

York Durham Sewage System Modifications

**Prepared for:
The Regional Municipality of York**

Prepared by:

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YORK REGION No. 74270**



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Section 1.0 Introduction

This report documents the York Durham Sewage System (YDSS) Modifications proposed by The Regional Municipality of York Region (York Region). Wastewater resulting from provincially approved growth in the Town of Aurora and portions of the Town of Newmarket would be conveyed to the Duffin Creek Water Pollution Control Plant (WPCP) via the York Durham Sewage System (YDSS) for treatment and discharge to Lake Ontario. However, the existing YDSS system in Newmarket is approaching capacity and must be upgraded with a new twin forcemain to ensure system reliability during high flow conditions and to complete necessary pipe maintenance work.

As a result, the modifications provide a standby or twin forcemain for both the Newmarket and Bogart Creek Pumping Stations to allow for maintenance servicing of the forcemains when required and relief to the YDSS during periods of extreme high wet weather flow at the Newmarket, Bogart, and Aurora Pumping Stations and provide sufficient capacity for approved growth to 2031.

The Newmarket Sewage Pumping Station is York Region's largest pumping station. It only has one forcemain, and it services the majority of the existing (approximately 65,000 people) and future population in Newmarket. The proposed twinning of the forcemains will maintain the existing rated capacity of the Newmarket and Bogart Creek Pump Stations.

As sewage flows from the existing service area starts approaching the approved rated capacity of the pump stations, the current forcemains will reach capacity and expose York Region to the potential risk of sewage overflow during peak wet weather flow conditions in Newmarket. The proposed twinning will not only alleviate these system risks, but will also allow the isolation of one forcemain to complete the necessary maintenance and repair work on the other.

The Newmarket Pump Station forcemain has been in operation since the early 1980s and has continuously been in operation for over 30 years. York Region has been prudent and diligent in maintaining the system, however continuous operation for 24 hours a day, 365 days a year does not allow the operational flexibility to re-direct flows to a second forcemain to complete necessary maintenance on the other. Forcemain inspections completed in 2010 indicated needed maintenance of the pipeline with respect to debris build up and gas accumulation that could lead to pipe wall corrosion. These current conditions coupled with an aged pipeline is a risk York Region must address immediately.

Section 2.0 Impact Assessment of the York Durham Sewage System Modifications

2.1 Description of the York Durham Sewage System Modifications

The modifications to the existing YDSS include the following:

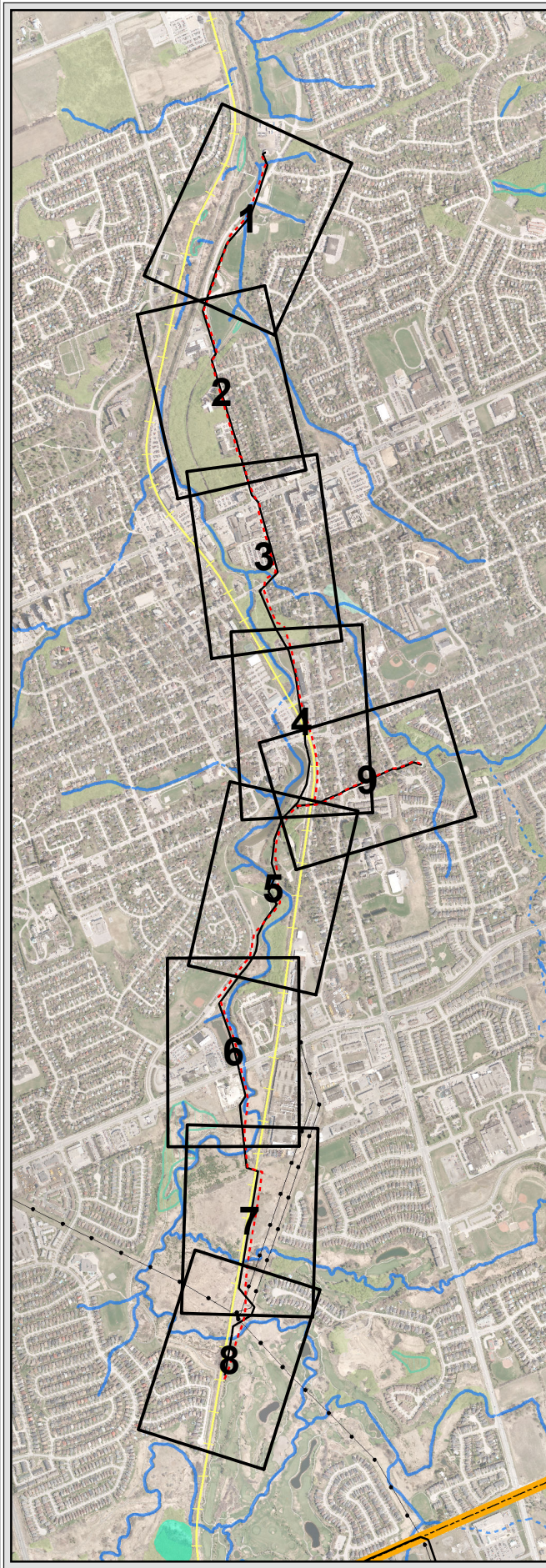
- A second forcemain (a new Newmarket forcemain) from the existing Newmarket Pumping Station to the existing gravity sewer that discharges to the Aurora Pumping Station (see **Figures 2.1 to 2.10**)
- A second forcemain (a new Bogart Creek forcemain) from the existing Bogart Creek Pumping Station to the new Newmarket forcemain (see **Figures 2.5, 2.6 and 2.10**)
- Modifications to the Newmarket and Bogart Creek Pumping Stations for connection of the new forcemains

The existing Bogart Creek forcemain would continue to discharge to the existing Newmarket forcemain, and the new Bogart Creek forcemain would discharge to the new Newmarket forcemain. York Region would have the flexibility to operate the forcemains such that flows from the Pumping Stations could be conveyed via either the existing or new forcemains.

A more detailed description of the preceding modifications is provided within the following sections:

- The design (see **Section 2.1.1**)
 - Design criteria
 - Newmarket Pumping Station
 - Newmarket forcemains
 - Bogart Creek Pumping Station
 - Bogart Creek forcemains
 - Redundancy measures
 - Construction methods

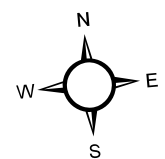
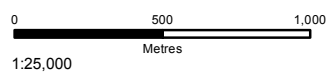
Figure 2.1
Route for York Durham Sewage
System Modifications Map Index
and Legend



Legend

- Existing Forcemains
- - - - - Route
- Construction Methods**
- Directional Drilling**
- Jack & Bore
- Open Cut
- Staging Area (Approximate)**
- ▨ Potential Additional Staging Area for Directional Drilling
- ▭ Directional Drilling
- ▭ Jack & Bore
- Existing Forcemains
- Construction Access Routes
- Tom Taylor Trail (Approximate)
- Go Rail
- Utility Line
- ▭ Study Area
- - - - - River - Intermittent
- River - Permanent
- ▭ Forest
- ▭ Significant Woodland
- ▭ Wetland, Unevaluated
- ▭ Wetlands - Not Provincially Significant
- ▭ Wetlands - Provincially Significant

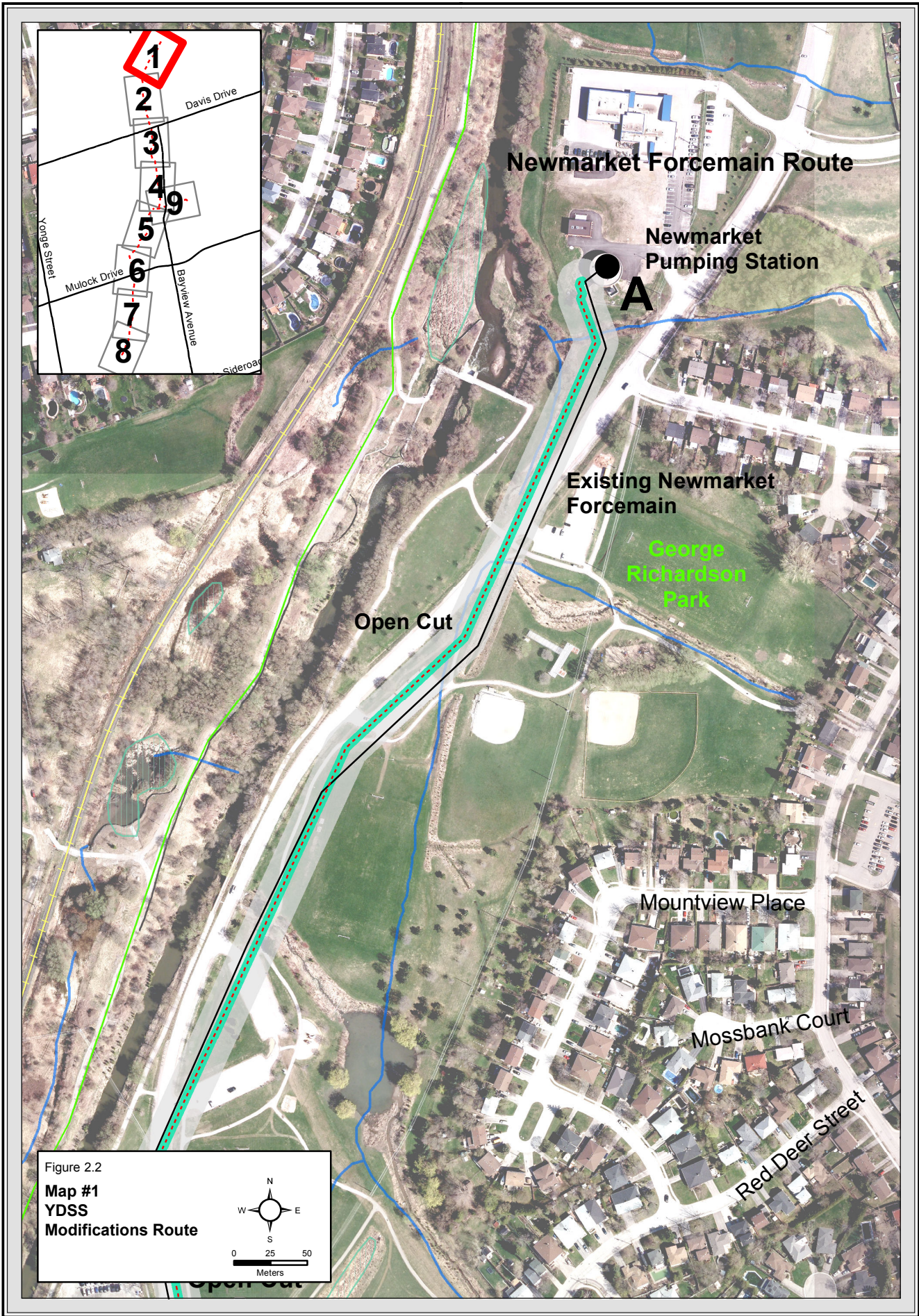
Directional Drilling Note:**
 The proposed directional drilling will be confirmed after geotechnical investigations are completed during the Impacts Assessment Stage, otherwise the construction method will be open cut. Therefore, the potential 15m open cut buffer (area of disturbance) is shown where directional drilling is specified.



