TOTAL AREA (ha)	LOT AREA (ha)	FLOOR SPACE INDEX	FLOOR AREA (ha)	LOT AREA (ha)	LOT AREA (ha)	RES INFIL 0.26	SEWAGE 0.0042	COMM 2.08	INDUS 1.04/ 2.08	INST 1.30	TOTAL FLOW l/s	SIZE mm	GRADE %	CAPACITY l/s	VELOCITY m/s
				3.23						0.50													
DENTON DRIVE	SA-1	SA-2	0.78		42	3.80	42	0.78						0.20	0.67	0.00	0.00	0.00	0.87	200	1.00	34.21	1.06
	SA-2	SA-3	0.58		36	3.80	78	1.36						0.35	1.24	0.00	0.00	0.00	1.60	200	1.00	34.21	1.06
	SA-3	SA-4	0.34		13	3.80	91	1.70						0.44	1.45	0.00	0.00	0.00	1.89	200	1.00	34.21	1.06
STREET E	SA-26	SA-27	0.43		16	3.80	16	0.43						0.11	0.26	0.00	0.00	0.00	0.37	200	1.00	34.21	1.06
	SA-27	SA-4	0.12		3	3.80	19	0.55						0.14	0.30	0.00	0.00	0.00	0.45	200	1.00	34.21	1.06
DENTON DRIVE	SA-4	SA-5	0.60		36	3.80	146	2.85						0.74	2.33	0.00	0.00	0.00	3.07	200	1.00	34.21	1.06
	SA-5	SA-6	0.47		29	3.80	175	3.32						0.86	2.79	0.00	0.00	0.00	3.66	200	0.50	24.19	0.75
STREET E	SA-26	SA-28	0.22		3	3.80	3	0.22						0.06	0.05	0.00	0.00	0.00	0.11	200	1.00	34.21	1.06
	SA-28	SA-29	0.99		42	3.80	45	1.21						0.31	0.72	0.00	0.00	0.00	1.03	200	0.50	24.19	0.75
	SA-29	SA-30	0.21		7	3.80	52	1.42						0.37	0.83	0.00	0.00	0.00	1.20	200	1.00	34.21	1.06
	SA-30	SA-6	0.48		23	3.80	75	1.90						0.49	1.20	0.00	0.00	0.00	1.69	200	2.20	50.75	1.56
DENTON DRIVE	SA-6	SA-7	0.10		3	3.80	253	5.32						1.38	4.04	0.00	0.00	0.00	5.42	200	1.60	43.28	1.33
	SA-7	SA-8	0.06		0	3.80	253	5.38						1.40	4.04	0.00	0.00	0.00	5.44	200	2.70	56.22	1.73
	A-2	N-16	1.07		175	3.80	175	1.07						0.28	2.79	0.00	0.00	0.00	3.07				
	A-3	N-16	2.27		205	3.80	380	3.34	0.01	0.50	0.01			0.87	6.06	0.01	0.00	0.00	6.94				
			3.29		142	3.80	522	6.63			0.01			1.72	8.33	0.01	0.00	0.00	10.06				
	A-4	N-15	4.77		364	3.80	886	11.40			0.01			2.96	14.14	0.01	0.00	0.00	17.11				
	A-5	N-14	11.66		1053	3.79	1053	11.66			0.01												
			2.98		174	3.74	1227	14.64			0.01			3.81	19.28	0.01	0.00	0.00	23.10	250	0.50	43.87	0.87
	A-6	N-13	1.56		84	3.55	2197	27.59			0.01			7.17	32.79	0.01	0.00	0.00	39.98	375	0.40	115.68	1.01
	A-7	N-12	6.89		545	3.48	2742	34.48			0.01			8.97	40.02	0.01	0.00	0.00	49.00	375	0.40	115.68	1.01
	A-8	N-12	1.47		100	3.80	100	1.47						0.38	1.60	0.00	0.00	0.00	1.98				
	A-9	N-11	2.08		158	3.44	3000	38.04			0.01			9.89	43.37	0.01	0.00	0.00	53.27	375	0.40	115.68	1.01
	A-10	N-10	2.33		171	3.42	3171	40.37			0.01			10.50	45.57	0.01	0.00	0.00	56.08	375	0.40	115.68	1.01

SANITARY SEWER DESIGN SHEET

PHASE 1

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

MUNICPALITY TOWN OF COBOURG
PROJECT RONDEAU (COBOURG) LTD.
PROJECT # 114057

DESIGN BY B.C.
CHK'D BY M.B.C.
DATE 14-Jan-22

CRITERIA
n 0.013

SINGLE FAMILY 3.23 persons/unit
TOWNHOUSE 2.68 persons/unit

LOCATION			RESIDENTIAL						COMMERCIAL			INDUS TRIAL	INSTITUT'N	FLOW (l/s)						PIPE DATA			
STREET	FROM MH	TO MH	GROSS AREA (ha)	DEN-SITY	POPU-LATION	PFF	TOTAL POPU-LATION	TOTAL AREA (ha)	LOT AREA (ha)	FLOOR SPACE INDEX	FLOOR AREA (ha)	LOT AREA (ha)	LOT AREA (ha)	RES INFIL 0.26	SEWAGE 0.0042	COMM 2.08	INDUS 1.04/ 2.08	INST 1.30	TOTAL FLOW l/s	SIZE mm	GRADE %	CAPACITY l/s	VELOCITY m/s
	A-11	N-17		3.23						0.50		19.21											
			2.52		228	3.80	228	2.52				9.59		0.66	3.64								
	A-12	N-10	1.70		110	3.80	338	4.22	0.95	0.5	0.48	28.80		1.10	5.39	0.99	59.90	0.00	67.38	375	0.50	129.33	1.13
FUTURE PHASES	A-13	A-14	1.54		139	3.80	139	1.54				28.80		0.40	2.22	0.00	59.90	0.00	62.52				
			4.66		421	3.80	560	6.20			0.01	8.91		1.61	8.94								
	A-14	N-9	7.34		268	3.80	828	13.54	0.95	0.5	0.48	37.71		3.52	13.21	1.00	78.44	0.00	96.17	375	0.50	129.33	1.13
	A-15	N-9	2.18		90	3.29	4427	60.31			0.48	37.71		15.68	61.24	1.00	78.44	0.00	156.35	450	0.50	210.31	1.28
	A-16	STUB	1.71		48	3.29	4475	62.02			0.48	37.71		16.13	61.82	1.00	78.44	0.00	157.38	450	0.50	210.31	1.28
DENTON DRIVE	STUB	SA-8	0.00		0	3.29	4475	62.02			0.48	37.71		16.13	61.82	1.00	78.44	0.00	157.38	450	0.50	210.31	1.28
	SA-8	SA-9	0.25		7	3.27	4735	67.65			0.48	37.71		17.59	64.97	1.00	78.44	0.00	161.99	450	0.60	230.38	1.40
	SA-9	SA-10	0.32		10	3.27	4745	67.97			0.48	37.71		17.67	65.09	1.00	78.44	0.00	162.20	450	0.60	230.38	1.40
STREET A	SA-10	SA-11	0.46		23	3.26	4768	68.43			0.48	37.71	2.63	17.79	65.36	1.00	78.44	3.42	166.01	450	0.75	257.58	1.57
	SA-11	SA-12	0.51		19	3.26	4787	68.94			0.48	37.71	2.63	17.92	65.59	1.00	78.44	3.42	166.37	450	1.40	351.91	2.14
	SA-12	SA-13	0.50		16	3.26	4803	69.44			0.48	37.71	2.63	18.05	65.79	1.00	78.44	3.42	166.69	450	1.40	351.91	2.14
	SA-11	SA-19	0.27		16	3.80	16	0.27						0.07	0.26	0.00	0.00	0.00	0.33	200	1.00	34.21	1.06
STREET B			0.32		21	3.80	37	0.59						0.15	0.59	0.00	0.00	0.00	0.74				
	SA-19	SA-20	0.08		3	3.80	40	0.67						0.17	0.64	0.00	0.00	0.00	0.81	200	1.00	34.21	1.06
	SA-20	SA-22	0.61		32	3.80	72	1.28						0.33	1.15	0.00	0.00	0.00	1.48	200	1.00	34.21	1.06
STREET C	SA-25	SA-22	0.67		43	3.80	43	0.67						0.17	0.69	0.00	0.00	0.00	0.86	200	1.00	34.21	1.06
	SA-22	SA-23	0.56		29	3.80	144	2.51						0.65	2.30	0.00	0.00	0.00	2.95	200	0.60	26.50	0.82
STREET B	SA-23	SA-24				3.80	144	2.51						0.65	2.30	0.00	0.00	0.00	2.95	200	1.00	34.21	1.06
	SA-24	SA-13	0.39		22	3.80	166	2.90						0.75	2.65	0.00	0.00	0.00	3.40	200	1.00	34.21	1.06
	SA-13	SA-14	0.44		19	3.25	4988	72.78			0.48	37.71	2.63	18.92	68.00	1.00	78.44	3.42	169.78	450	0.75	257.58	1.57
	SA-14	SA-15	0.45		16	3.24	5004	73.23			0.48	37.71	2.63	19.04	68.19	1.00	78.44	3.42	170.09	450	1.40	351.91	2.14
STREET A	SA-15	SA-16	0.63		19	3.24	5023	73.86			0.48	37.71	2.63	19.20	68.42	1.00	78.44	3.42	170.48	450	0.75	257.58	1.57
	SA-16	SA-17	0.31		13	3.24	5036	74.17			0.48	37.71	2.63	19.28	68.57	1.00	78.44	3.42	170.71	450	0.80	266.02	1.62
	SA-17	SA-18	0.31		10	3.24	5046	74.48			0.48	37.71	2.63	19.37	68.69	1.00	78.44	3.42	170.91	450	0.60	230.38	1.40

SANITARY SEWER DESIGN SHEET

PHASE 1

D.G.BIDDLE & ASSOCIATES LTD.

consulting engineers

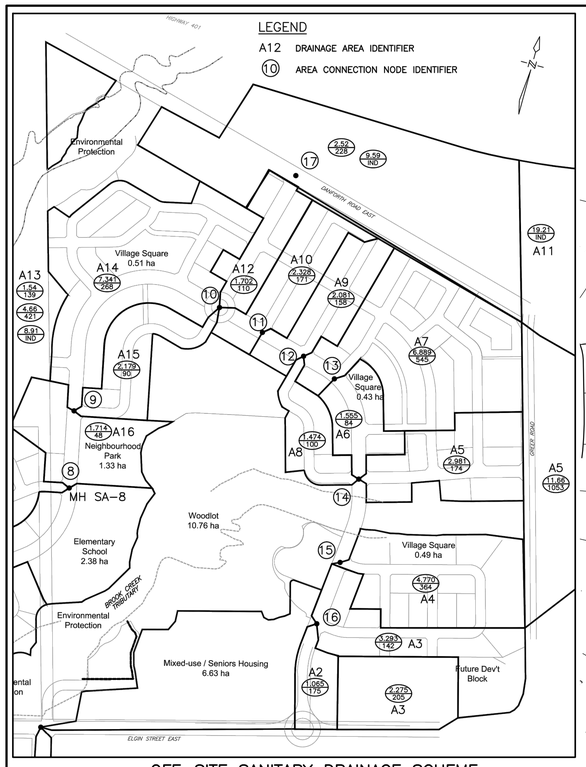
MUNICPALITY TOWN OF COBOURG
PROJECT RONDEAU (COBOURG) LTD.
PROJECT # 114057

DESIGN BY B.C.
CHK'D BY M.B.C.
DATE 14-Jan-22

CRITERIA
n 0.013

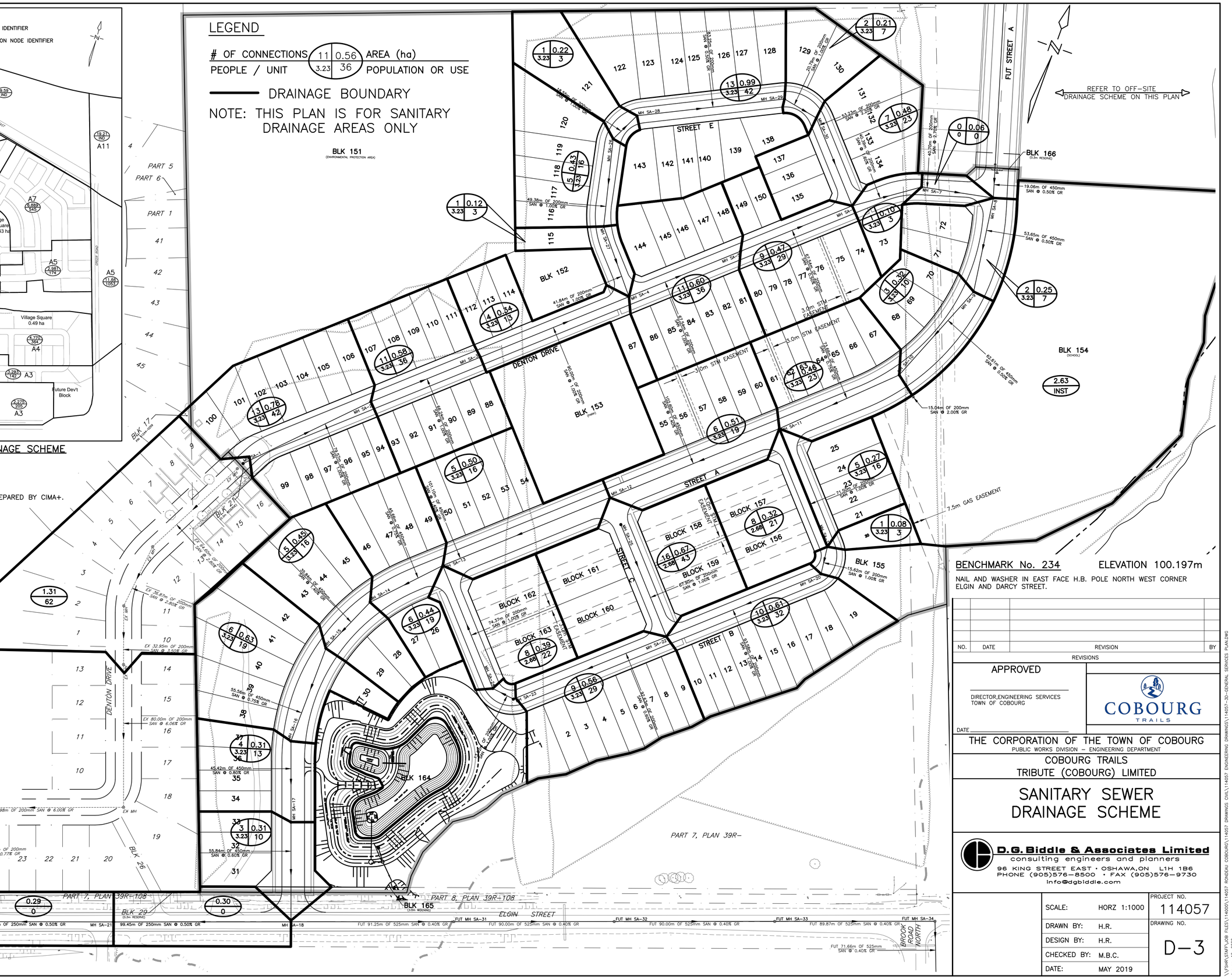
SINGLE FAMILY 3.23 persons/unit
TOWNHOUSE 2.68 persons/unit

LOCATION			RESIDENTIAL						COMMERCIAL			INDUS TRIAL	INSTITUT'N	FLOW (l/s)						PIPE DATA			
STREET	FROM MH	TO MH	GROSS AREA (ha)	DEN-SITY	POPU-LATION	PFF	TOTAL POPU-LATION	TOTAL AREA (ha)	LOT AREA (ha)	FLOOR SPACE INDEX	FLOOR AREA (ha)	LOT AREA (ha)	LOT AREA (ha)	RES INFIL 0.26	SEWAGE 0.0042	COMM 2.08	INDUS 1.04/ 2.08	INST 1.30	TOTAL FLOW l/s	SIZE mm	GRADE %	CAPACITY l/s	VELOCITY m/s
										0.50													
	SA-18	FUT SA-E2				3.24	5046	74.48			0.48	37.71	2.63	19.37	68.69	1.00	78.44	3.42	170.91	525	0.40	283.75	1.27
ELGIN STREET WEST	FUT SA-E2	FUT SA-E3				3.24	5046	74.48			0.48	37.71	2.63	19.37	68.69	1.00	78.44	3.42	170.91	525	0.40	283.75	1.27
	FUT SA-E3	FUT SA-E4				3.24	5046	74.48			0.48	37.71	2.63	19.37	68.69	1.00	78.44	3.42	170.91	525	0.40	283.75	1.27
	FUT SA-E4	FUT SA-E5				3.24	5046	74.48			0.48	37.71	2.63	19.37	68.69	1.00	78.44	3.42	170.91	525	0.40	283.75	1.27
	FUT SA-E5	BROOK RD	6.63		1938	3.11	6984	81.11			0.48	37.71	2.63	21.09	91.15	1.00	78.44	3.42	195.10	525	0.40	283.75	1.27



OFF-SITE SANITARY DRAINAGE SCHEME

NOT TO SCALE



NOTE

REFER TO COBOURG TRAILS EXTERNAL SERVICES PLAN PREPARED BY CIMA+. FOR BOUNDARIES OUTSIDE COBOURG TRAILS.
PROJECT No. C14-0454

BENCHMARK No. 234 ELEVATION 100.197m

NAIL AND WASHER IN EAST FACE H.B. POLE NORTH WEST CORNER ELGIN AND DARCY STREET.