Source Reference:
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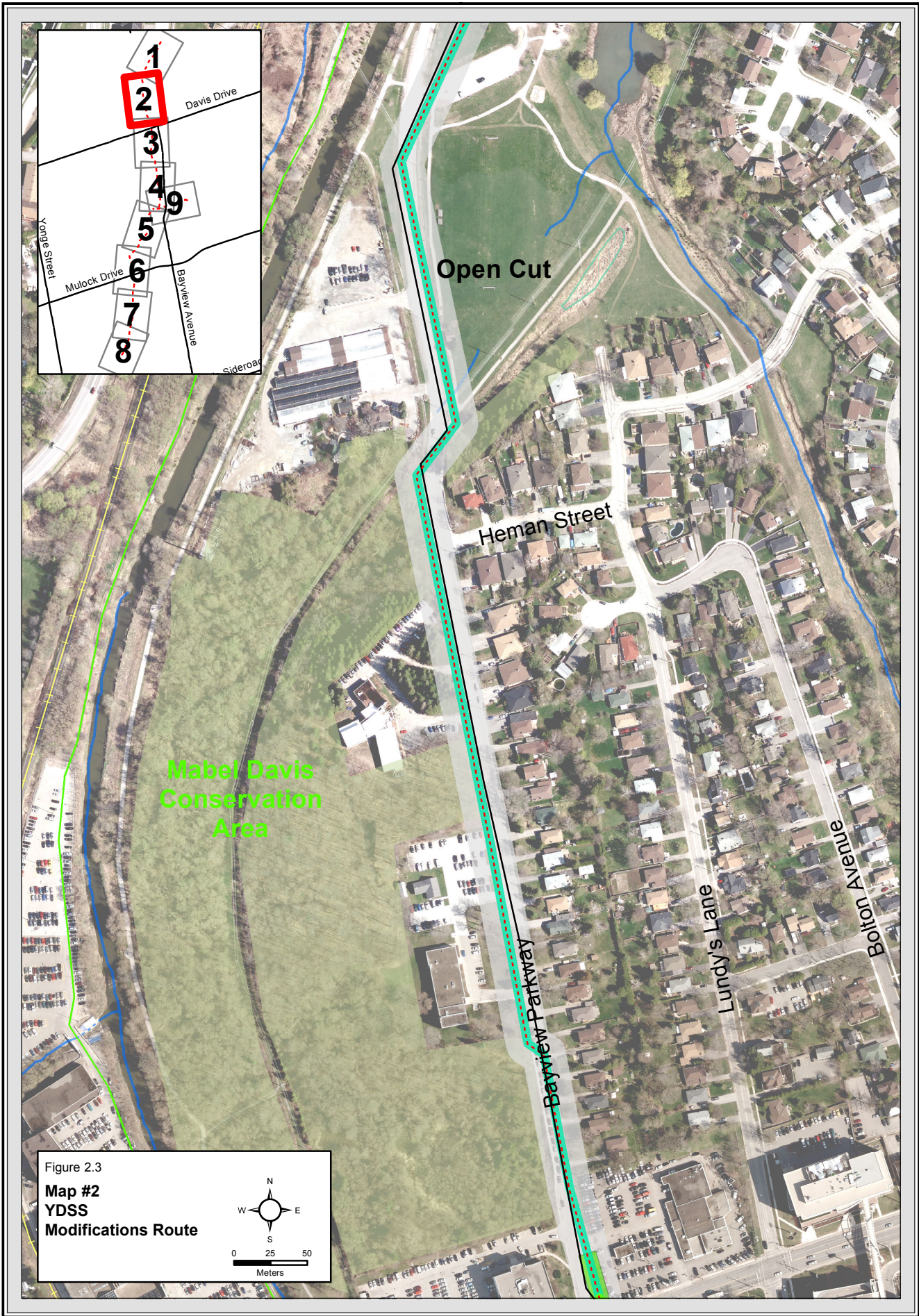
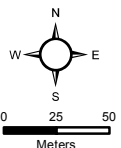
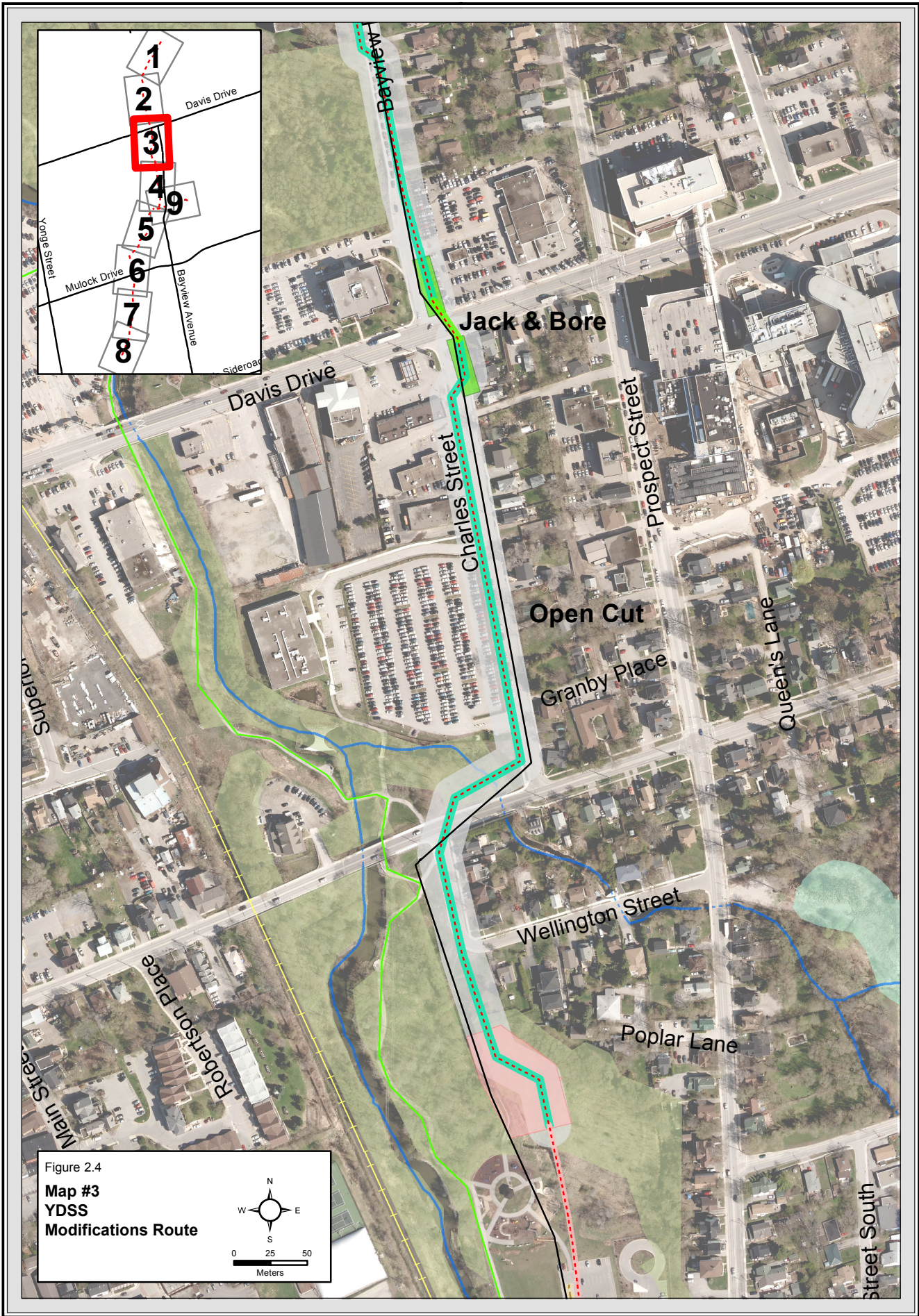
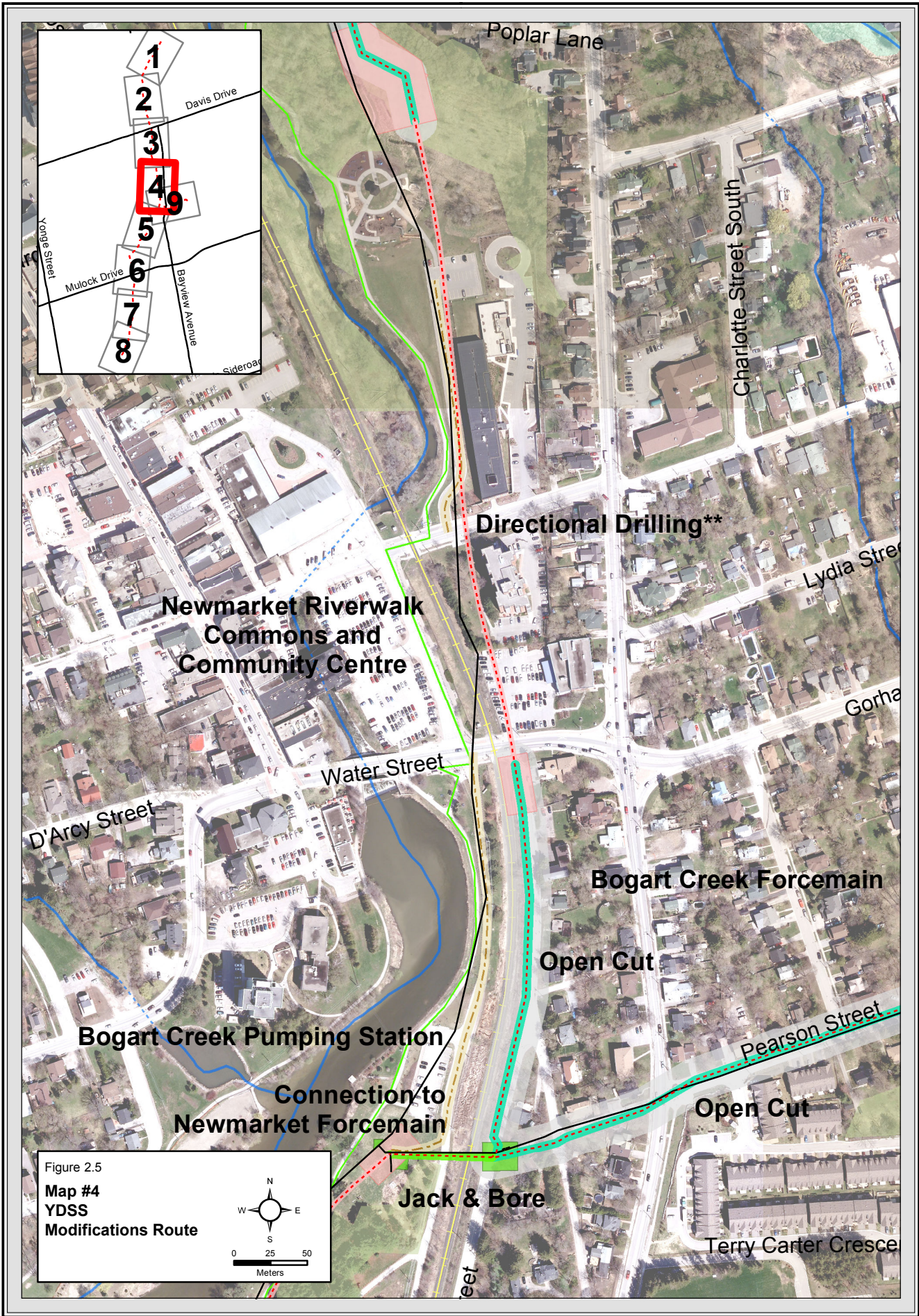