NO.	DATE	REVISION	BY

REVISIONS

APPROVED

DIRECTOR,ENGINEERING SERVICES
TOWN OF COBOURG

DATE:

COBOURG TRAILS

THE CORPORATION OF THE TOWN OF COBOURG
PUBLIC WORKS DIVISION – ENGINEERING DEPARTMENT

COBOURG TRAILS
TRIBUTE (COBOURG) LIMITED

SANITARY SEWER DRAINAGE SCHEME

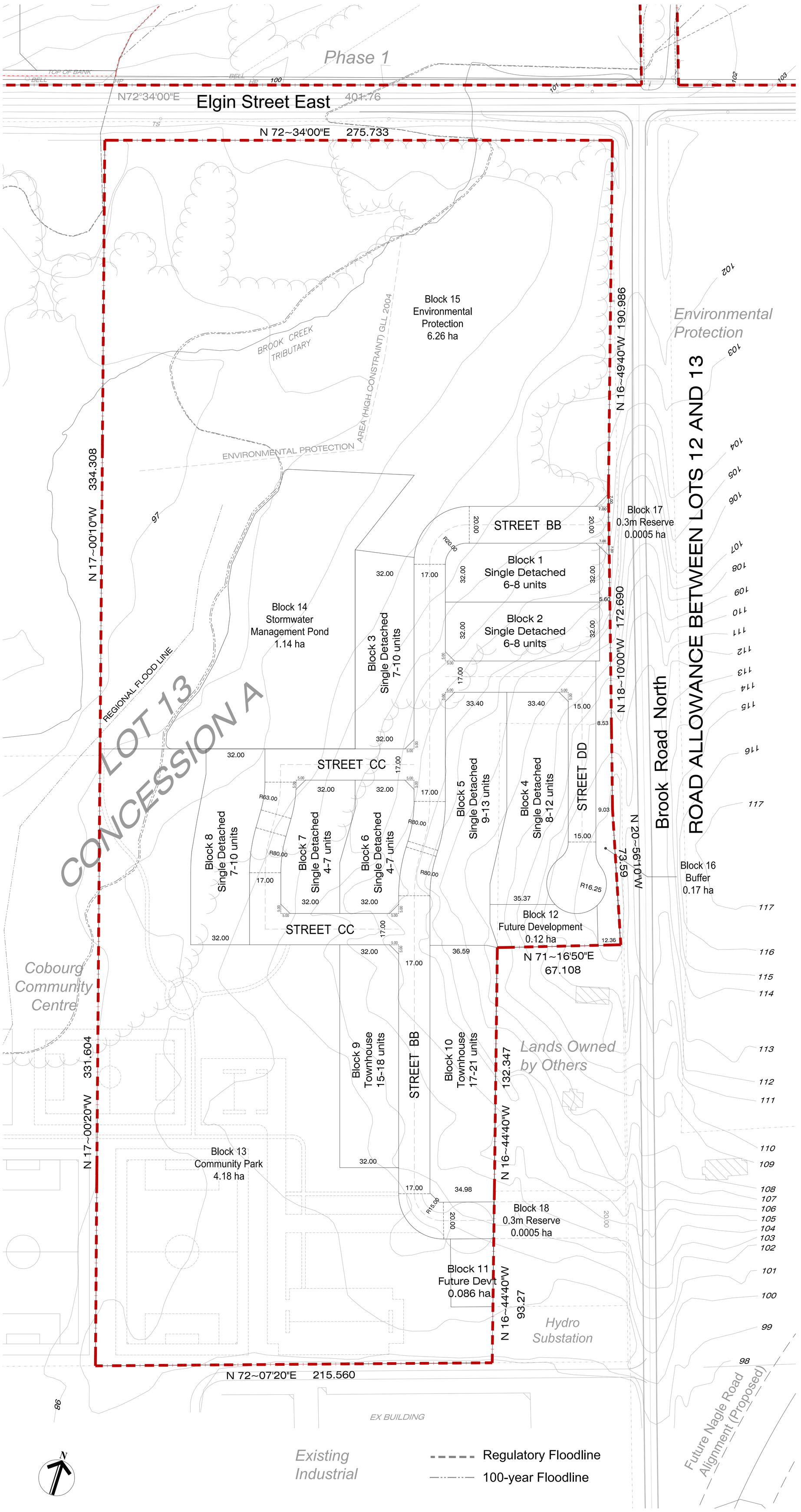
D.G. Biddle & Associates Limited
consulting engineers and planners
96 KING STREET EAST • OSHAWA,ON L1H 1B6
PHONE (905)576-8500 • FAX (905)576-9730
info@dgbiddle.com

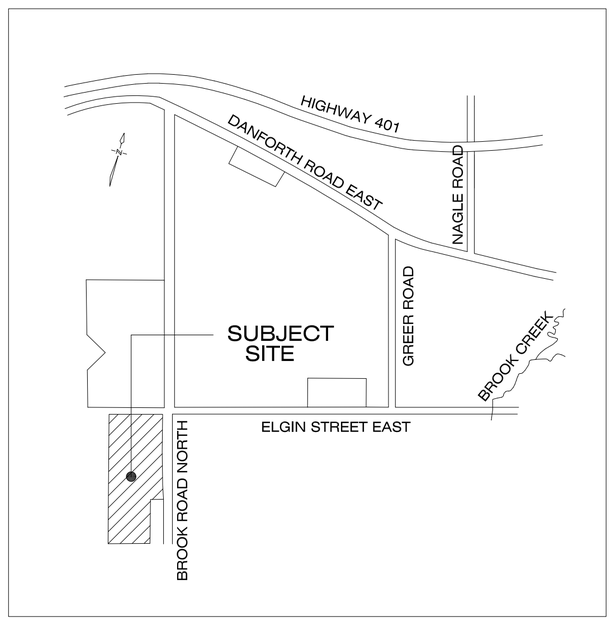
SCALE:	HORZ 1:1000	PROJECT NO.	114057
DRAWN BY:	H.R.	DRAWING NO.	D-3
DESIGN BY:	H.R.		
CHECKED BY:	M.B.C.		
DATE:	MAY 2019		

\\FSHR\STAFF\JOB FILES\114000\114057 RONDEAU COBOURG\114057 DRAWINGS CIVIL\114057 ENGINEERING DRAWINGS\114057-3D-GENERAL SERVICES PLAN.DWG
January 19, 2022

F

Appendix F: Cobourg Trails Phase 2 Draft Plan, The Planning Partnership





Key Map NTS

DRAFT PLAN OF SUBDIVISION

Section 51, Planning Act

a) As shown on the draft plan
b) As shown on the draft plan
c) As shown on the draft plan
d) As shown on the Land Use Table
e) As shown on the draft plan
f) As shown on the draft plan
g) As shown on the draft plan
h) Municipal piped water
i) Sandy Loam
j) As shown on the draft plan
k) Full Municipal services
l) As shown on the draft plan

Land Use Table	Lot/Block No.	Area (ha)
Residential		
Single Detached Townhouse	Bocks 1-10	3.407
Future Development	Block 11-12	0.206
Community Park	Blocks 13	4.18
Stormwater Management	Blocks 14	1.14
Environmental Protection	Blocks 15	6.26
Buffer	Block 16	0.17
0.3m Reserve	Blocks 17-18	0.001
Public Right-of-Way	---	1.671
TOTAL		17.035 ha

Unit Table	No. of Units
13.72 m Single Detached 11.6 m Single Detached 9.2 m Single Detached 6.1 m Townhouse	Range of units 81-114
TOTAL	81-114 units

R.O.W.	Length (m)	Area (ha)
20.0m Local	161.27	0.32
17.0m Local	660.0	1.12
15.0m Local	144.0	0.216
Daylighting		0.015
TOTAL	965.27 metres	1.671 ha

Owners Authorization

We being the registered owners of the subject lands hereby authorize THE PLANNING PARTNERSHIP to prepare a draft plan of subdivision and to make application to the Town of Cobourg for approval thereof:

Date: , 2022 Signed:

Steve Libfeld, Secretary
Tribute (Cobourg) Limited
1815 Ironstone Manor, Unit 1
Pickering, ON L1W 3W9

Surveyor's Certificate

I hereby certify that the boundaries of the land to be subdivided and their relationship to the adjacent lands are accurately and correctly shown on this plan.

Date: , 2022 Signed:

Merill McLean, Ontario Land Surveyor
DFP Surveyors
1101 Boundary Rd.
Oshawa, ON L1J 8P8

Revisions

Drawing No.	Date	Description
A	Jan 2022	New Draft Plan 'A' for Phase 2 Lands

METRIC: DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

Draft Plan of Subdivision
Cobourg Trails Phase 2

Part of Lot 13
Concession A
Town of Cobourg
County of Northumberland

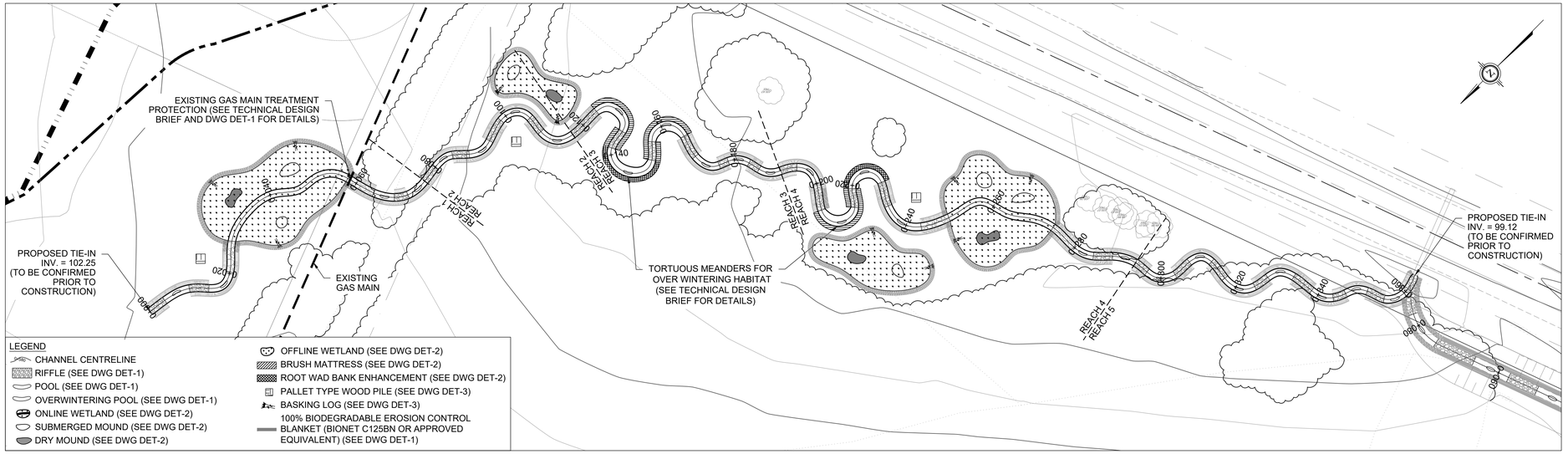
The Planning Partnership
1255 Bay Street, Suite 500
Toronto, Ontario M5R 2A9

Job.No.	Designed:
1613–16	SLM
Date: Jan.14, 2022	Drawn: SLM
Scale: 1:1000	Checked: DHL

Drawing No. A

G

Appendix G: Brook Creek Tributary Realignment Planform and Profile, Geo Morphix Ltd.



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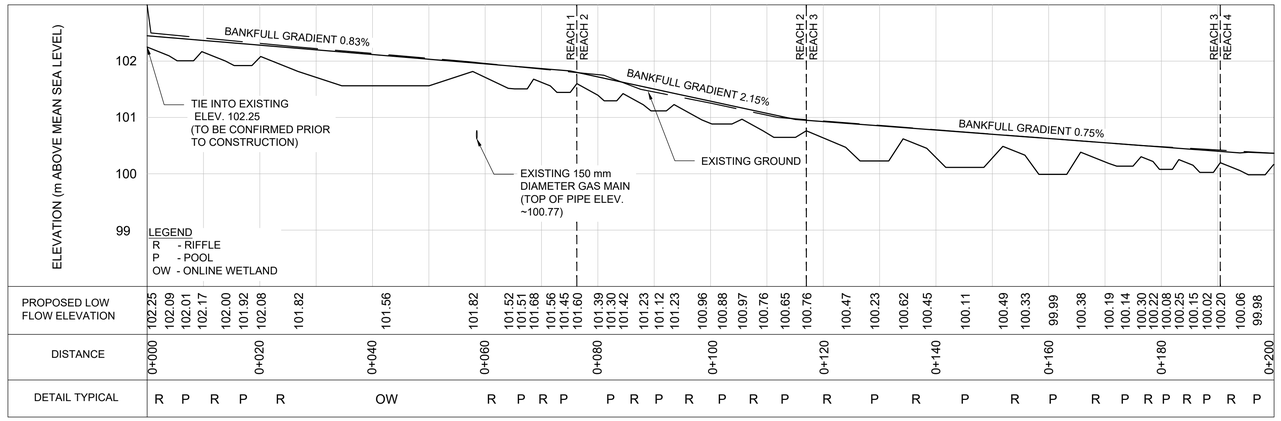

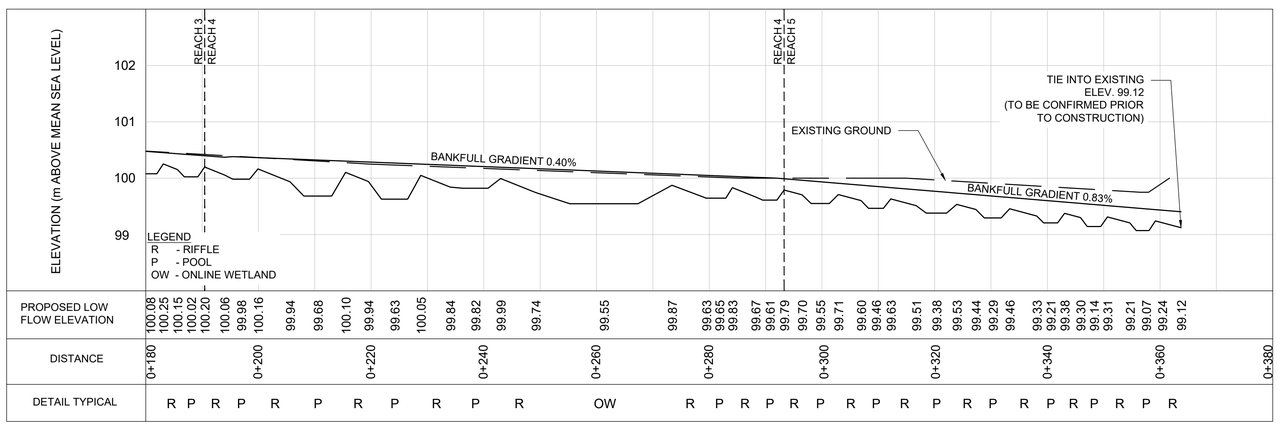

PROFILE
H = 1:500; V=1:50

NOT FOR CONSTRUCTION

SCALED FOR PLOT ON ARCH D

N
N.T.S.

KEY MAP
N.T.S.

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	2019-07-02	BM	FIRST SUBMISSION
	DATE	BY	REVISIONS

DESIGNED BY: PV/LD	CHECKED BY: PV
DRAWN BY: BM/AC	DATE: JULY 2019

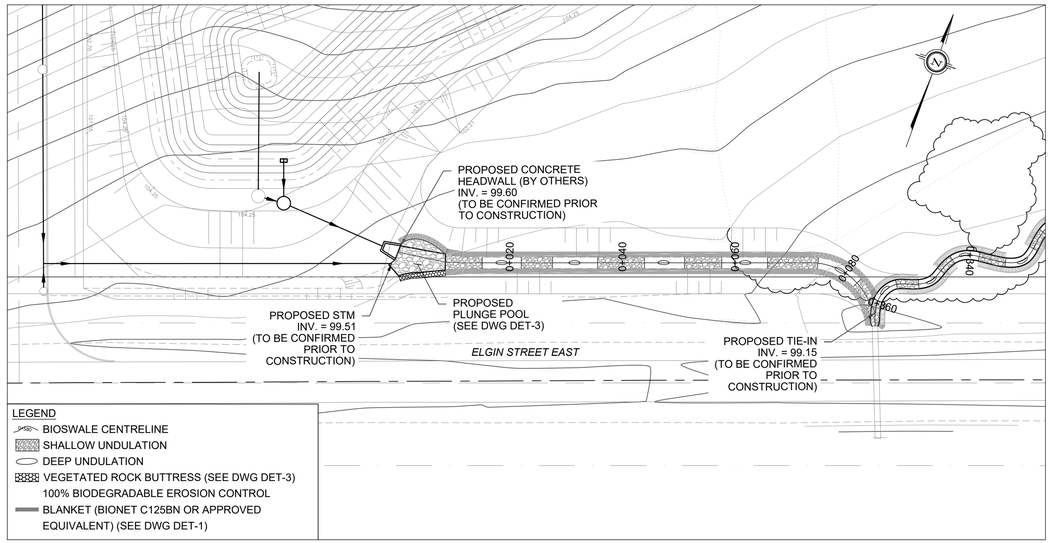
PROFESSIONAL GEOSCIENTIST
PAUL V. VILLARD
PRACTISING MEMBER
0957
ONTARIO
2019-07-02

GEO MORPHIX
Geomorphology Earth Science Observations
36 Main Street North
Campbellville, Ontario L0P 1B0
T: 416.920.0926
www.geomorphix.com

TRIBUTARY OF BROOK CREEK RONDEAU (COBOURG) LTD.