Figure 2.3
Map #2
YDSS
Modifications Route







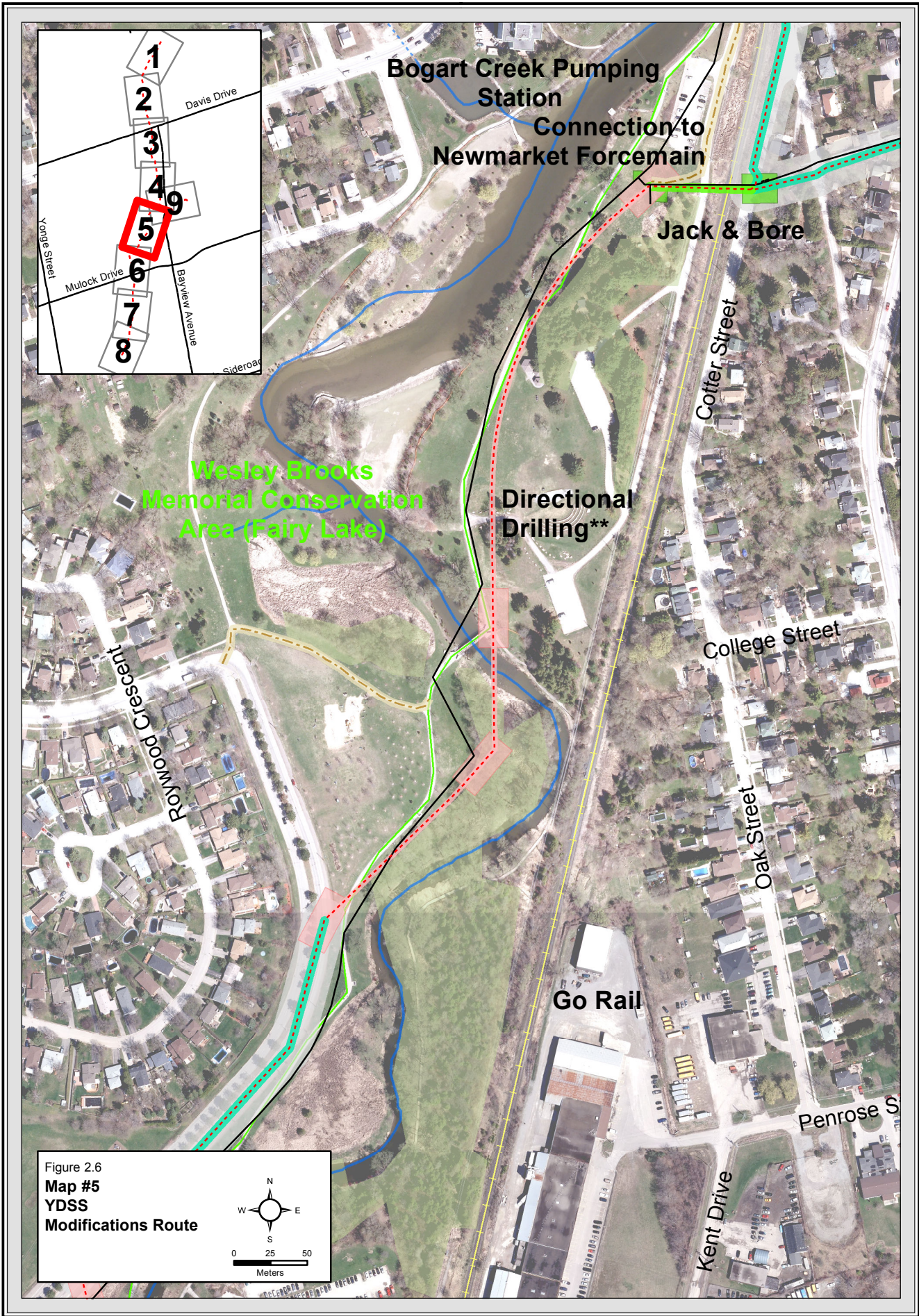
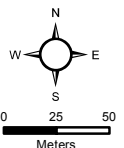


Figure 2.6
Map #5
YDSS
Modifications Route



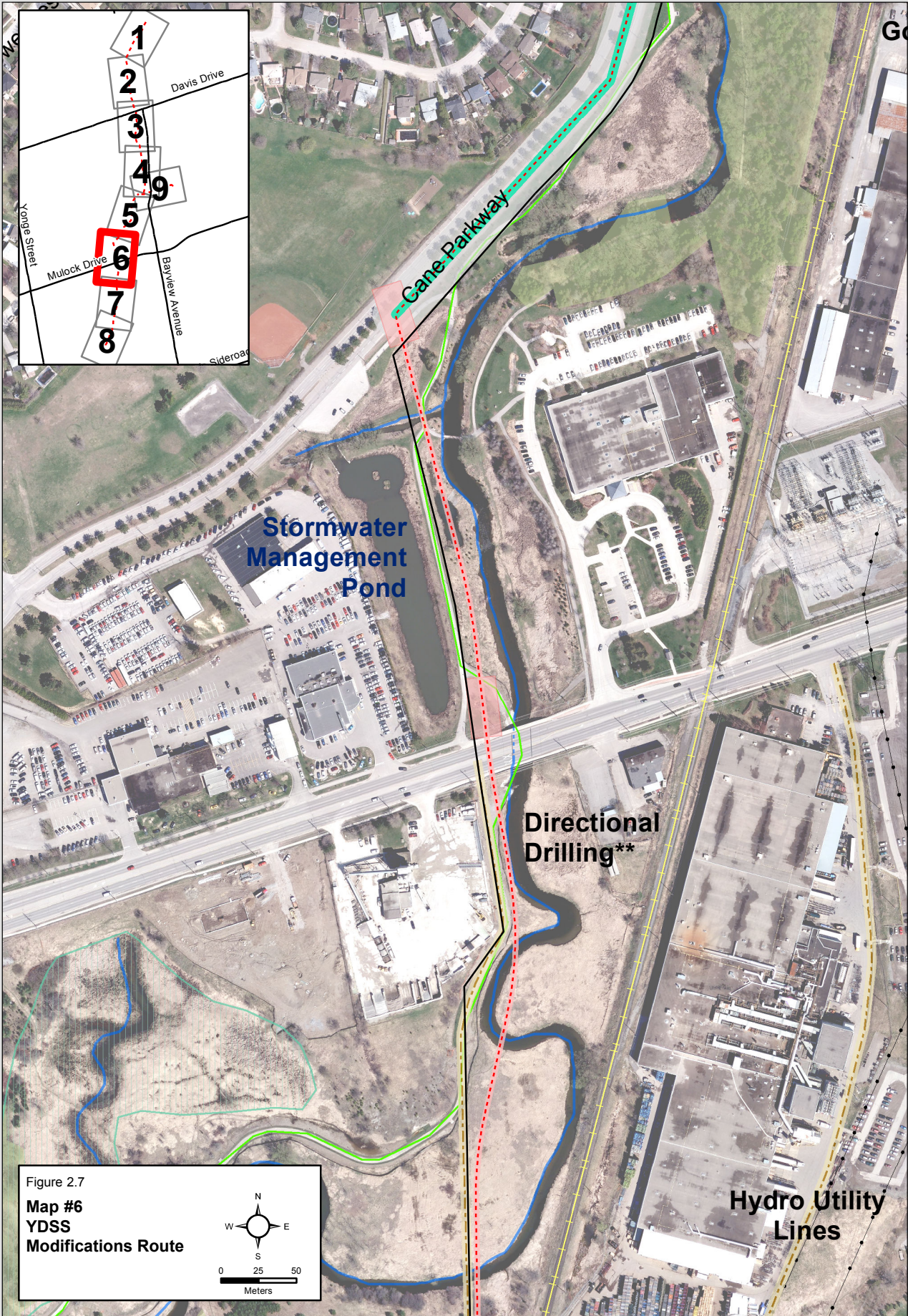
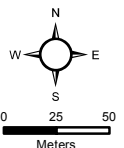


Figure 2.7
Map #6
YDSS
Modifications Route



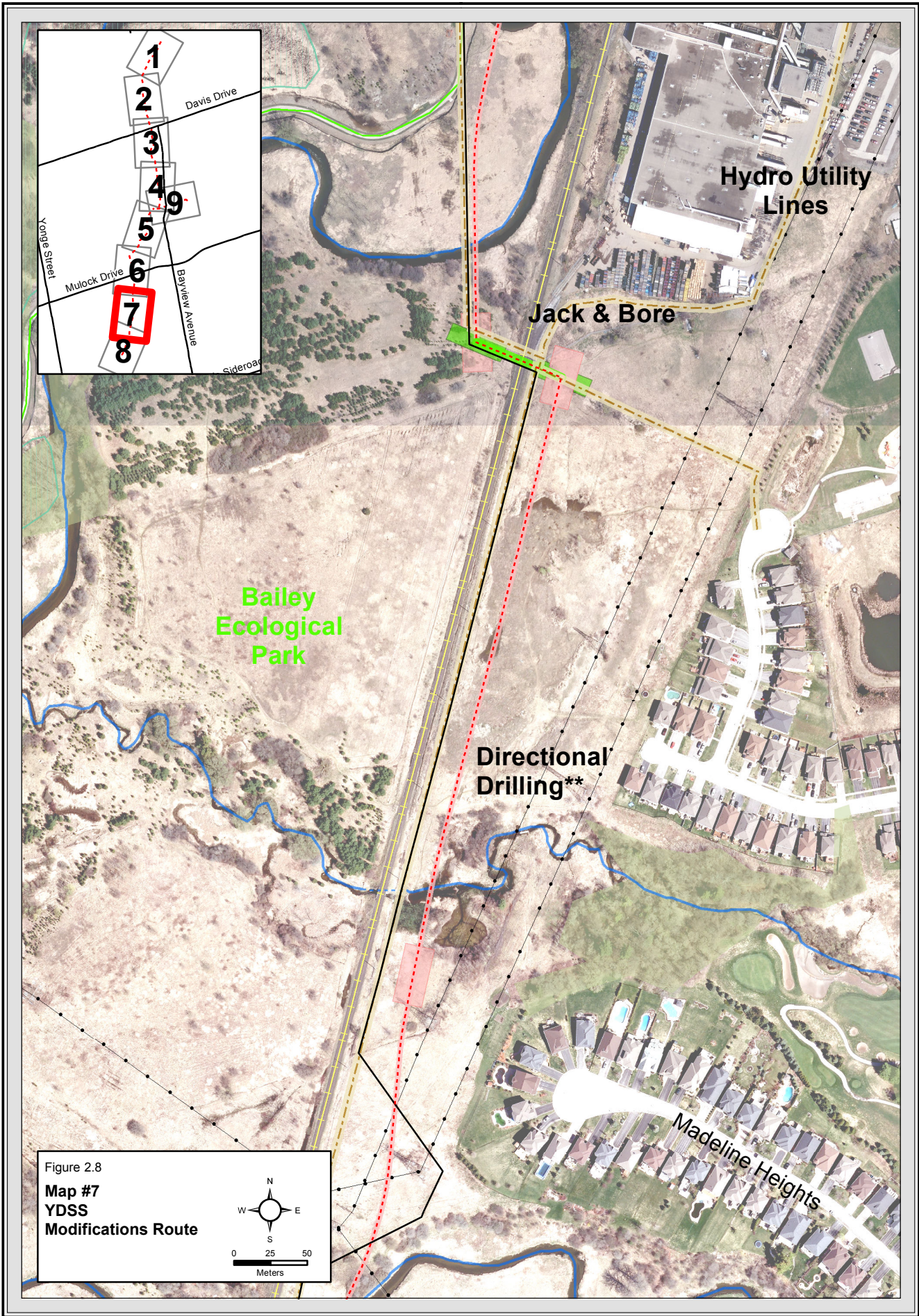
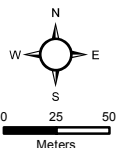


Figure 2.8
Map #7
YDSS
Modifications Route



Figure 2.9
Map #8
YDSS
Modifications Route



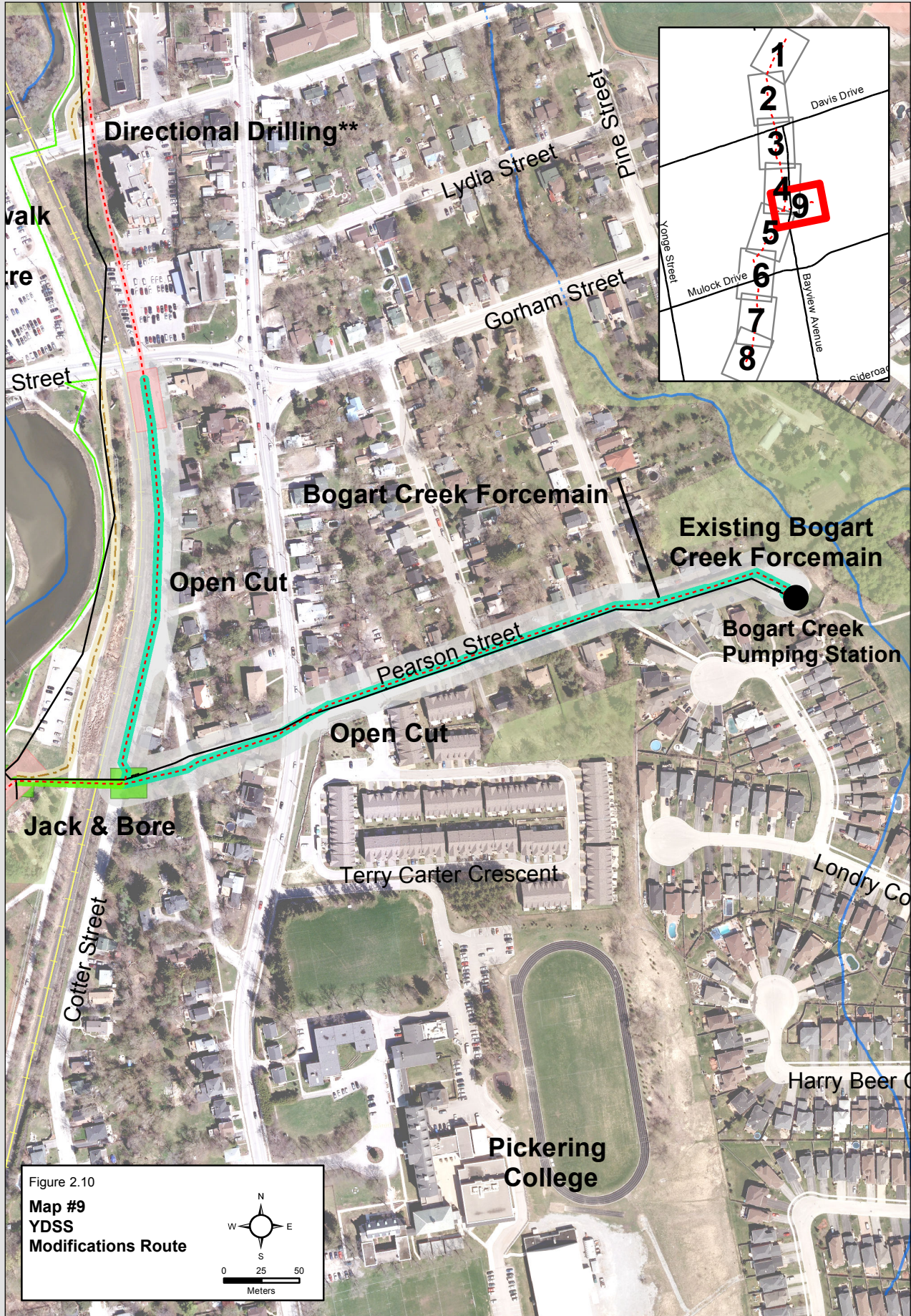


Figure 2.10
Map #9
YDSS
Modifications Route

2.1.1 YDSS Modifications Design

Newmarket Pumping Station

The Newmarket Pumping Station would receive gravity wastewater flow from its service area and will operate under its current rated capacity as set out in its current Certificate of Approval. The modifications to include an additional twin forcemain will not change the rated capacity of the Pumping Station.