TRIBUTARY REALIGNMENT PLANFORM AND PROFILE

PROJECT No.: 18148	DRAWING No.: GEO-1
SCALE: AS NOTED	SHEET 1 OF 5



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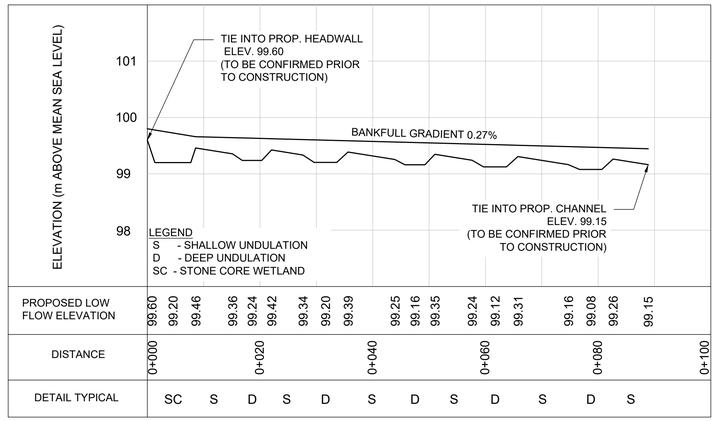

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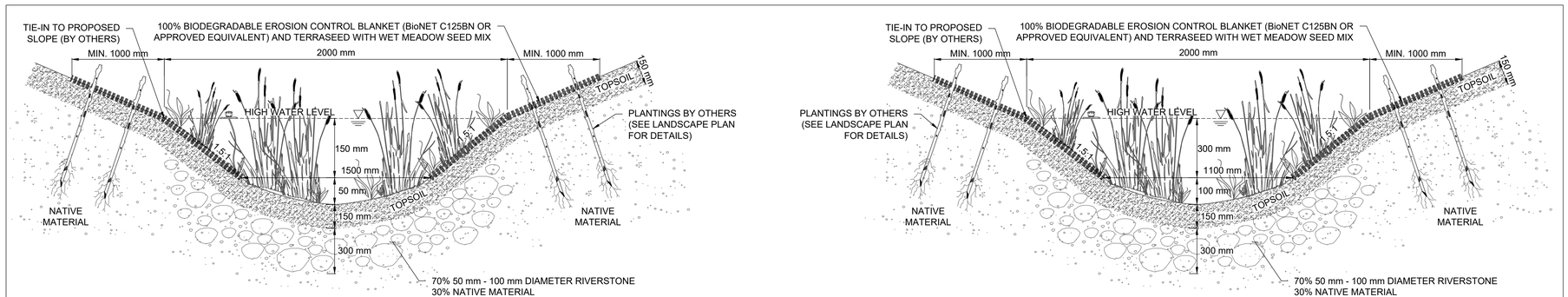

BIOSWALE FEATURES
N.T.S.

NOT FOR CONSTRUCTION

SCALED FOR PLOT ON ARCH D

N
N.T.S.

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	DATE	BY	REVISIONS

DESIGNED BY: PV/LD	CHECKED BY: PV
DRAWN BY: BM/AC	DATE: JULY 2019

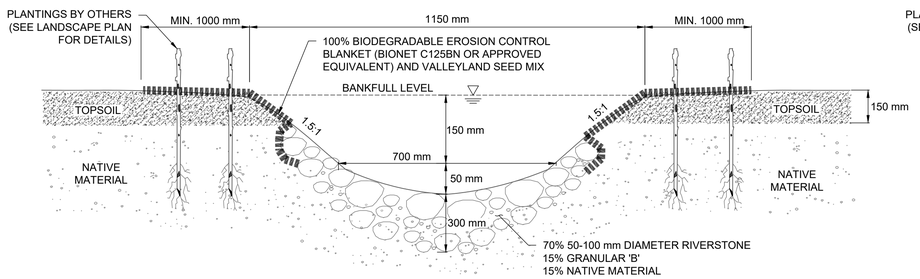
PROFESSIONAL GEOSCIENTIST
PAUL V. VILLARD
PRACTISING MEMBER
0957
ONTARIO
2019-07-02

GEO MORPHIX
Geomorphology
Earth Science
Observations
36 Main Street North
Campbellville, Ontario L0P 1B0
T: 416.920.0926
www.geomorphix.com

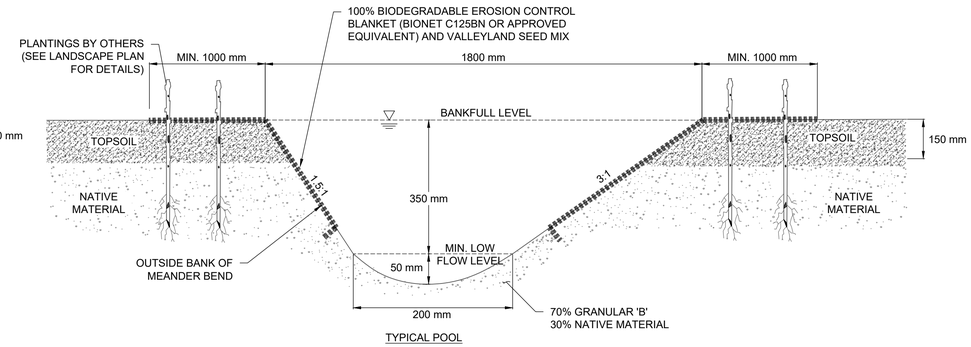
TRIBUTARY OF BROOK CREEK
RONDEAU (COBOURG) LTD.

BIOSWALE
PLANFORM AND PROFILE

PROJECT No.: 18148	DRAWING No.: GEO-2
SCALE: AS NOTED	SHEET 2 OF 5



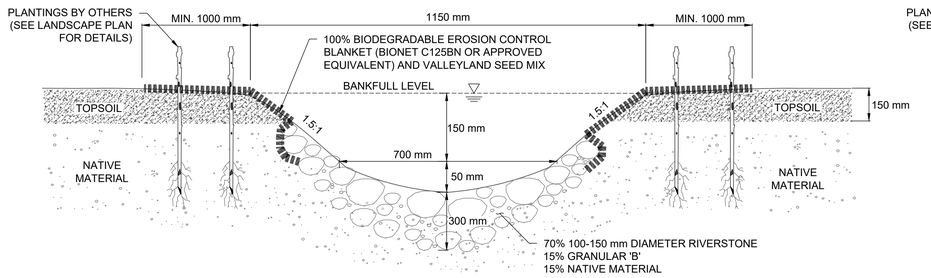
TYPICAL RIFFLE



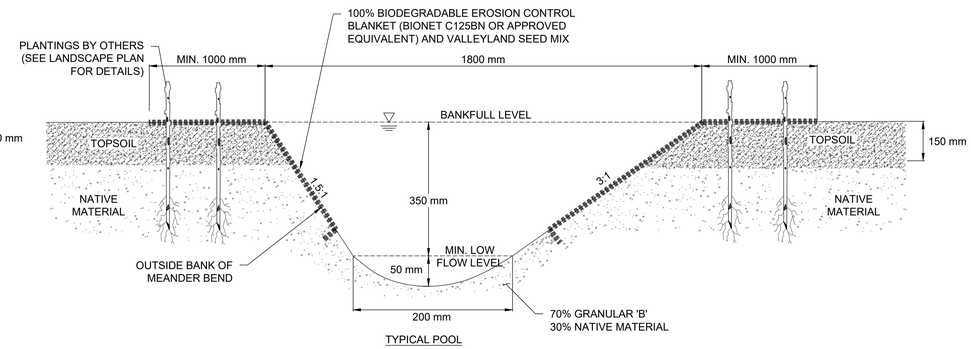
TYPICAL POOL

CHANNEL CROSS SECTIONS - REACHES 1, 3, 4, 5

N.T.S.



TYPICAL RIFFLE



TYPICAL POOL

CHANNEL CROSS SECTIONS - REACH 2

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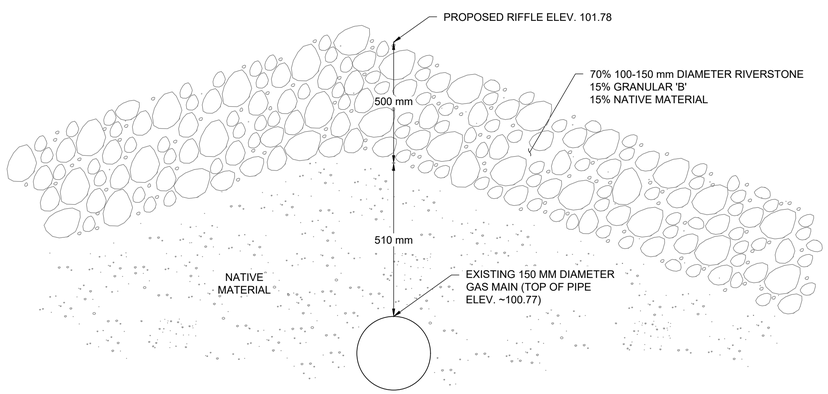

EXISTING GAS MAIN PROTECTION TREATMENT

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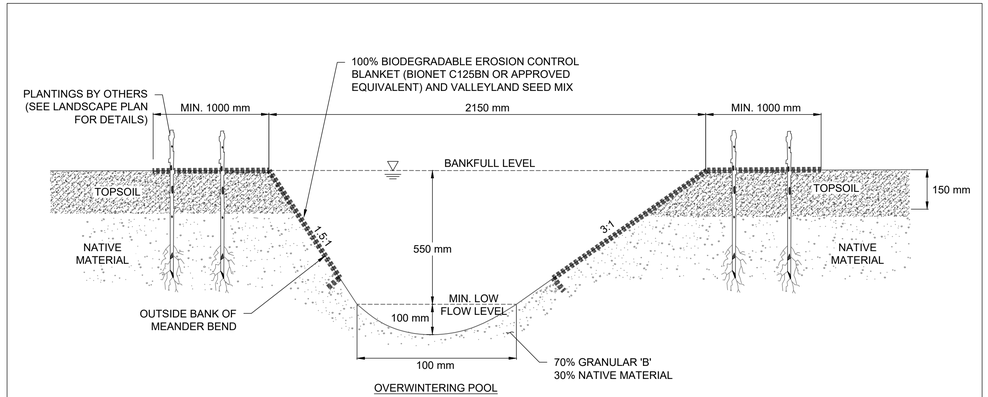

OVERWINTERING POOL

CHANNEL CROSS SECTIONS

N.T.S.

NOT FOR CONSTRUCTION

N
N.T.S.

KEY MAP
N.T.S.

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5. STABILIZE, TEMPORARILY OR PERMANENTLY, ANY DISTURBED AREAS AS WORK PROGRESSES, OR SOON AS CONDITIONS ALLOW. ON SOILS THAT WILL BE EXPOSED FOR PROLONG PERIODS, TEMPORARILY INSTALL A BIODEGRADABLE EROSION CONTROL BLANKET ON EXPOSED SOILS, OR APPLY A NURSE CROP AT A RATE OF 60 KG/HA.
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	2019-07-02	BM	FIRST SUBMISSION
	DATE	BY	REVISIONS

DESIGNED BY: PV/LD	CHECKED BY: PV
DRAWN BY: BM/AC	DATE: JULY 2019

PROFESSIONAL GEOSCIENTIST
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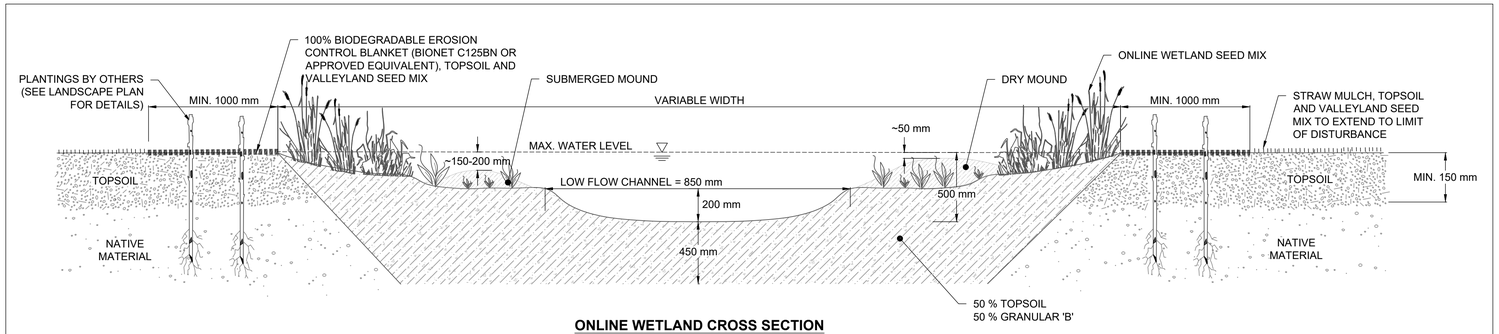
TRIBUTARY OF BROOK CREEK RONDEAU (COBOURG) LTD.

TRIBUTARY REALIGNMENT RESTORATION DETAILS

PROJECT No.: 18148	DRAWING No.: DET-1
SCALE: AS NOTED	SHEET 3 OF 5

SCALED FOR PLOT ON ARCH D



ONLINE WETLAND CROSS SECTION
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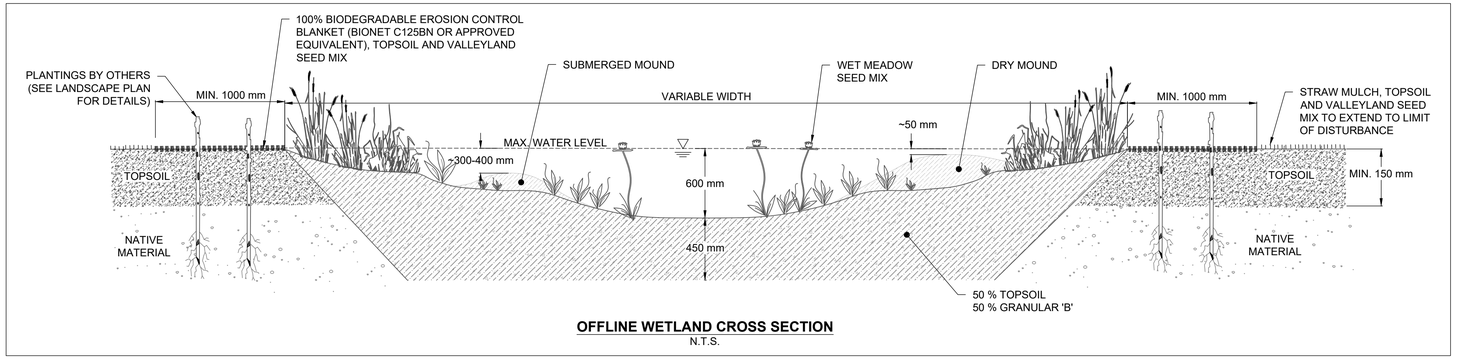

OFFLINE WETLAND CROSS SECTION
N.T.S.

ONLINE WETLAND SEED MIX

COMMON NAME	SPECIES	PERCENTAGE
BROADLEAVED ARROWHEAD	*Sagittaria latifolia*	10
SWAMP ASTER	*Aster puniceus*	5
RICE CUTGRASS	*Leersia oryzoides*	20
FOWL MANNA GRASS	*Glyceria striata*	10
CANADA RUSH	*Juncus canadensis*	5
GREEN BULRUSH	*Scirpus atrovirens*	15
FOX SEDGE	*Carex vulpinoidea*	15
NODDING BUR-MARIGOLD	*Bidens cernua*	5
SOFTSTEM BULRUSH	*Scirpus validus*	5
REED CANARY GRASS	*Phalaris aundinacea*	10

NOTES
1. APPLY SEED MIX AT A RATE OF 60 kg PER HECTARE.
2. SEEDING SHALL OVERLAP ADJACENT GROUND COVER BY 300 mm.
3. APPLY OAT OR RYE NURSE CROP AT A RATE OF 30 kg PER HECTARE.
4. WATER SOIL AFTER SEED APPLICATION.

WET MEADOW SEED MIX

COMMON NAME	SPECIES	PERCENTAGE
SWAMP MILKWEED	*Asclepias incarnata*	10
SWAMP ASTER	*Aster puniceus*	5
THREE WAY SEDGE	*Dulichium arundinaceum*	2
VIRGINIA WILD RYE	*Elymus virginicus*	30
BLUE FLAG	*Iris versicolor*	5
SOFT RUSH	*Juncus effusus*	3
RICE CUTGRASS	*Leersia oryzoides*	15
SENSITIVE FERN	Onoclea sensibilis	10
TEAR-THUMB	*Polygonum arifolium*	5
WOOL GRASS	*Scirpus cyperinus*	5
LESSER BUR REED	*Sparghanium americanum*	10

NOTES
1. TO BE INSTALLED ON THE WET MEADOW FLOODPLAIN.
2. APPLY SEED MIX AT A RATE OF 60 kg PER HECTARE.
3. SEEDING SHALL OVERLAP ADJACENT GROUND COVER BY 300 mm.
4. APPLY OAT OR RYE NURSE CROP AT A RATE OF 30 kg PER HECTARE.
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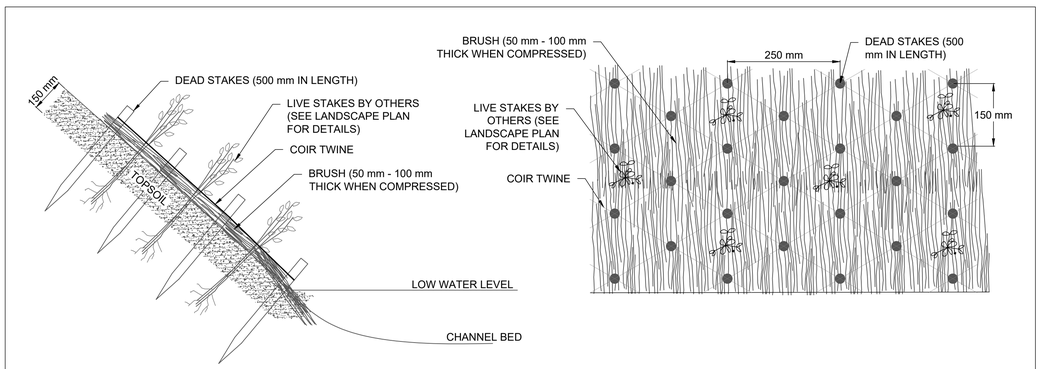
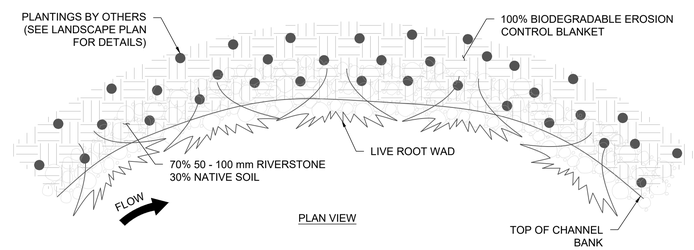
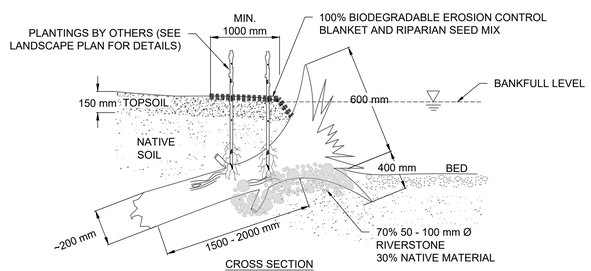


NOTES
1. LIVE BRANCHES TO CONSIST OF WILLOW AND DOGWOOD SPECIES, APPROXIMATELY 1 m IN LENGTH AND 50 mm - 100 mm IN WIDTH.
2. BRANCHES TO BE KEPT IN MOIST AND COLD UNTIL INSTALLATION.
3. BRUSH MATTRESS TO BE INSTALLED WHILE BRANCHES ARE DORMANT.
4. BRANCHES TO BE PLACED ON SLOPE WITH BUTT END TOWARDS VALLEY FLOOR AND PUSHED INTO SOIL.
5. BRANCHES MUST BE FLEXIBLE ENOUGH TO CONFORM TO THE SLOPE SURFACE IRREGULARITIES.
6. POUND DEAD STAKES TO HALF THEIR LENGTH INTO SOIL BETWEEN BRANCHES. TIE COIR TWINE AROUND DEAD STAKES AND TIGHTLY OVER BRANCHES. USE A CLOVE HITCH TO SECURE STAKES. POUND STAKES INTO SLOPE TO COMPRESS BRANCHES AGAINST GROUND.
7. TAMP LIVE STAKES BETWEEN DEAD STAKES.
8. FILL VOIDS BETWEEN BRANCHES OF THE BRUSH MATTRESS WITH SOIL TO PROMOTE ROOTING.

BRUSH MATTRESS
N.T.S.





NOTES
1. SALVAGE NATIVE TREES ON SITE, IF POSSIBLE, AND CUT TO DIMENSIONS SHOWN.
2. ROOT WAD TREATMENT TO EXTEND FULL LENGTH OF OUTSIDE BANK OF MEANDER BEND BETWEEN RIFFLES WHERE SHOWN ON PLANFORM.

ROOT WAD BANK ENHANCEMENT WITH STONE BEDDING
N.T.S.

NOT FOR CONSTRUCTION

N
N.T.S.

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	2019-07-02	BM	FIRST SUBMISSION
	DATE	BY	REVISIONS

DESIGNED BY: PV/LD	CHECKED BY: PV
DRAWN BY: BM/AC	DATE: JULY 2019

PROFESSIONAL GEOSCIENTIST ONTARIO
PAUL V. VILLARD
PRACTISING MEMBER
0957
2019-07-02

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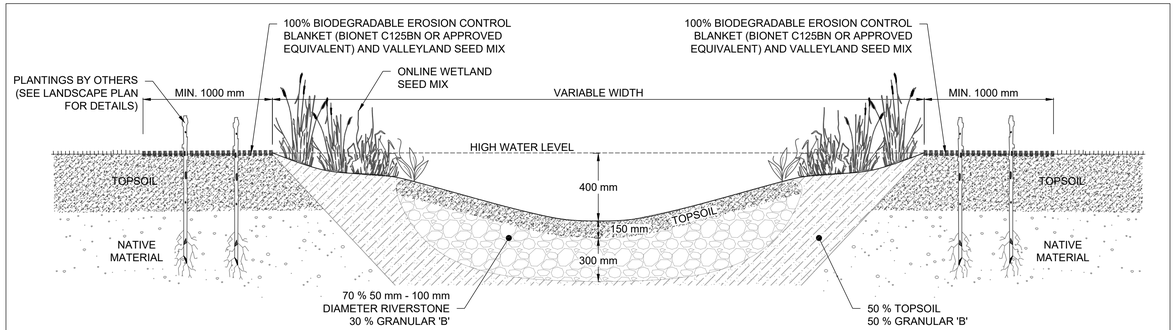
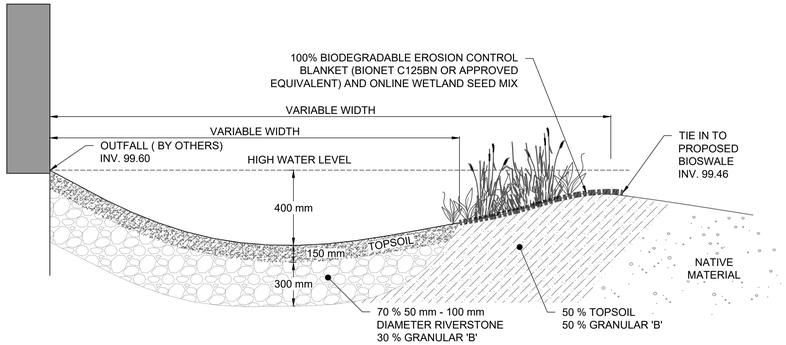
TRIBUTARY OF BROOK CREEK RONDEAU (COBOURG) LTD.

TRIBUTARY REALIGNMENT RESTORATION DETAILS

PROJECT No.: 18148	DRAWING No.: DET-2
SCALE: AS NOTED	SHEET 4 OF 5

SCALED FOR PLOT ON ARCH D





PLUNGE POOL
N.T.S.

VALLEYLAND SEED MIX

COMMON NAME	SPECIES	PERCENTAGE
FOX SEDGE	*Carex vulpinoidea*	15
WITCH GRASS	*Panicum capillare*	20
FOWL MANNAGRASS	*Glyceria striata*	20
FOWL BLUEGRASS	*Poa palustris*	20
PATH RUSH	*Juncus tenuis*	10
BLACK EYED SUSAN	*Rudbeckia hirta*	7
PURPLE STEMMED ASTER	*Aster puniceus*	8

NOTES
1. TO BE INSTALLED TO DISTURBED AREAS (AS SHOWN ON PLAN).
2. APPLY SEED MIX AT A RATE OF 60 kg PER HECTARE.
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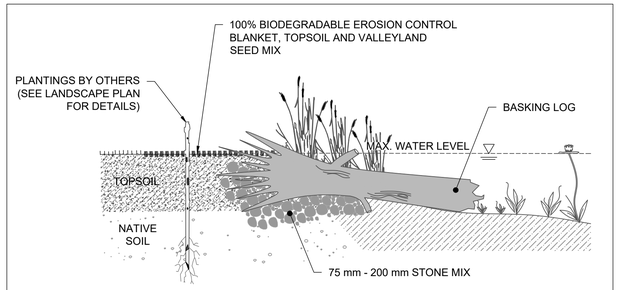
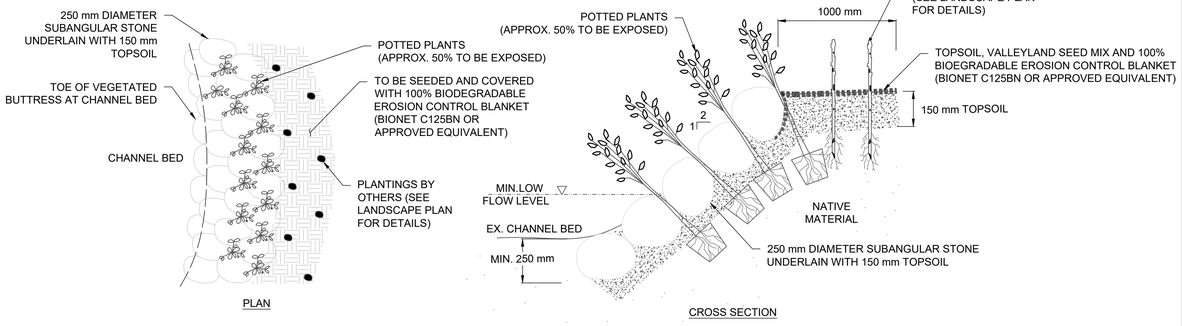


NOTES
1. ANCHOR AND SUPPORT BASKING LOGS WITH 75 mm - 200 mm STONE MIX.
2. FIRMLY COMPACT STONE MIX TO PREVENT THROUGH FLOW.
3. BURY 1/3 OF LOG INTO SOIL.
4. LENGTH OF BASKING LOGS ARE TO BE INSTALLED 1000 - 1500 mm INTO WET AREA.
5. BASKING LOGS TO BE A MINIMUM 500 mm IN DIAMETER AND 2000 - 2500 mm IN LENGTH.
6. BASKING LOGS SHOULD BE ANGLED TO PROMOTE TURTLE BASKING.
7. BASKING LOGS SHOULD BE A MIXTURE OF SUITABLE HARDWOOD AND SOFTWOOD SPECIES.

BASKING LOG
N.T.S.



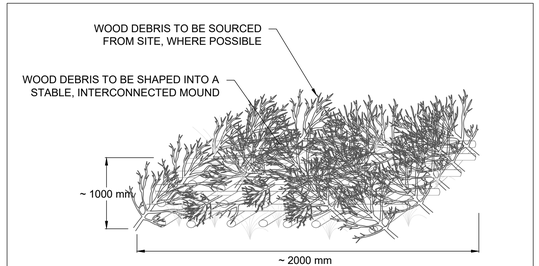
CONSTRUCTION NOTES

1. VEGETATED ROCK BUTTRESS TO BE INSTALLED IN LIFTS.
2. TOE STONES TO BE EMBEDDED INTO CHANNEL BED.
3. INSTALL PLANTS 1 m O/C IN EACH LAYER.
4. LATERALLY STAGGER EACH SUCCESSIVE LAYER OF PLANTS TO AVOID VERTICAL STACKING.
5. PLANTING SPECIES PLACEMENT SHOULD BE RANDOM.

POTTED PLANTINGS SPECIES AND QUANTITIES

COMMON NAME	SPECIES	QUANTITY	CONDITION
RED OSIER DOGWOOD	*Salix discolor*	14	1 m ht. POTTED
SANDBAR WILLOW	*Salix exigua*	14	1 m ht. POTTED
SHINING WILLOW	*Salix lucida*	14	1 m ht. POTTED

VEGETATED ROCK BUTTRESS
N.T.S



NOTES
1. LARGEST AND HEAVIEST LOG MATERIAL SHOULD BE PLACED ON THE BASE OF THE BRUSH PILE. THE SMALLEST BRUSH MATERIAL SHOULD BE PLACED AT THE TOP.
2. LOGS SHOULD BE FORMED INTO A PALLET SHAPE.
3. HEIGHT OF BRUSH PILE IS NOT TO EXCEED 1.0 M.
4. A MIX OF HARDWOOD AND SOFTWOOD SHOULD BE USED.
5. PLANT WITH NATIVE FRUIT BEARING VINES.

PALLET TYPE WOOD PILE
N.T.S

N
N.T.S.

KEY MAP
N.T.S.

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SITE AND MATERIAL MANAGEMENT

1. ALL CONSTRUCTION EQUIPMENT AND MATERIALS (IMPORTED OR EXCAVATED) MUST BE STORED AT LEAST 30 m AWAY FROM ANY WATERBODY IN A STABLE AREA ABOVE THE ACTIVE FLOODPLAIN, OR IN A DESIGNATED STAGING/STORAGE AREA.
2. IN THE EVENT OF AN UNEXPECTED STORM, ALL UNFIXED ITEMS THAT HAVE THE POTENTIAL TO CAUSE A SPILL OR AN OBSTRUCTION TO FLOW MUST BE MOVED A STABLE AREA ABOVE ACTIVE FLOODPLAIN.
3. STOCKPILES MUST BE LOCATED OUTSIDE THE ISOLATED WORK AREAS.
4. STABILIZE STOCKPILED SOILS THAT ARE STORED FOR PROLONGED PERIODS WITH THE APPLICATION OF A NURSE CROP AT A RATE OF 60 kg/ha.
5. STABILIZE, TEMPORARILY OR PERMANENTLY, ANY DISTURBED AREAS AS WORK PROGRESSES, OR SOON AS CONDITIONS ALLOW. ON SOILS THAT WILL BE EXPOSED FOR PROLONG PERIODS, TEMPORARILY INSTALL A BIODEGRADABLE EROSION CONTROL BLANKET ON EXPOSED SOILS, OR APPLY A NURSE CROP AT A RATE OF 60 KG/HA.
6. MINIMIZE THE AREA OF DISTURBANCE TO THE EXTENT POSSIBLE.
7. ALL VEGETATION, ADJACENT TO THE WORK AREA, MUST BE PROTECTED AND DELINEATED WITH CONSTRUCTION FENCING OR TREE PROTECTION BARRIERS.
8. ALL GRADES IN THE AREA REGULATED BY THE CONSERVATION AUTHORITY MUST BE MAINTAINED OR MATCHED, UNLESS OTHERWISE AUTHORIZED IN THE APPLICABLE PERMIT.

EROSION AND SEDIMENT CONTROL

1. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSTALLED PRIOR TO START OF WORKS.
2. SEDIMENT CONTROLS MUST BE INSPECTED DAILY TO ENSURE THAT THEY ARE IN GOOD REPAIR AND FUNCTIONING AS INTENDED.
3. EROSION AND SEDIMENT CONTROLS MUST BE MAINTAINED DURING CONSTRUCTION, AND ANY REQUIRED REPAIRS OR REPLACEMENTS MUST BE COMPLETED WITHIN 24 HOURS AFTER THEY HAVE BEEN IDENTIFIED DURING THE MONITORING.
4. EROSION AND SEDIMENT CONTROLS MAY REQUIRE PERIODIC ADJUSTMENTS TO REFLECT CHANGING SITE CONDITIONS. THE CONTRACTOR WILL BE RESPONSIBLE FOR THESE ADJUSTMENTS TO ENSURE PROPER FUNCTION.
5. ANY CHANGES TO THE EROSION AND SEDIMENT CONTROL PLAN BEYOND MINOR ADJUSTMENTS MUST BE APPROVED BY THE CONTRACT ADMINISTRATOR.
6. ADDITIONAL EROSION AND SEDIMENT CONTROL SUPPLIES MUST BE KEPT ON SITE IN ORDER TO FACILITATE IMMEDIATE REPAIRS AND/OR UPGRADES AS NEEDED.
7. ALL TEMPORARY SEDIMENT CONTROLS MUST BE REMOVED AFTER THE CONTRACT ADMINISTRATOR DEEMS THE SITE TO BE STABLE.

DELETERIOUS SUBSTANCE CONTROL/SPILL MANAGEMENT

1. PREVENT THE RELEASE OF SEDIMENT, SEDIMENT-LADEN WATER, RAW CONCRETE, CONCRETE LEACHATE OR ANY OTHER DELETERIOUS SUBSTANCES INTO ANY WATERBODY, RAVINE OR STORM SEWER SYSTEM.
2. ENSURE EQUIPMENT AND MACHINERY ARE IN GOOD OPERATING CONDITION (POWER WASHED), FREE OF LEAKS, EXCESS OIL, AND GREASE.
3. NO EQUIPMENT REFUELLING OR SERVICING SHOULD BE UNDERTAKEN WITHIN 30 m OF ANY WATERCOURSE OR SURFACE WATER DRAINAGE.
4. A SPILL CONTAINMENT KIT MUST BE READILY ACCESSIBLE ON SITE IN THE EVENT OF A RELEASE OF A DELETERIOUS SUBSTANCE TO THE ENVIRONMENT. ONSITE STAFF MUST BE TRAINED IN ITS USE.
5. THE CONTRACT ADMINISTRATOR MUST BE NOTIFIED IMMEDIATELY IN THE EVENT OF A SPILL OF DELETERIOUS SUBSTANCE.

WORK AREA ISOLATION

1. ALL WORK IN ISOLATED WORK AREAS MUST BE COMPLETED IN THE DRY. AN ADEQUATE NUMBER OF PUMPS MUST BE USED FOR UNWATERING.
2. THE UNWATERING DISCHARGE LOCATION MUST BE LOCATED AT LEAST 30 M FROM ANY WATERCOURSE OR WETLAND IN AN AREA WITH DENSE VEGETATIVE GROUNDCOVER, AND WHERE THE DISCHARGE CAN RETURN TO THE WATERBODY DOWNSTREAM OF THE WORK AREA OVER THE GROUNDCOVER.
3. FISH MUST BE REMOVED FROM THE WORK AREA ONCE ISOLATED. FISH SALVAGE MUST BE COMPLETED BY A QUALIFIED TECHNICIAN WITH A LICENSE FROM THE ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY.