The Certificate of Approval, which was issued by the Ministry of the Environment and Climate Change (MOECC) in May 2011, authorizes the Newmarket Pumping Station to have a firm capacity of 111 megalitres per day (MLD) at 38 m of total dynamic head.

Since the existing infrastructure at the Newmarket Pumping Station has sufficient capacity for the 2031 design flow rates no modifications or upgrades other than forcemain connection to the station are required.

The new Newmarket forcemain would connect to the existing forcemain outside of the pumping station in order to (1) avoid extensive modifications to the pumping station header within the pumping station building, and (2) minimize the need to shut down the pumping station during construction and commissioning. A new meter chamber would be constructed, which will serve both forcemains.

Newmarket Forcemains

The new Newmarket forcemain route would generally parallel the existing forcemain, with slight route alterations as required for constructability reasons and to minimize disturbances to the natural environment and existing utilities. The routes for the existing and new Newmarket forcemains are shown in **Figure 2.1** to **Figure 2.10**.

More specifically, the new forcemain would connect to the existing forcemain outside of the Newmarket Pumping Station, and from there travel south along Bayview Parkway towards Davis Drive for approximately 1.5 kilometres (km). South of Davis Drive, the forcemain would continue along Charles Street for approximately 300 m, then travel west along Queen Street for another 50 m. The route then travels south adjacent to Tom Taylor Trail and the rail corridor for a distance of approximately 960 m, until the proposed connection with the Bogart Creek forcemain beneath Cotter Street to the west of Pearson Street.

The new forcemain would then travel west for approximately 70 m towards Fairy Lake Park, and southwest for approximately 570 m adjacent to the Tom Taylor Trail until it passes beneath the East Holland River to Cane Parkway. The route would follow Cane Parkway for approximately 310 m, then travel south along the Tom Taylor Trail for approximately 270 m until Mulock Drive.

From Mulock Drive, the route would travel south for approximately 1.4 km until the connection to the Newmarket gravity sanitary sewer, passing beneath the East Holland River, the rail corridor, and the hydro corridor along the route.

The new Newmarket forcemain would be 900 mm in diameter, which would result in the new forcemain having a hydraulic capacity equal to the existing forcemain. The wastewater velocity would be within the York Region design guideline range of 0.8 to 3.0 metres per second (m/s) when the pumping station is operating at the 2031 peak day flow rate and the pumping station firm capacity (York Region, 2006).

Where open cut construction is proposed, the forcemain would be reinforced concrete pressure pipe and where trenchless construction methods are proposed, the forcemain would be high-density polyethylene pipe or reinforced concrete pipe.

Bogart Creek Pumping Station

In its existing Certificate of Approval, which was issued by MOECC in June 2007, the firm capacity of the Bogart Creek Pumping Station is listed as 27 MLD at 35 m of Total Dynamic Head, which is equal to the peak flow rate from the pumping station service area.

No modifications or upgrades would be required for the pumps.

A new meter chamber would be constructed to house the flow meter for the new forcemain, and the existing meter chamber would remain in service for the existing forcemain.

Bogart Creek Forcemains

Similar to the new Newmarket forcemain, the new Bogart Creek forcemain route would generally be parallel to the existing forcemain, with slight deviations as required for constructability reasons and to minimize disturbance to existing utilities. The routes for the existing and new Bogart Creek forcemains are shown in **Figure 2.10**. The new forcemain would exit the Bogart Creek Pumping Station and travel west along Pearson Street for approximately 470 m. The forcemain would discharge to the new Newmarket forcemain at Cotter Street.

The new Bogart Creek forcemain would be 450 mm in diameter, which would result in the new forcemain having a hydraulic capacity equal to the existing forcemain. The velocity of wastewater in the forcemain would be within the York Region design guideline range of 0.8 to 3.0 m/s if the pumping station is operating at its firm capacity. Open cut construction is proposed for the new forcemain, which would be reinforced concrete pressure pipe.

Construction Methods

The new forcemains and pumping station connections would be designed and constructed such that interruptions to existing Pumping Station operation would be minimized during construction and commissioning. Temporary by-pass pumps and piping would be used to continue pumping wastewater to the Aurora Pumping Station while the final connections are made between each Pumping Station and the new forcemain.

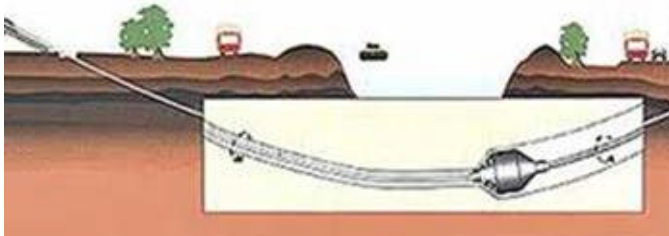
Construction of the new forcemains would involve both open cut and trenchless construction methods. Open cut construction, which involves excavation of a trench from the ground surface to the depth of the base of the pipe, is the most common technique for installing sewer(s). Open cut construction is efficient in various soil conditions and there is no restriction on the length or

diameter of pipe that can be installed. Open cut construction is proposed for the new Bogart Creek forcemain, as well as for sections of the new Newmarket forcemain along Bayview Parkway, Charles Street, Queen Street, Cotter Street and Cane Parkway (see **Figures 2.1 to 2.10**).

Trenchless construction methods such as microtunnelling, directional drilling, pipe jacking would be utilized for the remaining sections of the new Newmarket forcemain to minimize potential adverse environmental effects (i.e., East Holland River crossings, Bailey Ecological Park, major Regional roadways and the rail corridor) (see **Figures 2.1 to 2.10**).

Microtunneling is a construction method where a horizontal shaft is mined through the earth from an entry point by grinding out soil and displacing the waste via conveyor or slurry. Once the shaft is mined; the tunnel machine is propelled forward via hydraulic jacks and a liner is installed behind the head of the tunnel machine to stabilize the earth. The completed liner provides a passage allowing new infrastructure to be installed.

Figure 2.11: Directional Drilling



Directional drilling is a steerable construction method that creates a temporary pathway through the soil in which the product pipe is placed (see **Figure 2.11**). The pathway is enlarged in steps by pulling slightly larger diameter drilling heads through the soil until the

pathway size becomes large enough to accommodate the pipe. Directional drilling is proposed for sections of the new Newmarket forcemain that would pass through parklands, including the Bailey Ecological Park, as well as sections that pass beneath the East Holland River.

Figure 2.12: Pipe Jacking

Pipe jacking uses hydraulic jacks to drive a casing pipe through the soil for distances of up to approximately 100 m without disrupting the surrounding surface area (see **Figure 2.12**). Pipe jacking is proposed for sections of the new Newmarket forcemain that would pass beneath transportation corridors (i.e., rail corridor and high traffic Regional roads).



2.2 Detailed Description of the Environment Potentially Affected

The new forcemains associated with the YDSS Modifications Route would be constructed within a highly urbanized environment composed of residential, commercial, institutional, and

recreational/open space uses. With this general description in mind, a detailed description and understanding of the environment is provided according to the following categories:

- Natural Environment
- Built Environment
- Social Environment
- Economic Environment
- Cultural Environment

2.2.1 Natural Environment

The new YDSS Modifications Route does not cross any designated natural areas such as Provincially Significant Wetlands, Areas of Natural and Scientific Interest, or Environmentally Sensitive Areas. The route, however, would pass through a number of identified areas of the natural heritage system including: Wesley Brooks Conservation Area, Fairy Lake Conservation Area, Mable Davis Conservation Area, and the Bailey Ecological Park.