	2019-07-02	BM	FIRST SUBMISSION
	DATE	BY	REVISIONS

DESIGNED BY: PV/LD	CHECKED BY: PV
DRAWN BY: BM/AC	DATE: JULY 2019

PROFESSIONAL GEOSCIENTIST
PAUL V. VILLARD
PRACTISING MEMBER
0957
ONTARIO
2019-07-02

GEO MORPHIX
Geomorphology Earth Science Observations
36 Main Street North
Campbellville, Ontario L0P 1B0
T: 416.920.0926
www.geomorphix.com

TRIBUTARY OF BROOK CREEK RONDEAU (COBOURG) LTD.

TRIBUTARY REALIGNMENT RESTORATION DETAILS

PROJECT No.: 18148	DRAWING No.: DET-3
SCALE: AS NOTED	SHEET 5 OF 5

NOT FOR CONSTRUCTION

SCALED FOR PLOT ON ARCH D

H

Appendix H: GRCA Contingencies for Sanitary Sewer Alignment, GHD Correspondence

From: Chris Ellingwood <Chris.Ellingwood@ghd.com>
Sent: Monday, November 1, 2021 12:26 PM
To: Dan Campbell; Chris Ellingwood
Cc: Jeff Solly; Trevor Mackenzie; Paul Watson; Mike Cai; Claire Wallis-South
Subject: RE: C14-0454: Trunk Sanitary Sewer at North End of Tribute Phase 2 Cobourg

EXTERNAL EMAIL

That alignment is what we had discussed on site with GRCA.

As long the path through the trees is a narrow a possible. Delineating the construction limit and avoiding damaging any trees not necessary for removal. We had also talked about planting some additional native trees in the small opening or even removing a few invasive buckthorn shrubs to the north and replanting with native tree species. Usually agencies are looking for 1:1 ratio area compensation for tree removal in a buffer.

Chris Ellingwood, B.E.S.
Senior Biologist

GHD *Formerly at Niblett Environmental Associates Inc.*
Proudly employee-owned | ghd.com

T: 1 705-931-3929 | C: 1 705-768-9962 | E: chris.ellingwood@ghd.com
now located at 347 Pido Road Unit 29 Peterborough Ontario K9J 6X7 Canada

---

From: Dan Campbell <Dan.Campbell@cima.ca>
Sent: Monday, November 1, 2021 9:51 AM
To: Chris Ellingwood <cellingwood@niblett.ca>
Cc: Jeff Solly <jeff.s@mytribute.ca>; Trevor Mackenzie <trevor.m@mytribute.ca>; Paul Watson <paul.w@mytribute.ca>; Mike Cai <Mike.Cai@cima.ca>; Claire Wallis-South <Claire.Wallis-South@cima.ca>
Subject: RE: C14-0454: Trunk Sanitary Sewer at North End of Tribute Phase 2 Cobourg

Hi Chris,

Just wanted to circle back to you on this. Any feedback that you can provide would be appreciated.

Regards,

DAN CAMPBELL
Senior Project Manager, Associate Partner / Infrastructure – Municipal Engineering

T 905 697-4464 ext. 6906 **M** 289-685-1767
415 Baseline Road West, 2nd Floor, Bowmanville, ON L1C 5M2 CANADA

From: Dan Campbell
Sent: Thursday, October 21, 2021 10:06 AM
To: Chris Ellingwood <cellingwood@niblett.ca>
Cc: Jeff Solly <jeff.s@mytribute.ca>; Trevor Mackenzie <trevor.m@mytribute.ca>; Paul Watson <paul.w@mytribute.ca>; Mike Cai <Mike.Cai@cima.ca>; Claire Wallis-South <Claire.Wallis-South@cima.ca>
Subject: C14-0454: Trunk Sanitary Sewer at North End of Tribute Phase 2 Cobourg

Hi Chris,

I understand that you've had some recent discussions with the team at Tribute regarding the environmental features and constraints along the north side of Phase 2 (on the west side of Brook Road South of Elgin Street) and it looks favorable to potentially impact the "peninsula" of 14A FOC4-1 that extends towards Brook Road between 15 CUM1-1 and 17 CUT to allow for the sloping required for Street B.

CIMA+ is working Tribute on an external trunk sewer that will pass through Phase 2. To mitigate against excessive sewer depths related to the embankment on Brook Road the hope would be that we could make a justifiable case to align the sewer though 15 CUM1-1 and cross the "peninsula" piece of 14A FOC4-1 where we would then run along the toe of the proposed slope for Street B at the north end of Phase 2.

To that end I've marked the sewer alignment on Figure 1 from your May 2016 Report and also overlayed the current Phase 2 draft plan concept.

Would appreciate your comment on the potential to make a justifiable case for this. Please let me know if you would like to discuss any details.

Regards,

DAN CAMPBELL
Senior Project Manager, Associate Partner / Infrastructure – Municipal Engineering

T 905 697-4464 ext. 6906 **M** 289-685-1767
415 Baseline Road West, 2nd Floor, Bowmanville, ON L1C 5M2 CANADA

Appendix I: Environmental Impact Study – Cobourg Trails External Servicing, Cobourg, Northumberland County, Ontario, Cambium Inc.

J

Appendix J: Draft EA Opinion Letter, P. Becker Consulting

P Becker CONSULTING

9 Darrowby Crescent
Palgrave, Ontario L7E 0C8

Cell: 416-529-3613
Email: pbecker@pathcom.com

January 14, 2022

Tribute Rondeau Limited Partnership
c/o Jeff Sollly

Email: jeff.s@mytribute.ca

RE: Cobourg Class EA Opinion

P Becker Consulting was retained by Tribute Rondeau Limited Partnership to review the environmental assessment (EA) requirements and work completed to date for external water and wastewater infrastructure (trunk watermains and sanitary sewers) to be constructed within the Cobourg East Community Secondary Plan area in Cobourg, Ontario. This infrastructure will support Tribute (Cobourg) Limited's ("Tribute") Cobourg Trails development and ultimately other growth in the secondary plan area.

Patricia Becker, MES is an EA Specialist with over 30 years of EA experience (including 22 years as P Becker Consulting). Pat has worked for municipalities and the private sector in the areas of environmental assessment, environmental planning and approvals throughout Ontario. Through project work P Becker Consulting has been involved in completing numerous environmental assessments (both provincial (individual and class) and federal) for various types of projects (e.g., master plans, transportation, water and wastewater) and in obtaining all necessary approvals. For the water, wastewater and transportation projects, the Municipal Engineers Association Class EA process has been completed for both Schedule B and C projects.

The purpose of this letter is to provide an opinion on the Municipal Engineers Associate (MEA) Municipal Class EA (as amended in 2007, 2011 & 2015) requirements for the watermain and wastewater servicing proposed for Cobourg Trails. The servicing is based on the external servicing map provided dated November 15, 2021 (which is attached).

1 Proponency

One of the initial steps in the Class EA process requires determining who the proponent will be for the project(s). The *COVID 19 Economic Recovery Act (2020)* included changes to the *Environmental Assessment Act* definition of "proponent". Previously it was interpreted that the definition meant that the municipality had to be the proponent of the project where they would own and operate the infrastructure after the developer had built it. The current definition makes it clear that the proponent is someone who:

a) carries out or proposes to carry out a project, or
b) is the owner or person having charge, management or control of a project

The key is the word "or" so for the Cobourg Trails external servicing work the proponent can be the developer since they will carry out the project, which is the Class EA work and not necessarily the construction or operation of the water and wastewater infrastructure.

Since Tribute or the Town can be the proponent the next step is to understand and decide who should be the proponent for the project.

- Ontario Regulation 345/93 designates private sector developers as subject to the EA Act where they are the proponent of Schedule C projects.

- A municipality and/or private sector developer(s) may jointly undertake a project for their mutual benefits, as co-proponents all terms and conditions of the Municipal Class EA apply equally to each co-proponent.

- Where a number of municipalities or a municipality and private sector developer(s) undertake a project for their mutual benefits but select one of the parties to be the lead proponent to carry out the project planning, design and implementation, only the lead proponent shall be subject to the terms and conditions of the Municipal Class EA.

Recommendation – Since Tribute is undertaking the design and implementation of the water and wastewater servicing they should be the proponent on the Class EA process. In these circumstances, generally the Town would work closely with Tribute throughout the Class EA process as the key stakeholder in the process.

2 MEA CLASS EA REQUIREMENTS

Once the proponent has been decided the next step is to determine which schedule in the MEA Municipal Class EA is applicable to the servicing projects.

There have been some additional modifications to the Class EA process due to legislative changes that happened in 2019 and 2020.

Based on the changes to the *Environmental Assessment Act* (EAA) found in the *More Homes, More Choice Act (2019)* it is now deemed that any Schedule A or A+ projects are now exempt from meeting the requirements of the EAA regardless of the proponent. These projects may proceed to implementation.

The other key change came with the passing of *COVID-19 Economic Recovery Act (2020).* This change removed the opportunity for anyone to request a Part II Order for any project unless it's related to Aboriginal and treaty rights.

The following outlines the determination of the appropriate Schedule and Class EA requirements for the proposed water and wastewater servicing.

2.1 Water Servicing Class EA Requirements

Water projects require completion of a Schedule A+ for the following:

- Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, provided all such facilities are in either an existing road allowance or an existing utility corridor, including the use of Trenchless Technology for water crossings.

A Schedule B would be required for the following:

- Establish, extend or enlarge a water distribution system and all works necessary to connect the system to an existing system or water source, where such facilities are not in either an existing road allowance or an existing utility corridor.

There are two separate trunk watermains and these could be considered to be different projects since the watermains are not linked together and they could be implemented separately. One trunk watermain is located to the north along Densmore Road/Danforth Road and the second trunk watermain is to the south along Elgin Street East and Brook Road North with a portion extending towards Barracks Road.

The trunk watermain to the north falls within an existing road allowance and involves trenchless technology for the watercourse crossings and can be considered to be a Schedule A+ project.

For the trunk watermain to the south, while most of the watermain is located within a road allowance, there is a portion that falls outside of an existing road allowance or utility corridor and is located on the Town of Cobourg recreation lands and Lakefront Utilities Services Inc. electrical substation lands. The watermain cannot be piecemealed into separate projects so the watermain would not be considered to be a Schedule A+ and Schedule B would apply.

Recommendation – For the 'north' trunk watermain that is a Schedule A+ the project can proceed to implementation without meeting any requirements of the Class EA process regardless of whether Tribute or the Town are the proponent. The *More Homes More Choice Act (2019)* has made all Schedule A and A+ projects exempt from the EA Act so there are no EA requirements for the developers or the Town to complete the project. The developers could proceed to project implementation. However, if the Town was the proponent previously the Schedule A+ required a notice to be issued prior to commencement of construction. It is a good idea to still meet this requirement by posting the notice on the Town's website. The notice is only intended to inform the public about the construction that will soon commence and is not two-way consultation so issuing this notice would not have any time implications on the project.

For the 'south' trunk watermain that is considered to be Schedule B (as noted above) it is recommended that Tribute be the proponent as the project would not be designated under the EA Act and could proceed to project implementation. If the Town is the proponent then the Schedule B process must be completed.

2.2 Wastewater Servicing Class EA Requirements

The MEA Class EA requires meeting the Schedule A+ process for the following projects:

- Establish, extend, or enlarge a sewage collection system and all necessary works to connect the system to an existing sewage or natural drainage outlet, provided all such facilities are in either an existing road allowance or an existing utility corridor, including the use of Trenchless Technology for water crossings.

While portions of the sewer are located within a road allowance there are other portions that require an easement/agreement and fall outside of an existing road allowance or utility corridor.

The sewer cannot be piecemealed into separate projects so the sewer would not be considered to be a Schedule A+.

The following are Schedule B Class EA projects:

- Establish, extend or enlarge a sewage collection system and all works necessary to connect the system to an existing sewage outlet where such facilities are not in an existing road allowance or an existing utility corridor.

This means that since a portion of the sewer needs to be located outside of the road allowance, then the project is a Schedule B for the wastewater system.

Recommendation - Tribute should be the proponent as the project would not be designated under the EA Act and could proceed to project implementation. If the Town is the proponent then the Schedule B process must be completed.

2.3 Summary of Class EA Requirements

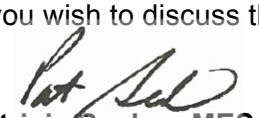
Based on the water and wastewater servicing being proposed these are considered to be Schedule A+ ('north' trunk watermain) and Schedule B projects ('south ' trunk watermains and sanitary sewers). For these projects, if Tribute is the proponent, then the project is exempt from the EA Act and the projects could proceed to implementation (e.g., detailed design and construction).

The MEA Municipal Class EA allows for the proponent to be a private sector developer or the Town. The Schedule A+ projects are exempt due to legislative changes made in 2019. The Schedule B projects would only be exempt from the EA Act provided Tribute is the proponent and not the Town.

2.4 Update on Proposed Changes to the MEA Class EA

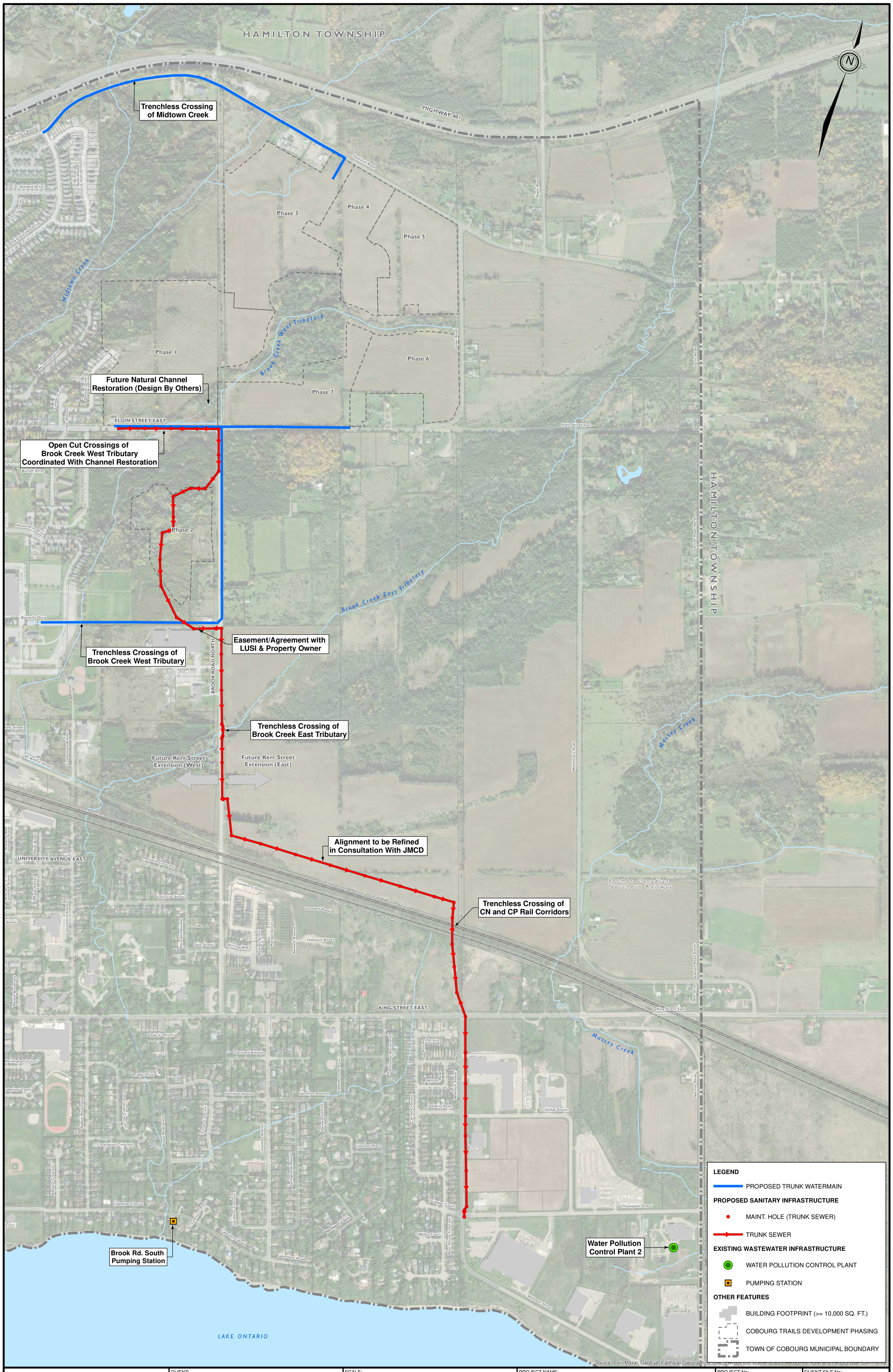
In July 2019, amendments were proposed to the MEA Class EA document, along with other Class EA documents. These have not yet been approved by the Ministry of the Environment, Conservation and Parks (MECP) so the existing MEA Municipal Class EA document (as amended in 2007, 2011 & 2015) outlines the current Class EA process to be followed. More significant changes were proposed for road project Schedules. While it is uncertain which if any of the proposed amendments will be approved, they do not affect the water and wastewater projects proposed for Cobourg Trails. Given the current situation with the MEA Class EA document, Tribute (as the proponent) can proceed with implementation of the water and wastewater projects that are identified to be Schedule A+ and Schedule B regardless of whether the proposed Class EA amendments are approved.

If you wish to discuss this matter further, please feel free to contact me.