Surface Water, Geomorphology and Aquatic Species, and Habitat

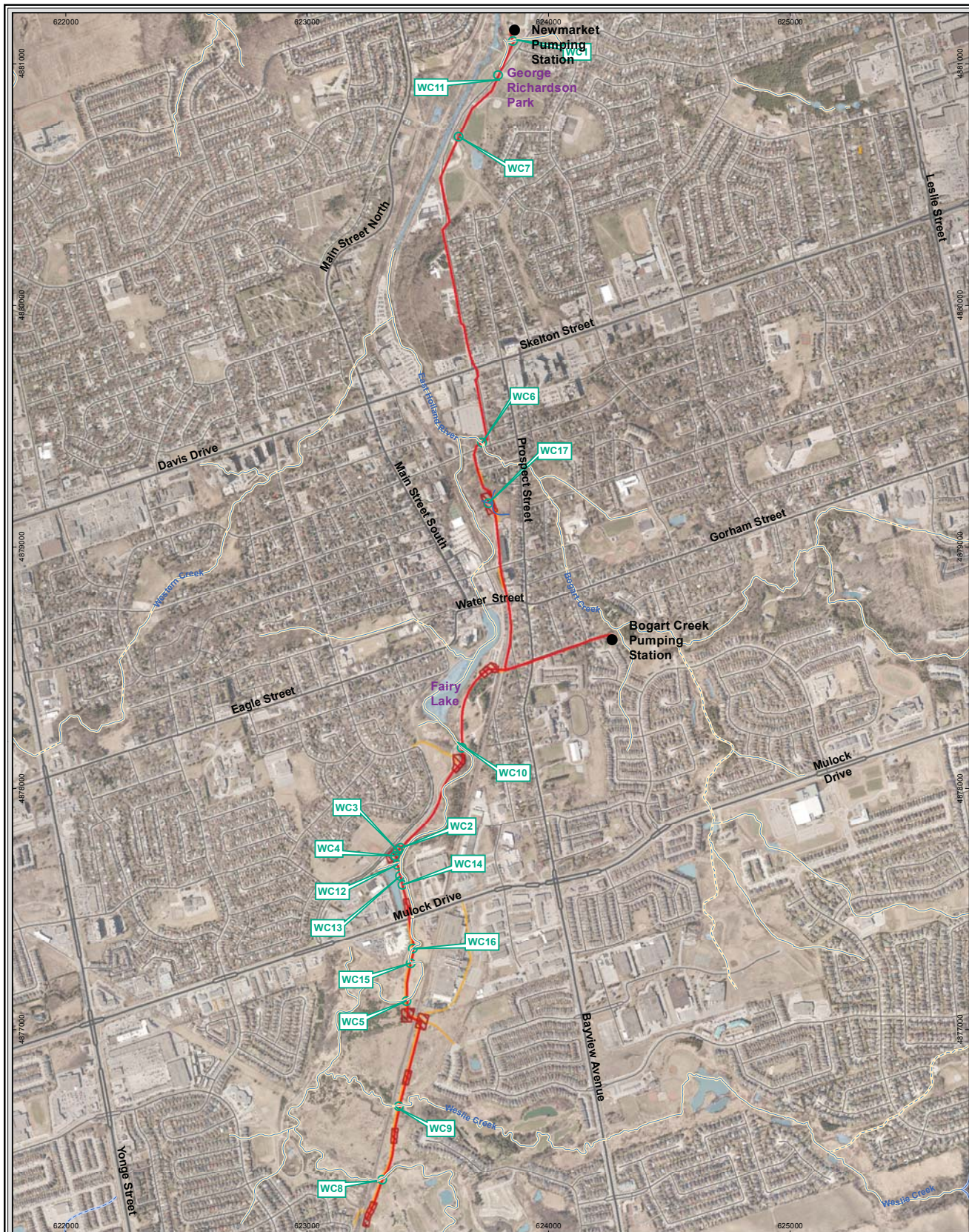
There are 17 watercourse crossings associated with the YDSS Modification Route as it generally follows the East Holland River, which flows north into Lake Simcoe. The East Holland River, Weslie Creek, and Bogart Creek have perennial flow characteristics with the remaining tributaries generally being shallow intermittent or vegetated ephemeral streams.

In addition to the effects of urban land development, the majority of the watercourses crossed by the new forcemains appear to have been altered in association with culvert and bridge construction, erosion protection, and previous subsurface infrastructure placement. Three of the proposed watercourse crossings are located within the Bailey Ecological Park, where the watercourses have a more natural configuration.

All watercourses have no recorded Species at Risk, and those that have been mapped by Ministry of Natural Resources and Forestry have a warmwater thermal regime. Site investigations were carried as part of the natural environmental impact assessment to assess the characteristics of these watercourse crossings as described below and shown on **Figure 2.13** (CRA et al., 2014g):

- Five crossings through the main channel of the East Holland River (identified from south to north):
 - One south of the Bailey Ecological Park (WC8). This reach is permanently flowing, has a variety of fish habitat and likely supports both cool and warmwater species.
 - Three in the Bailey Ecological Park (WC5, WC15, and WC16). This reach is permanently flowing and a high quality fish habitat with a cool to warmwater fish community comprised of White Sucker, Longnose Dace, and Pumpkinseed.

- One south of Fairy Lake (WC 10). This reach is permanently flowing and is partially controlled by backwater conditions from Fairy Lake. It has a cool to warmwater fish community comprised of White Sucker, Longnose Dace, and Pumpkinseed.
- 12 crossings through tributaries of the East Holland River (identified from south to north):
 - One through Weslie Creek south of the Bailey Ecological Park (WC9). This reach is permanently flowing and provides a fish habitat with a cool to warmwater fish community comprised of White Sucker, Longnose Dace, Creek Chub, Brook Stickleback, Pumpkinseed, and Largemouth Bass.
 - Two through an offline manmade wetland feature between the East Holland River and the Tom Taylor pedestrian trail north of Mulock Drive (WC13 and WC14). This wetland area is unlikely to provide direct fish habitat and has poor hydraulic connectivity to the East Holland River, but could contribute flow and nutrients to downstream reaches after high-flow events.
 - One through an unnamed tributary north of Mulock Drive (WC12). This tributary appears to have been previously straightened and receives drainage from stormwater management ponds and storm sewers. While it is highly impacted it may provide low quality fish habitat, however, no records exist.
 - Three through a small wetland feature east of Cane Parkway that receives overflow from a nearby stormwater management pond (WC2, WC3, and WC4). The feature is unlikely to provide fish habitat.
 - One through a small unnamed watercourse south of Wellington Street (WC17). This tributary is unmapped and appears to be isolated from the main branch of the East Holland River, although it may provide ephemeral flow to the main branch of the East Holland River.
 - One through Bogart Creek near Queen Street (WC6). Although heavily influenced by anthropogenic inputs, the watercourse provides fish habitat with a cool to warmwater fish community comprised of White Sucker, Common Shiner, Bluntnose Minnow, Fathead Minnow, Longnose Dace, Creek Chub, Brook Stickleback, Pumpkinseed, Largemouth Bass, and Mottled Sculpin.
 - Two through tributaries in George Richardson Park (WC 7, WC 11) and one just north of George Richardson Park (WC 1). These tributaries are highly impacted but may provide low quality fish habitat given their connection to the East Holland River.



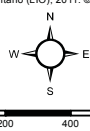
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Legend

- Watercrossings
- YDSS Modifications Route
- Temporary Access Route/Bridge
- Staging Areas
- Pumping Station

Stream Type & Thermal Assessment (MNR)

- Permanent, Coldwater
- Permanent, Warmwater
- Intermittent, Coldwater
- Intermittent, Warmwater



UTM Zone 17N, NAD 83 1:15,000

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Figure 2.13

Watercourse Crossings along the YDSS Modifications Route

July 2014



Terrestrial Species

Much of the YDSS Modifications Route is located within or adjacent to existing infrastructure including a railway, road rights-of-way and pedestrian pathways. However, the new forcemains would pass through several natural vegetation communities. In particular through the Mabel Davis Conservation Area, Wesley Brooks (Fairy Lake) Conservation Area, and Baily Ecological Park (see **Figure 2.14**). These areas are already disturbed as result of the development of the surrounding residential area that has reduced the size of these vegetation communities into small habitat patches.

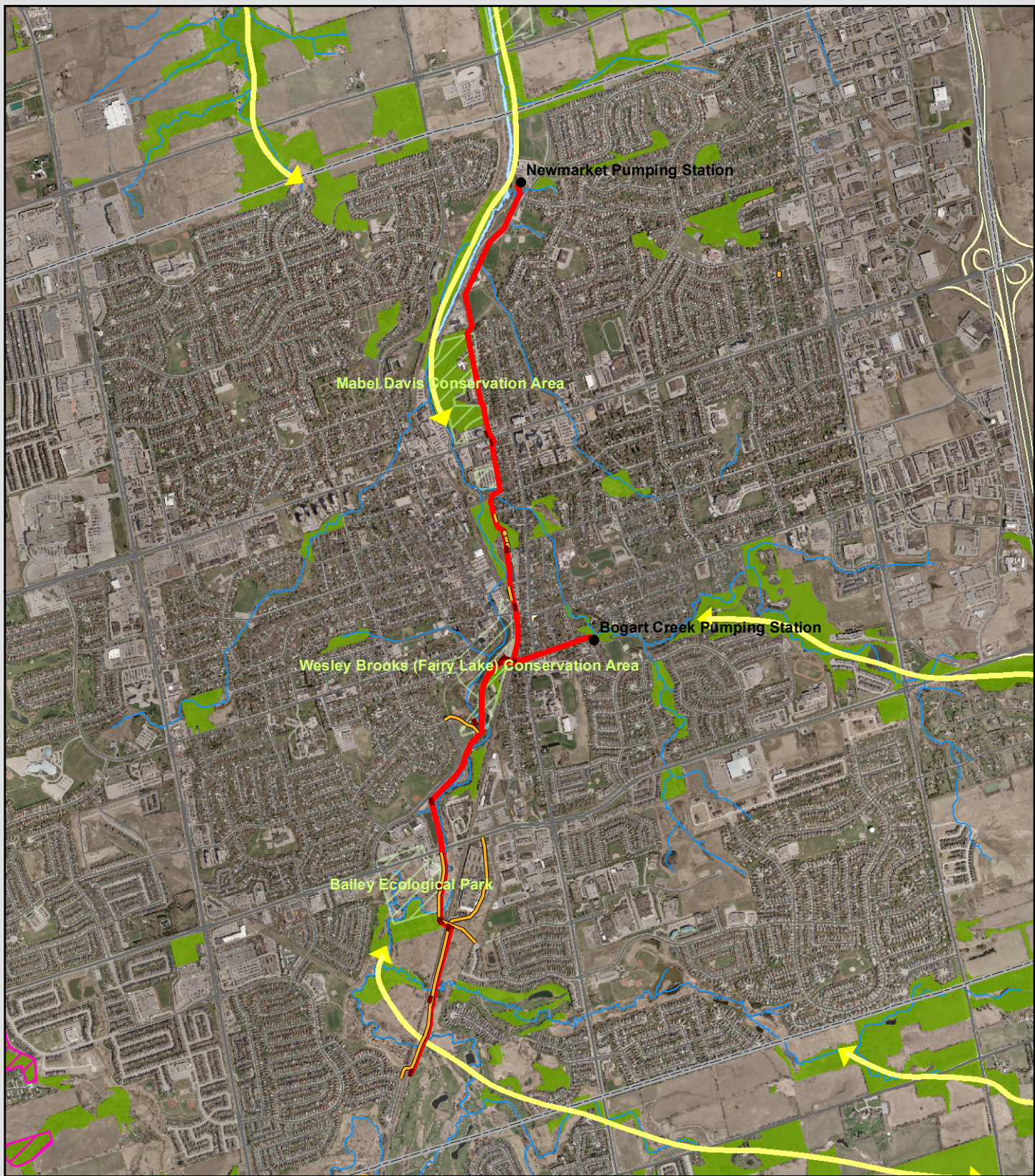
The new forcemains would also pass through unevaluated wetland communities. Most of these are small in size (less than 0.5 ha) and are relatively low functioning wetlands that support a low diversity of plant and wildlife species. Some of these are larger and more functionally significant wetland communities including the Reed-canary Grass Mineral Meadow Marsh south of Mulock Drive, a Cattail Mineral Shallow Marsh located north of Mulock Drive, and a Cattail Mineral Shallow Marsh and Willow Mineral Deciduous Swamp located within the Wesley Brooks (Fairy Lake) Conservation Area.

The Barn Swallow was the only terrestrial Species at Risk recorded near the new forcemains during breeding bird surveys. Barn Swallows are listed as a Federally and Provincially Threatened species. Other bird species recorded near YDSS Modifications Route are common in York Region and tolerant of urban impacted habitats. Generally, some breeding amphibians were recorded along YDSS Modifications Route. There were no Species of Special Concern or Species of Local Concern recorded near YDSS Modifications Route.

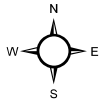
Terrestrial Habitat

There are no Environmentally Significant Areas or Areas of Natural and Scientific Interest located near the new forcemains along the YDSS Modifications Route. However, the route passes through a number of areas designated within the Natural Heritage System by York Region, including Wesley Brooks (Fairy Lake) Conservation Area, Mabel Davis Conservation Area, and the Bailey Ecological Park.

The East Holland River provides patches of riparian vegetation in the form of deciduous forests, cultural meadows and marshes, which potentially serve as a movement corridor for wildlife. However, as determined through the natural environmental site specific investigation, the habitat quality of this wildlife corridor is poor given the number of intersecting roads, and residential and commercial areas that disrupt this natural linkage along the majority of the East Holland River. Many of the habitats present within this wildlife corridor are thus highly fragmented and degraded due to the close proximity to human settlement. However, the East Holland River is the only north-south natural linkage through urban area within The Town of Newmarket and is likely used by a number of common wildlife species.



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200 100 0 200 400 600 Meters

UTM Zone 17N, NAD 83 1:30,000

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Legend

- Pumping Station
- YDSS Modifications Route Access
- Routes/Bridges
- Staging Area
- Waterbody
- Watercourse/Drain
- ↔ Pathways of Lower Quality Connectivity
- ↔ Pathways of Higher Quality Connectivity

Terrestrial Features

- Provincially Significant Wetland (PSW)
- Environmentally Significant Area (ESA)
- Area of Natural and Scientific Interest (ANSI)
- Natural Heritage System Core Areas
- Conservation Area

Figure 2.14

Terrestrial Features Along the YDSS Modifications Route

July 2014



As mentioned, the YDSS Modifications Route would also pass through unevaluated wetland communities. Most of these wetlands are situated along existing pedestrian trail paths within parklands and conservation areas that are surrounded by residential and commercial buildings. As such, most of the wetlands are small in size (less than 0.5 ha) and dominated by either cattails or Reed Canary Grass, and therefore are relatively low functioning wetlands that support a low diversity of plant and wildlife species.

Geology and Hydrogeology

The YDSS Modifications Route is regionally underlain by a thick sequence of glacial overburden deposits, consisting mainly of silt till and silty sand till underlain by glaciolacustrine clayey silt to a depth of approximately 23 m. These low permeability materials act as aquitards. Thin coarse textured glacio-fluvial sand deposits are also locally encountered, which may form local unconfined aquifer conditions. Based on the monitoring undertaken as part of the natural environmental site specific investigation, the water table beneath the YDSS Modifications Route generally ranges from approximately 1.5 to 4 mbgs, and fluctuates seasonally by approximately 0.5 m (CRA et al., 2014g).

2.2.2 Built Environment

Existing Residences, Businesses, Community, Institutional and Recreation Facilities, Agricultural Operations, Roadways, and Utility Infrastructure

In general, the northern portion of the YDSS Modifications Route between the Newmarket Pumping Station and Queen Street follows existing roadways in primarily residential areas in the Town of Newmarket (see **Figure 2.15**). South of Queen Street, the YDSS Modifications Route principally follows the East Holland River and Tom Taylor Trail. The Tom Taylor Trail is a continuous multi-use pathway that follows the East Holland River through The Town of Newmarket from George Richardson Park south to the Town of Aurora.

More specifically, between the Newmarket Pumping Station and Davis Drive (a Regional Arterial Road), the forcemain would be located within the existing Bayview Parkway right-of-way (a Town Minor Collector Road). As such, it is adjacent to the Tom Taylor Trail, George Richardson Park, Mabel Davis Conservation Area, 29 single family residences, a small number of businesses and offices for institutional uses (including a banquet hall, medical centre, car dealership, the Lake Simcoe Conservation Authority, and York Region Community Service Housing Department offices).

The Route south of Davis Drive on Charles Street (a Town Local Road), Queen Street (a Town Minor Collector Road), and Concession Street (a Town Local Road) is adjacent to nine residences, a small commercial plaza at the Charles Street and Davis Drive intersection, a staff parking lot for Southlake Regional Health Centre, and the Town of Newmarket Recreation Youth and Sk8park.

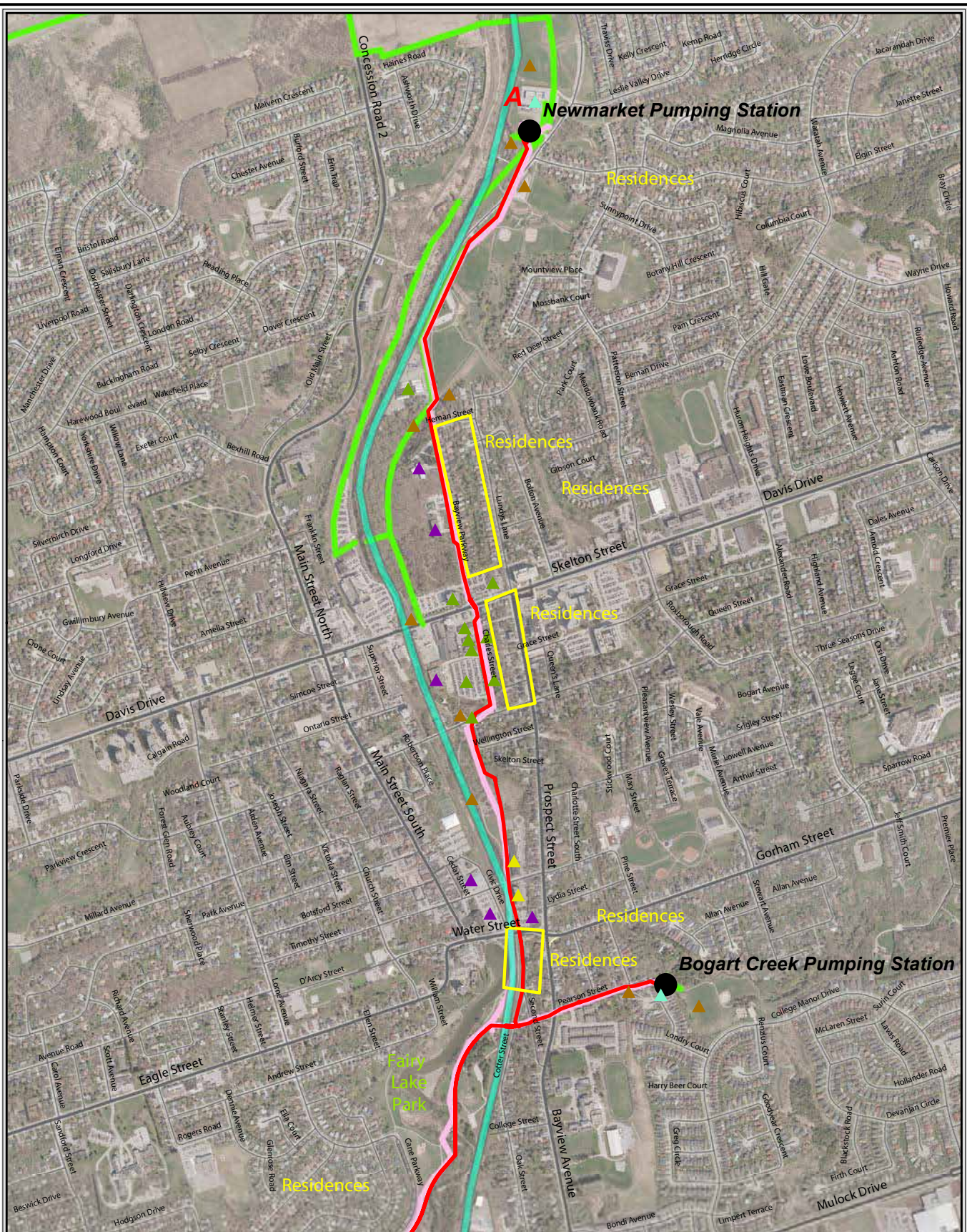


Figure 2.15

Land Uses on and Adjacent to the YDSS Modifications Route (Northern Portion)