Patricia Becker, MES
Principal/EA Specialist

P Becker Consulting
Cell: 416-529-3613



CLIENT: Tribute communities OVER 35 YEARS

SCALE: 100 50 0 100 200 300 400 meters
1:6,000

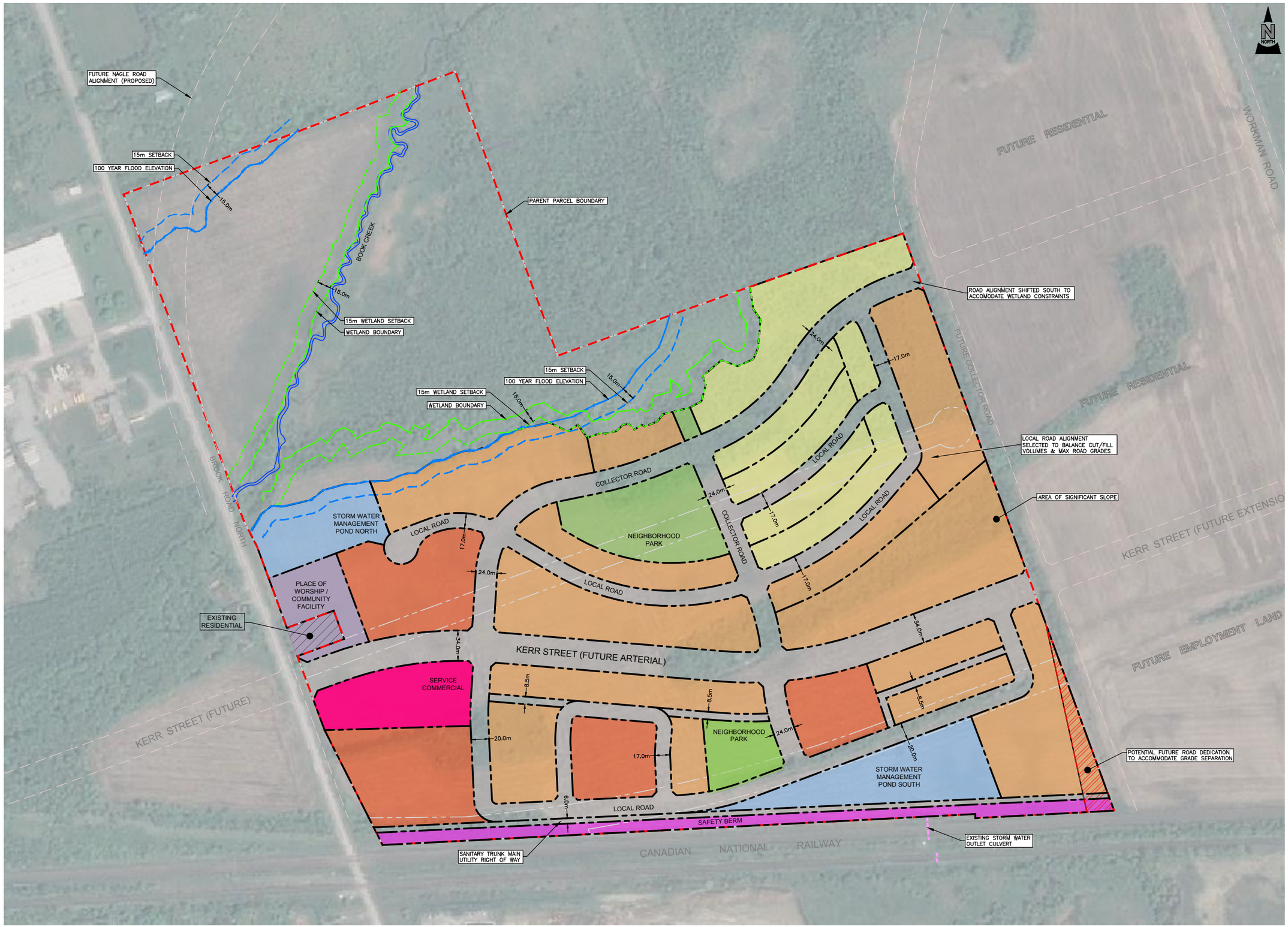
PROJECT NAME:
COBOURG TRAILS EXTERNAL SERVICING

SHEET TITLE:
OVERVIEW OF PROPOSED EXTERNAL SERVICING

PROJECT No: C14-0454		CLIENT FILE No: ---
DRAFTER: S. ELLIOTT	DESIGNER: ---	DRAWING No: --
APPROVER: D. CAMPBELL	APPROVER: ---	
DATE: 11/15/2021		SHEET No: 1 of 1

K

Appendix K: East Village North Block Plan, Monument Geomatics



LEGEND

DEVELOPMENT AREA = 402683m²

- LOW DENSITY
- MEDIUM DENSITY
- HIGH DENSITY
- NEIGHBORHOOD PARK
- PLACE OF WORSHIP / COMMUNITY FACILITY
- SERVICE COMMERCIAL
- STORM WATER MANAGEMENT POND
- SAFETY BERM

NO.	DATE (D/M/Y)	REVISION	BY
–	–	–	–

NOT FOR CONSTRUCTION

MONUMENT GEOMATICS
MONUMENTGE.COM

MONUMENT PROJECT No.:	21-0115
DRAWN:	DA
CHECKED:	PQ
ENGINEER:	CO
DATE:	12/10/21
SCALES:	HORZ. 1:2000
SCALES:	VERT. 1:N/A

JMCD
EAST VILLAGE NORTH
CONCEPT PLAN

OPTION 6
OVERALL PLAN

DRAWING No.
CP-6

0 60 120 Meters

C:\Users\Dustin.Alexander\Monument Geomatics\EAD-EV North - General\1 Design\03 Preliminary Design\CSD\01 Models\Supermodel\Jan 2022\MXE - CSD22-PreliminaryBase - Option 6.dwg

L

Appendix L: External Servicing Preliminary Cost Estimate, CIMA+

Cobourg Trails External Servicing
Preliminary Design Cost Estimate - External Trunk Sanitary Sewer

Item	Location	Description	Estimated Quantity	Unit	Unit Price	Total
Administrative and Contractual Items						
A.1		**General**				
	Various	Mobilization & Demobilization	1.00	L.S	$233,808	$233,808
	Various	Contract Administrators Field Office	16.00	mon	$2,500	$40,000
A.2		**Contract Documentation Items**				
	Various	Performance Bond	1.00	L.S.	$116,904	$116,904
	Various	Labour & Materials Payment Bond	1.00	L.S.	$25,000	$25,000
	Various	Insurance	1.00	L.S.	$87,678	$87,678
	Various	Holdback Financing	1.00	L.S.	$25,000	$25,000
	Various	Provide traffic control for maintenance of traffic as per OTM Book 7 Temporary Condition	1.00	L.S.	$233,808	$233,808
	Various	Portable Message Signs	16.00	mon	$1,200	$19,200
	Various	**Pre and Post Construction Survey & Layout (excl. Settlement Monitoring)**				
	Various	Open Cut	15.00	day	$1,500	$22,500
	Various	Trenchless	10.00	day	$1,500	$15,000
Sub Total Administrative and Contractual Items						**$818,897**
Trunk Sanitary Sewer – Open Cut						
B.1		**525mm dia. Reinforced Concrete Pipe, CL 100D, up to 3.0 to 4.5m in Depth (including earth excavation, bedding, cover and backfill; excl. road restoration)**				
	Elgin Street	SA-E4 to SA-E5	75.7	m	$950	$71,915
	Elgin Street	SA-E3 to SA-E4	90.1	m	$950	$85,595
	Elgin Street	SA-E2 to SA-E3	90	m	$950	$85,500
	Elgin Street	SA-18 to SA-E2	89.9	m	$950	$85,405
B.2		**600mm dia. Sanitary Sewer (excl. restoration) at 4.5 to 6.0m Depth**				
	Brook Road N.	SA-E19-A to SA-E19B	124.9	m	$1,450	$181,105
	Phase 2	SA-E13 to SA-E14	82.1	m	$1,160	$95,236
	Phase 2	SA-E12B to SA-E13	68.25	m	$1,160	$79,170
	Phase 2	SA-E12A to SA-E12B	74.09	m	$1,160	$85,944
	Phase 2	SA-E9 to SA-E10	64.73	m	$1,160	$75,087
	Phase 2	SA-E8-B to SA-E9	54.13	m	$1,160	$62,791
	Phase 2	SA-E8-A to SA-E8-B	81.13	m	$1,160	$94,111
B.3		**600mm dia. Sanitary Sewer (excl. restoration) at 6.0 to 7.5m Depth**				
	Brook Road N.	SA-E18 to SA-E19-A	93.81	m	$1,600	$150,096
	Markham Metals	SA-E17 to SA-E18	59.14	m	$1,600	$94,624
	Markham Metals	SA-E16 to SA-E17	34.33	m	$1,600	$54,928
	Phase 2	SA-E10 to SA-E11	38.13	m	$1,280	$48,806
	Phase 2	SA-E15 to SA-E16	67.71	m	$1,280	$86,669
	Phase 2	SA-E14 to SA-E15	120.94	m	$1,280	$154,803
	Brook Road N.	SA-E5 to SA-E6	91.77	m	$1,600	$146,832
B.4		**600mm dia. Sanitary Sewer (excl. restoration) 7.5m Depth Plus**				

	Phase 2	SA-E7 to SA-E8-A	65.5	m	$1,440	$94,320
	Phase 2	SA-E11 to SA-E12A	93.69	m	$1,440	$134,914
	Brook Road N.	SA-E6 to SA-E7	55.98	m	$1,800	$100,764
B.5		**675mm dia. Sanitary Sewer (excl. restoration) at 6.0 to 7.5m Depth**				
	Brook Road N.	SA-E19-B to SA-E20-A	108.2	m	$2,000	$216,400
B.6		**750mm dia. Sanitary Sewer (excl. restoration) at 4.5 to 6.0m Depth**				
B.7		**750mm dia. Sanitary Sewer (excl. restoration) at 6.0 to 7.5m Depth**				
	JMCD Lands	SA-E30 to SA-E31	70	m	$1,680	$117,600
	JMCD Lands	SA-E29 to SA-E30	125	m	$1,680	$210,000
	JMCD Lands	SA-E28 to SA-E29	125	m	$1,680	$210,000
	JMCD Lands	SA-E27 to SA-E28	125	m	$1,680	$210,000
B.8		**750mm dia. Sanitary Sewer (excl. restoration) at 7.5m Depth Plus**				
	JMCD Lands	SA-E26 to SA-E27	125	m	$1,760	$220,000
	JMCD Lands	SA-E25 to SA-E26	125.9	m	$1,760	$221,584
	JMCD Lands	SA-E24 to SA-E25	105.2	m	$1,760	$185,152
	JMCD Lands	SA-E23 to SA-E24	148.4	m	$1,760	$261,184
	Brook Road N.	SA-E22 to SA-E23	15.6	m	$2,200	$34,320
	Brook Road N.	SA-E21 to SA-E22 (Possible Trenchless)	92.5	m	$2,200	$203,500
	Brook Road N.	SA-E20-B to SA-E21	52.8	m	$2,200	$116,160
B.9		**825mm dia. Sanitary Sewer (excl. restoration) at 3.0 to 4.5m Depth**				
	Willmott Street	SA-E41 to SA-E42	14.50	m	$1,400	$20,300
	Willmott Street	SA-E40 to SA-E41	123.20	m	$1,400	$172,480
B.10		**825mm dia. Sanitary Sewer (excl. restoration) at 4.5 to 6.0m Depth**				
	Willmott Street	SA-E39 to SA-E40	120.00	m	$1,800	$216,000
	Willmott Street	SA-E38 to SA-E39	68.10	m	$1,800	$122,580
	Willmott Street	SA-E37 to SA-E38	119.90	m	$1,800	$215,820
	Willmott Street	SA-E36 to SA-E37	107.00	m	$1,800	$192,600
	Willmott Street	SA-E35 to SA-E35	124.90	m	$1,800	$224,820
	Willmott Street (Unopened)	SA-E34 to SA-E35	87.60	m	$1,440	$126,144
	Willmott Street (Unopened)	SA-E33-B to SA-E34	89.60	m	$1,440	$129,024
	Willmott Street (Unopened)	SA-E33-A to SA-E33-B	78.10	m	$1,440	$112,464
B.11		**825mm dia. Sanitary Sewer (excl. restoration) at 6.0 to 7.5m Depth**				
	Willmott Street	SA-0651 to SA-E42	23.90	m	$2,200	$52,580
	Willmott Street (Unopened)	SA-E31 to SA-E32	47.50	m	$2,200	$104,500
Sub Total Trunk Sanitary Sewer – Open Cut						**$5,963,827**
Trunk Sanitary Sewer – Trenchless						
C.1		**900mm dia. Sanitary Sewer (Conc. Jacking Pipe)**				
	Rail Crossing	SA-E33-A to SA-E32 (Railway Crossing)	100.00	m	$8,000	$800,000
	Brook Road N.	SA-E20-A to SA-E20-B (Brook Creek East Trib. Crossing)	90.00	m	$7,000	$630,000
C.2		**Shafts for Trenchless Installation**				
	Rail Crossing	Railway Sending Shaft (South)	1.00	each	$350,000	$350,000

	Rail Crossing	Railway Recieivng Shaft (North)	1.00	each	$275,000	$275,000
	Brook Road N.	Brook Creek East Trib. Sending Shaft (South)	1.00	each	$250,000	$250,000
	Brook Road N.	Brook Creek East Trib. Sending Shaft (North)	1.00	each	$225,000	$225,000
C.3		**Settlement Monitoring Program**				
	Rail Crossing	Railway Crossing	1.00	each	$60,000	$60,000
	Brook Road N.	Brook Creek East Trib. Culvert Crossing	1.00	each	$25,000	$25,000
C.4		**Railway Inspection/Flagging Costs**				
	Rail Crossing	Canadian Pacific	30.00	day	$1,500	$45,000
	Rail Crossing	Canadian National	35.00	day	$1,500	$52,500
C.5		**Dewatering**				
	Rail Crossing	Railway Crossing	1.00	each	$50,000	$50,000
	Brook Road N.	Brook Creek East Trib. Crossing	1.00	each	$75,000	$75,000
Sub Total Trunk Sanitary Sewer – Trenchless						**$2,837,500**
Trunk Sanitary Sewer – Maintenance Holes						
D.1		**1200mm dia. Sanitary Maintenance Hole at 3.0 to 4.5 m Depth**				
	Phase 2	SA-E12A	1.00	each	$9,600	$9,600
	Phase 2	SA-E9	1.00	each	$9,600	$9,600
	Phase 2	SA-E8-B	1.00	each	$9,600	$9,600
	Elgin Street	SA-E4	1.00	each	$12,000	$12,000
	Elgin Street	SA-E3	1.00	each	$12,000	$12,000
	Elgin Street	SA-E2	1.00	each	$12,000	$12,000
D.2		**1200mm dia. Sanitary Maintenance Hole at 4.5 to 6.0 m Depth, including safety landing**				
	Brook Road N.	SA-E19-A	1.00	each	$17,000	$17,000
	Phase 2	SA-E13	1.00	each	$13,600	$13,600
	Phase 2	SA-E10	1.00	each	$13,600	$13,600
D.3		**1200mm dia Sanitary Maintenance Hole at 6.0 to 7.5 m Depth, including safety landing**				
	Markham Metals	SA-E17	1.00	each	$22,000	$22,000
	LUSI Substation	SA-E16	1.00	each	$22,000	$22,000
	Phase 2	SA-E15	1.00	each	$17,600	$17,600
	Phase 2	SA-E14	1.00	each	$17,600	$17,600
	Phase 2	SA-E8-A	1.00	each	$17,600	$17,600
D.4		**1200mm dia Sanitary Maintenance Hole at 7.5m Plus, including safety landing**				
	Brook Road N.	SA-E7	1.00	each	$30,000	$30,000
	Brook Road N.	SA-E6	1.00	each	$30,000	$30,000
D.5		**1500mm dia. Sanitary Maintenance Hole at 3.0 to 4.5 m Depth**				
	Willmott Street	SA-E41	1.00	each	$15,000	$15,000
	Phase 2	SA-E12B	1.00	each	$12,000	$12,000
D.6		**1500mm dia. Sanitary Maintenance Hole at 4.5 to 6.0 m Depth, including safety landing**				
	Willmott Street	SA-E40	1.00	each	$20,000	$20,000
	Willmott Street	SA-E39	1.00	each	$20,000	$20,000
	Willmott Street	SA-E38	1.00	each	$20,000	$20,000
	Willmott Street	SA-E37	1.00	each	$20,000	$20,000
	Willmott Street	SA-E36	1.00	each	$20,000	$20,000

	Willmott Street	SA-E35	1.00	each	$20,000	$20,000
	Willmott Street (Unopened)	SA-E34	1.00	each	$16,000	$16,000
	Willmott Street (Unopened)	SA-E33-B	1.00	each	$16,000	$16,000
	Brook Road N.	SA-E5	1.00	each	$20,000	$20,000
D.7		**1500mm dia Sanitary Maintenance Hole at 6.0 to 7.5 m Depth, including safety landing**				
	Willmott Street	SA-E42	1.00	each	$25,000	$25,000
	JMCD Lands	SA-E30	1.00	each	$20,000	$25,000
	JMCD Lands	SA-E29	1.00	each	$20,000	$25,000
	JMCD Lands	SA-E28	1.00	each	$20,000	$25,000
	JMCD Lands	SA-E27	1.00	each	$20,000	$25,000
	Brook Road N.	SA-E19-B	1.00	each	$25,000	$25,000
	Brook Road N.	SA-E18	1.00	each	$25,000	$25,000
	Phase 2	SA-E11	1.00	each	$20,000	$25,000
D.8		**1500mm dia Sanitary Maintenance Hole at 7.5m Plus, including safety landing**				
	JMCD Lands	SA-E26	1.00	each	$28,000	$28,000
	JMCD Lands	SA-E25	1.00	each	$28,000	$28,000
	JMCD Lands	SA-E24	1.00	each	$28,000	$28,000
	JMCD Lands	SA-E23A	1.00	each	$28,000	$28,000
	JMCD Lands	SA-E23B	1.00	each	$28,000	$28,000
	Brook Road N.	SA-E22	1.00	each	$35,000	$35,000
	Brook Road N.	SA-E21	1.00	each	$35,000	$35,000
D.9		**1800mm dia Sanitary Maintenance Hole at 6.0 to 7.5 m Depth, including safety landing**				
	Willmott Street (Unopened)	SA-E31	1.00	each	$22,400	$22,400
	Willmott Street (Unopened)	SA-E33-A	1.00	each	$22,400	$22,400
	Willmott Street (Unopened)	SA-E32	1.00	each	$22,400	$22,400
	Brook Road N.	SA-E20-A	1.00	each	$28,000	$28,000
D.10		**1800mm dia Sanitary Maintenance Hole at 7.5m Plus, including safety landing**				
	Brook Road N.	SA-E20-B	1.00	each	$35,000	$35,000
D.11		**3000mm dia Sanitary Maintenance Hole at 6.0 to 7.5 m Depth, including safety landing**				
	Willmott Street	SA-E43	1.00	each	$60,000	$60,000
Sub Total Trunk Sanitary Sewer – Maintenance Holes						**$1,065,000**
Restoration						
E.1		**County Road 3.5m Lane + 3m Partially Paved Shoulder**				
	Brook Road N.	Brook Road N. East Shoulder Fut. Kerr Street to Brook Creek East Trib.	150.00	m	$800	$120,000
	Brook Road N.	Brook Road N. East Shoulder Brook Creek East Trib. to Markham Metals	240.00	m	$800	$192,000
	Brook Road N.	Brook Road N. West Shoulder Phase 2 to Elgin Street	160.00	m	$800	$128,000
	Elgin Street	Elgin Street North Lane	440.00	m	$800	$352,000
E.2		**Existing Asphalt Road (Perpednicular Crossing)**				
	Willmott Street	Thompson Street	20.00	m	$1,200	$24,000
	Willmott Street	King Street East	20.00	m	$1,200	$24,000
E.3		**Commercial Entrance**				

	Markham Metals	Markham Metals North Entrance	60.00	m	$600	$36,000
E.4		**Boulevard with Entrances**				
	Willmott Street	Willmott Street East Boulevard	661.50	m	$150	$99,225
E.5		**Agricultural Field and Green Space**				
	Willmott Street (Unopened)	King Street East to CPR	255.00	m	$50	$12,750
	Willmott Street (Unopened)	CNR Northerly to JMCD Lands	80.00	m	$50	$4,000
	JMCD Lands	JMCD Lands from Willmott Street to Brook Road North	825.00	m	$50	$41,250
	Markham Metals	Markham Metals Entrance to LUSI Substation	36.00	m	$50	$1,800
Sub Total						**$1,035,025**
Miscellaneous						
F.1		**Utilities**				
	Various	Non-Destructive Daylighting of Existing Utilities	10.00	each	$1,500	$15,000
	Various	Temporarily Support Existing Utilities at Crossings	10.00	each	$5,000	$50,000
F.2		**Existing Sewers**				
	Willmott Street	Remove Existing 300mm dia. Sewer	670.00	m	$50	$33,500
	Willmott Street	Temporary Flow By-pass / Conveyance	1.00	L.S.	$20,000	$20,000
	Willmott Street	Remove Existing Manhole	6.00	each	$1,500	$9,000
F.3		**Dewatering**				
	Elgin Street	Elgin Street Wetland Area	1.00	L.S.	$250,000	$250,000
F.4		**Sediment and Erosion Control Measures**				
	Various	Cover Existing Catchbasins	20.00	each	$250	$5,000
	Various	Staw Bale Check Dams	20.00	each	$350	$7,000
	Various	Rock Flow Check Dams	5.00	each	$1,200	$6,000
	Willmott Street (Unopened)	Light Duty Silt Fence - Willmott Street Unopened ROW (Both Sides)	710.00	m	$15	$10,650
	JMCD Lands	Light Duty Silt Fence - JMCD Lands (One Side)	950.00	m	$15	$14,250
	Brook Road N.	Light Duty Silt Fence - Brook Road North - South Portion (One Side)	550.00	m	$15	$8,250
	Brook Road N.	Light Duty Silt Fence - Brook Road North - North Portion (One Side)	180.00	m	$15	$2,700
	Elgin Street	Light Duty Silt Fence - Elgin Street (One Side)	350.00	m	$15	$5,250
	LUSI Sub-Station to Alexandria Dr	Light Duty Silt Fence - LUSI Sub-Station to Alexandria Dr. (One Side)	610.00	m	$15	$9,150
F.5		**Elgin Street Culvert**				
	Elgin Street	New 900mm dia. CSP Culvert (Incl. Excavation, Bedding and Backfill)	25.00	m	$1,400	$35,000
	Elgin Street	Remove Existing 900 mm dia. CSP Culvert	20.00	m	$250	$5,000
	Elgin Street	Road Restoration for Existing Culvert and New Culvert	45.00	m	$800	$36,000
	Elgin Street	Dewatering of Excavations	1.00	L.S.	$10,000	$10,000
F.6		**Sewer Access Routes**				
	Phase 2	Overbuild Trail To Access MH SA-E13 & MH SA-E12	260.00	m	$200	$52,000
	Phase 2	Gravel Access Road to MH SA-E8-B, SA-E8-A	145.00	m	$230	$33,350
F.7	Varies	Excess Soil Disposal	5731.29	m^3	$30	$171,939
Sub Total Miscellaneous						**$789,039**
Estimate Summary						
		Administrative and Contractual Items				$818,897
		Trunk Sanitary Sewer – Open Cut				$5,963,827

	Trunk Sanitary Sewer – Trenchless	$2,837,500
	Trunk Sanitary Sewer – Maintenance Holes	$1,065,000
	Restoration	$1,035,025
	Miscellaneous	$789,039
	Total (Excl. HST)	**$12,509,288**

Cobourg Trails External Servicing
Preliminary Design Cost Estimate - External Trunk Watermain

Item	Location	Description	Estimated Quantity	Unit	Unit Price	Total
Administrative and Contractual Items						
A.1		**General**				
	Various	Mobilization & Demobilization	1.00	L.S	$108,901	$108,901
A.2		**Contract Documentation Items**				
	Various	Performance Bond	1.00	L.S.	$54,450	$54,450
	Various	Labour & Materials Payment Bond	1.00	L.S.	$25,000	$25,000
	Various	Insurance	1.00	L.S.	$40,838	$40,838
	Various	Holdback Financing	1.00	L.S.	$25,000	$25,000
	Various	Provide traffic control for maintenance of traffic as per OTM Book 7 Temporary Condition	1.00	L.S.	$108,901	$108,901
Sub Total Administrative and Contractual Items						**$363,090**
Trunk Watermain – Open Cut						
B.1		**400mm Concrete Pressure Pipe**				
	Alexandria Dr	From Alexandria Dr. to West of Brook Creek West Tributary	114.50	m	$960	$109,920
	Community Center	From East of West of Brook Creek West Tributary to West of LUSI-Sub-Station	450.00	m	$960	$432,000
	Brook Road N	LUSI-Sub-station to Elgin Street	690.00	m	$1,200	$828,000
	Elgin Street	Phase 1 to Phase 7	870.00	m	$1,200	$1,044,000
B.2	Densmore/Danforth	**300mm Gate Valve and Valve Box**	5.00	each	$3,500	$17,500
B.3		**400mm Gate Valve and Valve Box**				
	Alexandria Dr / LUSI Sub-Station	Alexandria Dr. to LUSI Sub-Station	2.00	each	$4,800	$9,600
	Brook Road N	LUSI Sub-Station to Elgin Street	2.00	each	$4,800	$9,600
	Elgin Street	Phase 1 to Phase 7	2.00	each	$6,000	$12,000
B.4	Brook Road N.	**Supply and Install 100mm Air Valve and Valve Chamber**	1.00	each	$15,000	$15,000
B.5	Brook Road N. / Elgin St.	**Supply and Install Drain Chamber**	2.00	each	$10,000	$20,000
B.6		**Supply and Install New Fire Hydrant**				
	Densmore/Danforth	Parkhill Drive to Phase 4	9.00	each	$7,500	$67,500
	Elgin Street	Phase 1 to Phase 7	12.00	each	$7,500	$90,000
	Alexandira / LUSI Sub-Station	Alexandira Dr. to Brook Road N	5.00	each	$6,000	$30,000
	Brook Road N	LUSI Sub-Station to Elgin Street	5.00	each	$7,500	$37,500
B.7	Varies	**Connect new watermain to exist. watermain (all sizes), incl. Field Closure**	3.00	each	$7,000	$21,000
Sub Total Trunk Watermain – Open Cut						**$2,743,620**
Trunk Watermain – Trenchless						
C.1	Densmore/Danforth	**Supply and Install 300mm PVC pressure pipe (Horizontal Directional Drill Method)**	1200.00	m	$1,300	$1,560,000
C.2	Brook Creek West Tributary	**Supply and Install 400mm Concrete Pressure pipe**	40.00	m	$1,200	$48,000
	Brook Creek West Tributary	**Excavation and Construction of Sending and Receiving Shaft (Exclude Dewatering) - 2.0m deep**	2.00	each	$50,000	$100,000
	Brook Creek West Tributary	**Supply and Install 750mm ID Casing Pipe (Jack and Bore)**	40.00	m	$2,500	$100,000
	Brook Creek West Tributary	**Dewatering**	1.00	L.S	$30,000	$30,000
	Brook Creek West Tributary	**Restoration of Temporary Working Areas. Includes all Labour, Materials and Equipment required to fully restore the pit**	1.00	L.S	$20,000	$20,000

Sub Total Trunk Watermain – Trenchless						**$1,858,000**
Restoration						
D.1		**County Road 3.5m Lane + 3m Partially Paved Shoulder**				
	Brook Road N.	Brook Road N. East Shoulder Markham Metals to Elgin Street (WM Restoration)	668.00	m	$800	$534,400
D.2		**Existing Asphalt Road (Perpednicular Crossing)**				
	Alexandria Dr.	Alexandria Drive (WM Restoration)	75.00	m	$1,200	$90,000
	LUSI Station	From Brook Rd to LUSI Substation (WM Restoration)	22.00	m	$1,200	$26,400
D.3		**Commerical Entrance**				
	LUSI Station	From Brook Road N. to LUSI Sub-Station (WM Restoration)	50.00	m	$600	$30,000
	Alexandria Dr.	From West of Brook Creek West Tributary to Alexandria Dr.	40.00	m	$600	$24,000
D.4		**Agricultural Field and Green Space**				
	LUSI Substation to Alexandria Dr.	LUSI Substation to the end of Community Center (end of Soccer Pitch) (WM Restoration)	375.00	m	$50	$18,750
Sub Total Restoration						**$723,550**
Miscellaneous						
E.1		**Utilities**				
	Various	Non-Destructive Daylighting of Existing Utilities	5.00	each	$1,500	$7,500
	Various	Temporarily Support Existing Utilities at Crossings	5.00	each	$5,000	$25,000
E.2		**Sediment and Erosion Control Measures**				
	Various	Cover Existing Catchbasins	10.00	each	$250	$2,500
	Various	Staw Bale Check Dams	10.00	each	$350	$3,500
	Various	Rock Flow Check Dams	2.00	each	$1,200	$2,400
	Brook Road N.	Light Duty Silt Fence - Brook Road North - North Portion (One Side)	668.00	m	$15	$10,020
	LUSI Sub-Station to Alexandria Dr.	Light Duty Silt Fence - LUSI Sub-Station to Alexandria Dr. (One Side)	610.00	m	$15	$9,150
E.3	Varies	Excess Soil Disposal	1993.50	m^3	$30	$59,805
Sub Total Miscellaneous						**$119,875**
Estimate Summary						
		Administrative and Contractual Items				$363,090
		Trunk Watermain – Open Cut				$2,743,620
		Trunk Watermain – Trenchless				$1,858,000
		Restoration				$723,550
		Miscellaneous				$119,875
		Total (Excl. HST)				**$5,808,135**

M

Appendix M: Cobourg Trails Development - EIS Addendum, GHD

347 Pido Road Unit 29
Peterborough Ontario K9J 6X7 Canada
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Our ref: 11221659

21 January 2021

Paul Watson
Tribute (Cobourg) Limited
1851 Ironstone Manor, Unit 1
Pickering, Ontario
L1W 3W9

Cobourg Trails Development, Cobourg Ontario- Environmental Impact Study Addendum

Dear Mr. Watson,

GHD Limited (GHD) has prepared the following Environmental Impact Study Addendum Letter for Phase 2 and 3 of the Cobourg Trails Development, draft plan of subdivision. The original Environmental Impact Assessment report, dated October 5, 2017, was completed and submitted to review agencies for the past property owner and site plan. Since then, Tribute Communities has purchased the subject property, revised the site plans and is completing a resubmission for Phases 2 and 3.The following addendum letter discusses the new site plan, project interactions, impacts, mitigation measures, permitting and compliance with the 2017 EIS recommendations. In addition, a new figure has been provided to illustrate the new site plans and environmental setbacks.

Sincerely,

Chris Ellingwood
Sr. Terrestrial and Wetland Biologist

Amanda Smith
Sr. Fisheries Biologist

1. Introduction

1.1 Background

GHD Limited (formerly Niblett Environmental Associates Inc.) was retained by Tribute (Cobourg) Limited to prepare and addendum to the original Environmental Impact Assessment report, dated October 5, 2017 (NEA, 2017). The addendum will provide an update to the 2017 EIS for Phase 2 and 3 of the Cobourg Trails Development, draft plan of subdivision resubmission. The majority of the property is located within the Cobourg East Community Secondary Plan area in the Town of Cobourg in the County of Northumberland.

In July of 2018, the Town of Cobourg's Municipal Council approved an Official Plan Amendment and Zoning By-law Amendment to develop a 1,604-1,924 unit community. The Draft Plan of Subdivision for Phase 1 Lands was approved as a block plan, with each block containing permissions for a unit range to allow for flexibility during the detailed design of each phase. Draft Plan of Subdivision approval was received in April 2018 for Phase 1 of the development, with servicing allocation for up to 216 units. This Draft Plan submission for Phase 2 and 3 represents the next two phases of the Cobourg Trails development. Phase 2 and Phase 3 represent vital phases to the sequencing of development not only for the entirety of Cobourg Trail, but also for the implementation of the Cobourg East Secondary Plan as well.

1.2 Location and Study Area

The subject properties encompass a total of approximately 107.3 ha (267 acres). The property is bounded on the south by Elgin Street East (County Road 20), Greer Road on the east and Danforth Road to the north. The property consists of Part Lots 11, 12 and 13, Concession 1 and Part lot 13, Concession A. The Bell property (17 ha/42 acres) is located south of Elgin Street East and west of Brook Road. Highway 401 lies just north (within 500 m) of the northern limit of study site.

1.3 Scope and Limitations

This report has been prepared by GHD for Tribute Communities and may only be used and relied on by Tribute Communities for the purpose agreed between GHD and Tribute Communities as set out in section 1 of this report.

GHD otherwise disclaims responsibility to any person other than Tribute Communities arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Proposed Development

2.1 Planning Summary

The proposed development for Phase 2 forms the southern extent of Cobourg Trails and comprises 17.126 hectares (42.32 acres), and Phase 3 forming the northern extent and comprises 20.71 hectares (51.18 acres). In total, the two phases will comprise between 241 – 274 units in single detached, semi detached, and townhouse forms. Phase 3 will also comprise a new 0.96 hectare commercial block, which will provide small scale local non-residential uses in form of retail and service uses to serve the community. Phase 3 will include 5.73 hectares of new parkland, which includes about 4.0 hectares of community space in Phase 2, and a 1.33 hectare neighbourhood park and 0.4 hectare village square in Phase 3. In addition, stormwater management facilities and new trails to the natural heritage system will continue to follow the planned open space network generally as envisioned by Council in April 2018.

The proposed development will feature a robust new road network, which will include a hierarchy of local and collector roads to service the proposed development. Overall, the proposed development will continue the planned vision for Cobourg Trail and generally meet the spirit and intent of the Cobourg East Secondary Plan and complete community principles.

2.2 Phase 2

Phase 2 is located south of Elgin St and west of Brook Road (Figure 1). The Phase 2 development plan will include single detached townhouses, a large community park (4.18 ha), one stormwater management pond, and an environmental protection area.

The stormwater management pond is located in the northwest of the phase (Block 14) measuring 1.14 ha. It will outlet to a tributary of Brook Creek. A total of approximately 6.34 ha of property in Phase 2 is designated as Environmental Protection (EP) (Blocks 15) and will be left in its natural state, preserving the woodlands, creeks and associated natural features and functions.

Servicing from Brook Road will include a 600 mm sanitary sewer to service the Phase 2 development. As this is gravity based, an alignment as far north as possible is proposed. To confirm this was feasible, GHD biologist met on site with GRCA staff, Town planner and Tribute Homes in October 2021 to view the proposed alignment.

The latest site grading plans (General Services Plan, D.G. Biddle & Associates Limited, Drawing D-1, Dec. 2021) shows that alignment of the sanitary sewer.

2.3 Phase 3

Phase 3 is located north of Elgin St, south of Danforth Road, and east of Midtown Creek. The Phase 3 development plan will include three types of residential homes; singles, semi-detached and part lots. It will also include a commercial block to the north, stormwater management ponds, village square in the northwest, and a neighbourhood park in the south.

Two stormwater management ponds will be located within this phase. One stormwater management pond measuring 1.18 ha will be located in the northwest corner and will outlet to Midtown Creek. The second stormwater pond measuring 2.58 ha will be located in the southeast and outlet into the adjacent woodlot and ultimately, to the tributary of Brook Creek.

A total of approximately 1.95 ha of property in Phase 3 is designated as Environmental Protection (EP) (Blocks 129) and will be left in its natural state preserving the woodlands, creeks and associated natural features and functions. Grading of the site will involve decreasing the elevation of the high drumlin tops and lowering the grades on roadways and existing side slopes.

3. Impact Assessment

A review of the NEA, 2017 EIS report impact and mitigation sections was completed determine if all recommends, setbacks/constraints, and mitigation measures were carried forward into the updated site plans for Phase 2 and 3 of the Cobourg Trails Development.

The original recommended constraints from the NEA, 2017 EIS report– Figure 3 have been brought forward and overlayed with the updated Phase 2 and 3 site plans (Figure 1). The updated Figure 1 shows that all constraints have been maintained in Phase 2 and 3 and no encroachment on the protected habitats has occurred.

3.1 Fish and Fish Habitat

The project fish and fish habitat impacts were discussed in the original EIS in *Section 6.4 Tributary to Brook Creek* and *6.5 Midtown Creek*. The following text replaces all of the original content related to Phase 2 and 3:

Section 6.4 Tributary to Brook Creek

The unnamed tributary to Brook Creek enters the site from the east under Greer Road through a CSP culvert, flowing west into the centre woodlot, existing in the southwest corner moving across the property in a southwestern direction to the proposed Brook Road allowance at Elgin Street East crossing the road through a CSP culvert. The tributary is intermittent and no fish were observed over two seasons upstream of Elgin Street West. In addition, the tributary channel is not considered to be fish bearing due to blockages in the flow pattern and barriers created from the proposed Brook Road allowance berm, which has inadvertently realigned the tributary just north of Elgin Street East. However, the tributary supports direct fish habitat observed downstream/south of Elgin Street East, where fish were sampled in the spring of 2006 and 2015.

Within both Phase 2 and 3, the entire Brook Creek tributary (30 m from the watercourse high-water mark) will be designated as Environmental Protection (EP) with the exception of receiving stormwater flows from one stormwater pond in Phase 2 and one stormwater pond in Phase 3. No other in-water or near-water works are proposed.

It is recommended that the stormwater outfalls are designed to flow into a wet meadow or wetland habitat prior to reaching the creek and a spreader or similar feature should be used to dissipate flows. Although the tributary is an intermittent and has a warm thermal regime, the receiving main stem of Brook Creek is a cold water system and measures should be made to minimize thermal impacts to Brook Creek from the proposed stormwater ponds. It is recommended that the pond outlet design incorporate a bottom draw or underground infiltration gallery to cool or minimize heating of discharged stormwaters. The outfall for the pond should not discharge directly into wet meadows and thickets known to support breeding frogs that are sensitive to pollution and contaminants.

The purpose of the Fisheries Act, Fish and Fish Habitat Program is to conserve and protect fisheries and aquatic ecosystems in Canada. Specifically, the fish and fish habitat protection provisions are intended to prevent the death of fish or the harmful alternation, disruption or destruction of fish habitat (HADD) from projects taking place in and around fish habitat. In addition, the Act administers relevant provisions of the federal Species at Risk Act.

If a project has the potential to cause the death of fish, harmful alteration, disruption or destruction of fish habitat than an authorization is required from the Minister of Fisheries and Oceans as per Paragraph 34.4(2)(b) or 35(2)(b) of the Fisheries Act Regulations.

The stormwater outlets may have the potential to cause a HADD if the detailed design cannot meet the *DFO Measures to Protect Fish and Fish Habitat*. The project detailed design is required to fully assess the potential impacts to fish and fish habitat with respect to the Fisheries Act.

However, to comply with the Fisheries Act, all project work near and below the high-water mark must follow the protective provisions of the Fisheries Act by implementing the DFO Measures to Protect Fish and Fish

Habitat. If all project undertakings can: prevent the death of fish, maintain riparian vegetation, carry out work on land only, maintain fish passage, ensuring proper sediment and erosion control, and prevent entry of deleterious substances in water, than a Fisheries Act review and Authorization may not be required.

If proposed works cannot integrate the DFO protective measures and have the potential to cause a HADD, a Request for Review document must be submitted to DFO for formal project assessment to determine the next steps in project compliance.

An example of work that may trigger a Request for Review includes: work below the high water mark, including outflow structures, temporary or permanent increase in existing footprint below the high water mark, or temporary or permanent fill placed below the high water mark.

Section 6.5 Midtown Creek

The headwater tributaries of Midtown Creek are located northwest of the proposed development and one reach bisects the north-west corner of the project, flowing south under Danforth Road in a south-westerly direction through dense grass meadows and narrow channel. The Midtown Creek headwaters provide direct and indirect fish habitat, amphibian and wildlife habitat.

The headwater tributaries of Midtown Creek have been zoned Environmental Protection (EP) and no development will occur within the EP boundary with the exception of stormwater flow from one stormwater pond in the northwest corner of the Phase 3 (Figure 1).

The same stormwater and Fisheries Act recommendation apply to Phase 2 and 3. It is recommended that the stormwater outfalls are designed to flow into a wet meadow or wetland habitat prior to reaching the creek and a spreader or similar feature should be used to dissipate flows. Midtown Creek is direct fish habitat and it is recommended that the pond outlet design incorporates a bottom draw or underground infiltration gallery to cool or minimize heating of discharged stormwaters. The outfall for the pond should not discharge directly into wet meadows and thickets known to support breeding frogs that are sensitive to pollution and contaminants.

The Fisheries Act also applies to Midtown Creek and all project work near and below the high-water mark must follow the protective provisions of the Fisheries Act by implementing the DFO Measures to Protect Fish and Fish Habitat. If all project undertakings can: prevent the death of fish, maintain riparian vegetation, carry out work on land only, maintain fish passage, ensuring proper sediment and erosion control, and prevent entry of deleterious substances in water, than a Fisheries Act review and Authorization may not be required.

If proposed works cannot integrate the DFO protective measures and have the potential to cause a HADD, a Request for Review document must be submitted to DFO for formal project assessment to determine the next steps in project compliance.

An example of work that may trigger a Request for Review includes: work below the high water mark, including outflow structures, temporary or permanent increase in existing footprint below the high water mark, or temporary or permanent fill placed below the high water mark.

4. Phase 2 Servicing from Brook Road

There has been discussions with Tribute (Cobourg) Limited and Ganaraska Region Conservation Authority (GRCA) regarding the environmental features and constraints along the north side of Phase 2 (on the west side of Brook Road South of Elgin Street) for a road improvement that regrades the slopes and for a trunk sewer within the treed areas of the site.

The sloping and road regrading along the west side of Brook Road will impact the “peninsula” of the ELC community 14A FOC4-1 that extends towards Brook Road between 15 CUM1-1 and 17 CUT to allow for the sloping required for Street B (Figure 2). This minor intrusion into a regenerating cultural thicket will not have a significant impact on the woodland and no impacts on the wetland.

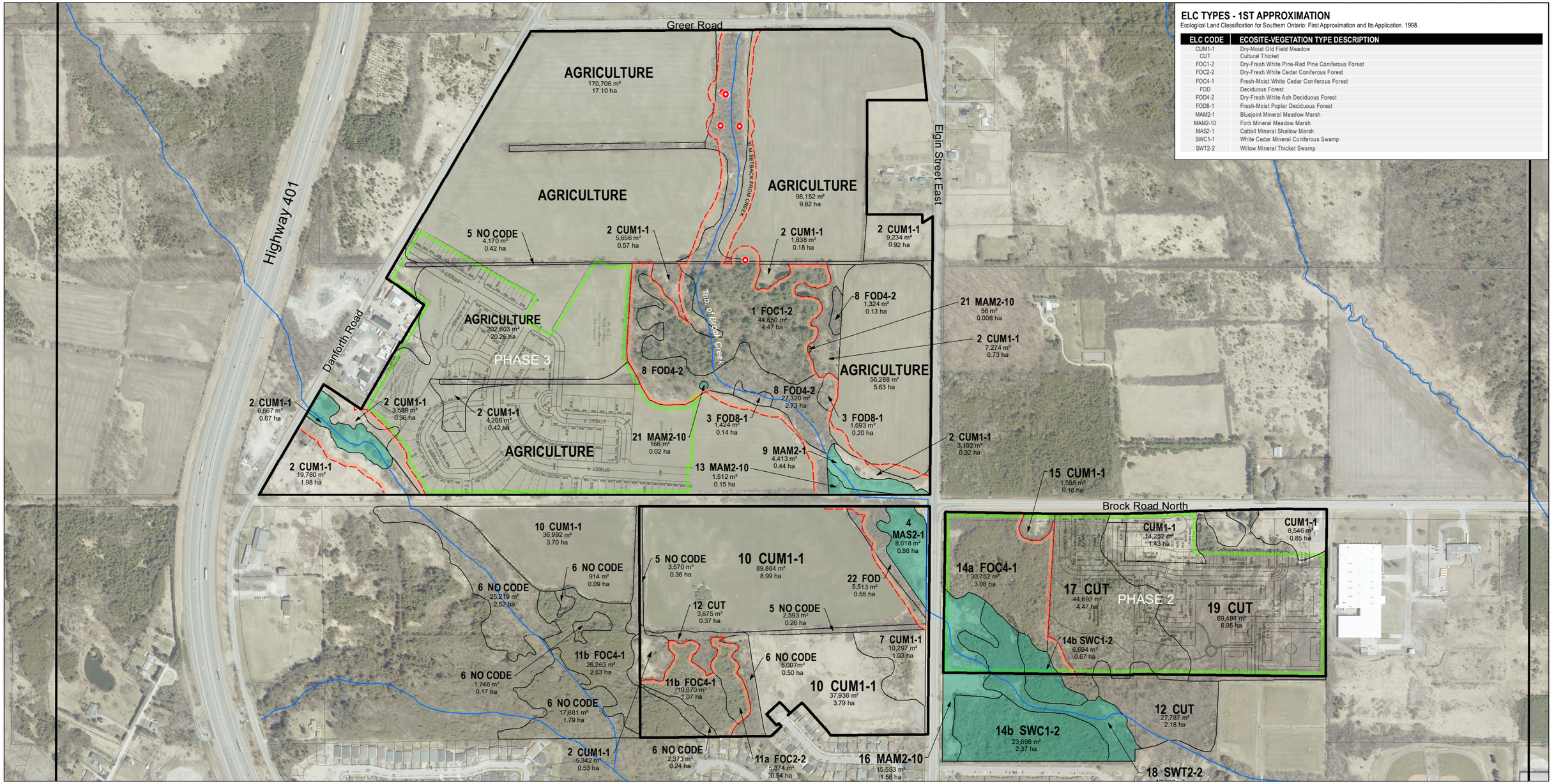
In addition, CIMA+ is working with Tribute (Cobourg) Limited on an external trunk sewer that will pass through Phase 2. To mitigate against excessive sewer depths related to the embankment on Brook Road the plan is to align the sewer though 15 CUM1-1 and cross the “peninsula” piece of 14A FOC4-1 where we would then run along the toe of the proposed slope for Street B at the north end of Phase 2 (Figure 1). This location was walked with the GRCA biologist and Town of Cobourg planner.

The angled trunk sewer alignment will require removal of a cultural thicket with European buckthorn and hawthorns, as well as path through an eastern white cedar community. It is proposed, that the construction envelope would be limited to the extent possible to limit tree removal. The impact on those communities would be limited to approximately 532 m^2 based on a 6 m allowance on both sides of the alignment for construction activities. However as European buckthorn is the dominant species in that alignment and adjacent to it. An invasive species management plan, as part of the landscaping plan, would include removal of a small patch of buckthorn and replacement with native tree species. The new tree planting would occur outside of the alignment, as trees are not conducive to being planted in service corridors. Tree species to be planted will include native species typical of the Cobourg area, including but not limited to: trembling aspen *(Populus tremuloides),* bur oak *(Quercus macrocarpa),* eastern white cedar *(Thuga occidentalis)* and balsam poplar *(Populus balsamifera)*.

Provided the path through the trees is as narrow as possible, impacts will be limited. Delineating the construction limit and avoiding damaging any adjacent trees not necessary for removal is recommended as part of the site preparation and surveying work. GHD has recommended additional plantings of native trees in the small opening or even removing a few invasive buckthorn shrubs to the north and replanting with native tree species. A compensation ratio of 1:1 is recommended for tree removal within a buffer.

5. Conclusions

The development of Phase 2 and 3 will not significantly impact the watercourse, woodlands, wetlands, and their features or functions if the EIS recommendations are implemented. This has been achieved through the careful design, protective constraints and preservation of the central woodland, Midtown Creek, Brook Creek, and wetland habitat. The key natural heritage features and their functions will be maintained by the proposed phase plans.



ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application. 1998.

ELC CODE	ECOSITE-VEGETATION TYPE DESCRIPTION
CUM1-1	Dry-Moist Old Field Meadow
CUT	Cultural Thicket
FOC1-2	Dry-Fresh White Pine-Red Pine Coniferous Forest
FOC2-2	Dry-Fresh White Cedar Coniferous Forest
FOC4-1	Fresh-Moist White Cedar Coniferous Forest
FOD	Deciduous Forest
FOD4-2	Dry-Fresh White Ash Deciduous Forest
FOD8-1	Fresh-Moist Poplar Deciduous Forest
MAM2-1	Bluejoint Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
SWC1-1	White Cedar Mineral Coniferous Swamp
SWT2-2	Willow Mineral Thicket Swamp

LEGEND

- Retainable Butternuts
- Watercourse
- Constraints
- Phases
- Property Limit
- Assessment Parcel
- Vegetation Community
- Wetland Community

CITATIONS

- Lee. H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Imagery: © County of Peterborough, 2018.

REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2012-12-18	Initial map creation.	C.E.

GHD

DATA DISCLAIMERS

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 66 meters

0 30 60 90 120
Meters

FOURTEEN ESTATES
Elgin Street & Brock Street North, Cobourg, ON
Pt Lots 11 & 12, Con 1, Geo. Township of Hamilton
Town of Cobourg
County of Northumberland
Ganaraska Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY UPDATE

VEGETATION COMMUNITIES & CONSTRAINTS

Project No. **11221659**
Revision No.
Date **12/8/2021**

N

FIGURE 1

Document Path: Q:\GIS\PROJECTS\11221000s\11221659\Layouts\202112_RPT001\11221659_202112_RPT001_GIS001 - Vegetation Communities and Constraints.mxd
Date Saved: 12/8/2021 4:59:29 PM

ELC TYPES - 1ST APPROXIMATION

Ecological Land Classification for Southern Ontario: First Approximation and Its Application. 1998.

ELC CODE	ECOSITE-VEGETATION TYPE DESCRIPTION
CUM1-1	Dry-Moist Old Field Meadow
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FOD8-1	Fresh-Moist Poplar Deciduous Forest
MAM2-1	Bluejoint Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
MAS2-1	Cattail Mineral Shallow Marsh
SWC1-1	White Cedar Mineral Coniferous Swamp
SWT2-2	Willow Mineral Thicket Swamp

Brock Road North

Elgin Street

INSET

PHASE 2

4 MAS2-1
8,618 m²
0.86 ha

15 CUM1-1
1,595 m²
0.16 ha

14a FOC4-1
30,752 m²
3.08 ha

CUM1-1
14,252 m²
1.43 ha

CUM1-1
8,546 m²
0.85 ha

17 CUT
44,692 m²
4.47 ha

19 CUT
69,494 m²
6.95 ha

18
SWT2-2
17,687 m²
1.77 ha

14b SWC1-2
6,694 m²
0.67 ha

12 CUT
27,787 m²
2.18 ha

Area to be Removed around Sanitary Sewer
532 m²

Trees to be Planted
532 m²

15 CUM1-1

17 CUT

14a FOC4-1

1 cm = 14 meters

MAIN LEGEND

- Phase 2 Limit
- Vegetation Community
- Wetland Community

INSET LEGEND

- Phase 2 Limit
- Trees to be Planted
- Vegetation Community
- 5 m Buffer from Sanitary Sewer

CITATIONS

- Lee. H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray, 1998. Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Imagery: © County of Peterborough, 2018.

REVISION & WORK HISTORY

REV	BY	DATE	DESCRIPTION	REQUEST
0	W.P.	2022-01-21	Initial map creation.	C.E.

DATA DISCLAIMERS

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Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 17N

SCALE
1 cm : 22 meters

0 10 20 30 40
Meters

COBOURG TRAILS DEVELOPMENT
Elgin Street & Brock Street North, Cobourg, ON
Pt Lots 11 & 12, Con 1, Geo. Township of Hamilton
Town of Cobourg
County of Northumberland
Ganaraska Region Conservation Authority

ENVIRONMENTAL IMPACT STUDY ADDENDUM

PHASE 2 SERVICING & TREE COMPENSATION PLAN

Project No. **11221659**
Revision No.
Date **01/21/2022**

N

FIGURE 2

Document Path: Q:\GIS\PROJECTS\11221000s\11221659\Layouts\202201_RPT001\11221659_202201_RPT001_GIS001 - Phase 2 Servicing and Tree Compensation Plan.mxd
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Engineering
for people