July 2014



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0 250 500
Meters

1:16,000

UTM Zone 17N, NAD 83

Legend

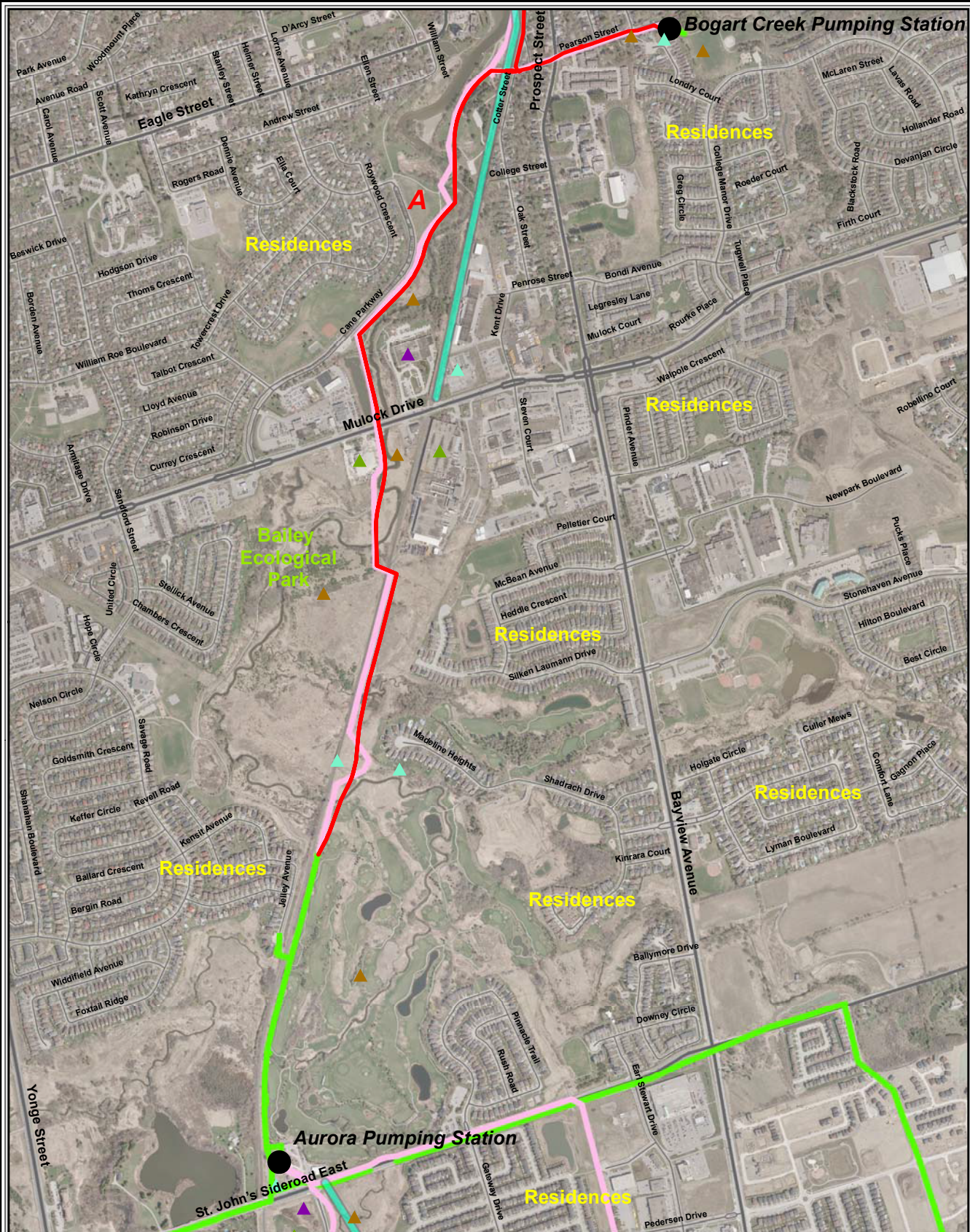
- Businesses Adjacent to Route
- Institutional Facilities Adjacent to Route
- Recreational Facilities Adjacent to Route
- Residences Adjacent to Route
- Utilities Adjacent to Route
- Adjacent Residences
- Pumping Stations
- Tom Taylor Trail
- Route
- Existing Gravity Sewer
- Existing Forcemain (Pressurized Sewer)

Between Queen Street and Mulock Drive, the YDSS Modifications Route is adjacent to the East Holland River and Tom Taylor Trail and a series of parks and recreational facilities, including the Newmarket Riverwalk Commons, the Newmarket Community Centre, and Wesley Brooks Memorial Conservation Area (also known as Fairy Lake Park) (see **Figure 2.16**). The YDSS Modifications Route crosses and then is adjacent to the rail corridor at Pearson Street. Near Timothy Street (a Town Local Road) and Water Street (a Town Primary Collector Road), the YDSS Modifications Route is adjacent to two multi-unit residential buildings and York Regional Police District 1 Headquarters.

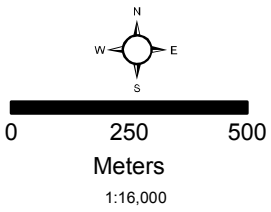
On Cotter Street between Water Street and Pearson Street, the Route is adjacent to four residences. In addition, there are two residences whose only access exists via Cotter Street and one residence on Second Street. At Mulock Drive (a Regional Arterial Road), the YDSS Modifications Route is adjacent to a telecommunications office and the Town of Newmarket Municipal Offices.

Between Mulock Drive and where the new forcemain would connect with the existing gravity sewer, the YDSS Modifications Route is within the Bailey Ecological Park and in some locations, adjacent to the Tom Taylor Trail. The connection to the existing gravity sewer is adjacent to the St. Andrews Valley Golf Club. This portion of the route crosses a hydro electric corridor and the rail corridor.

The route for the new second forcemain along Pearson Street between the Bogart Creek Pumping Station and the new Newmarket forcemain is within a residential neighbourhood that has single detached dwellings (16 driveway accesses), townhouses (one driveway access), and a pedestrian pathway between Pearson Street and Gaston Place.



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UTM Zone 17N, NAD 83

Legend

- ▲ Businesses Adjacent to Route
- ▲ Institutional Facilities Adjacent to Route
- ▲ Recreational Facilities Adjacent to Route
- ▲ Utilities Adjacent to Route
- Pumping Stations
- Tom Taylor Trail
- Preferred Route
- Existing Gravity Sewer
- Existing Forceman (Pressurized Sewer)

Figure 2.16

Land Uses on and Adjacent to the YDSS Modifications Route (Southern Portion)

July 2014



2.2.3 Social Environment

Private Wells

The YDSS Modifications Route is situated within an urban area that is serviced by a municipal water supply system with no private wells in the area.

Noise and Vibration

Noise and vibration in the area of the YDSS Modifications Route are characteristic of an urban setting (background conditions between 50 dBA and 55 dBA). The YDSS Modifications Route is immediately adjacent to approximately 118 noise and vibration sensitive receptors.

Odour

The only existing odour sources along the YDSS Modifications Route are the existing Aurora Pumping Station, Newmarket Pumping Station, and Bogart Pumping Station. Tests were undertaken at all three pumping stations with sampling being a reasonable representation of potential worst-case odour conditions (CRA et al., 2014i). Modelling of odour emissions from the Aurora Pumping Station and the Newmarket Pumping Station showed that the guideline of 1 Odour Unit was met at the property line, and are therefore considered insignificant to any sensitive receptors.

Modelling of odour emissions at the Bogart Creek Pumping Station showed results of 1.7 Odour Unit at its property line, which is slightly higher than the guideline. However, modelling results at the nearest residences were all below the 1 Odour Unit guideline. Notwithstanding this, York Region has initiated as a separate odour control project (i.e., installation of activated carbon odour treatment equipment) at the Bogart Creek Pumping Station.

2.2.4 Economic Environment

Approved/Planned Land Uses and Agricultural Soil Resources

The new forcemains are a permitted use within all land use designations under Section 14.2.4 of the Town of Newmarket's Official Plan (2006) and Section 4.1.4 of the Town of Newmarket's Zoning Bylaw (2010).

Since the YDSS Modifications Route is completely within the urban built up area of the Town of Newmarket, no agricultural soil resources exist.

2.2.5 Cultural Environment

Archaeological Resources

The YDSS Modifications Route is considered clear of archaeological concern and no further archaeological work is recommended based on the completed Stage 1 Archaeological Assessment and Stage 2 Archaeological Assessment.

Built Heritage Resources and Cultural Heritage Landscapes

There are 15 built heritage resources located within and adjacent to the YDSS Modifications Route on Second Street, Prospect Street, Pearson Street, Cotter Street, Timothy Street, and Concession Street (see **Figures 2.17 to 2.24**) (CRA et al., 2013r). All of the built heritage resource except for one are residences. The exception (is a former industrial building located at 543 Timothy Street, which has been converted into a multi-unit residential building).

As well, there are three cultural heritage landscapes (see **Figures 2.23 to 2.24**): the East Holland River/Newmarket Canal; Fairy Lake/Wesley Brooks Conservation Area, which has cultural heritage value to its design features and proximity to the East Holland River; and a former Toronto and York Radial Railway corridor running north from Davis Drive. Transit service, including this corridor was established by the Toronto and York Radial Railway Company in the Newmarket area by 1899. The railway infrastructure has since been removed and the alignment is now visible within the Mabel Davis Conservation Area and George Richardson Park.

Figures 2.17, 2.18, 2.19, 2.20, 2.21, and 2.24 include Key Built Heritage Resources and Cultural Heritage Landscapes Adjacent to the YDSS Modifications Route.

Figure 2.17: Toronto and York Radial Railway Company arch (CHL 3)
Built circa 1899



Figure 2.18: 543 Timothy Street (BHR 12)
Earliest surviving component of a factory complex that extended along the tracks from Water Street to Timothy Street



Figure 2.19: Lock structure located on the Newmarket Canal (CHL 1)
Near Bayview Parkway and Elgin Street



Figure 2.20: 266 Prospect Street (BHR 11)
Residence built circa 1848

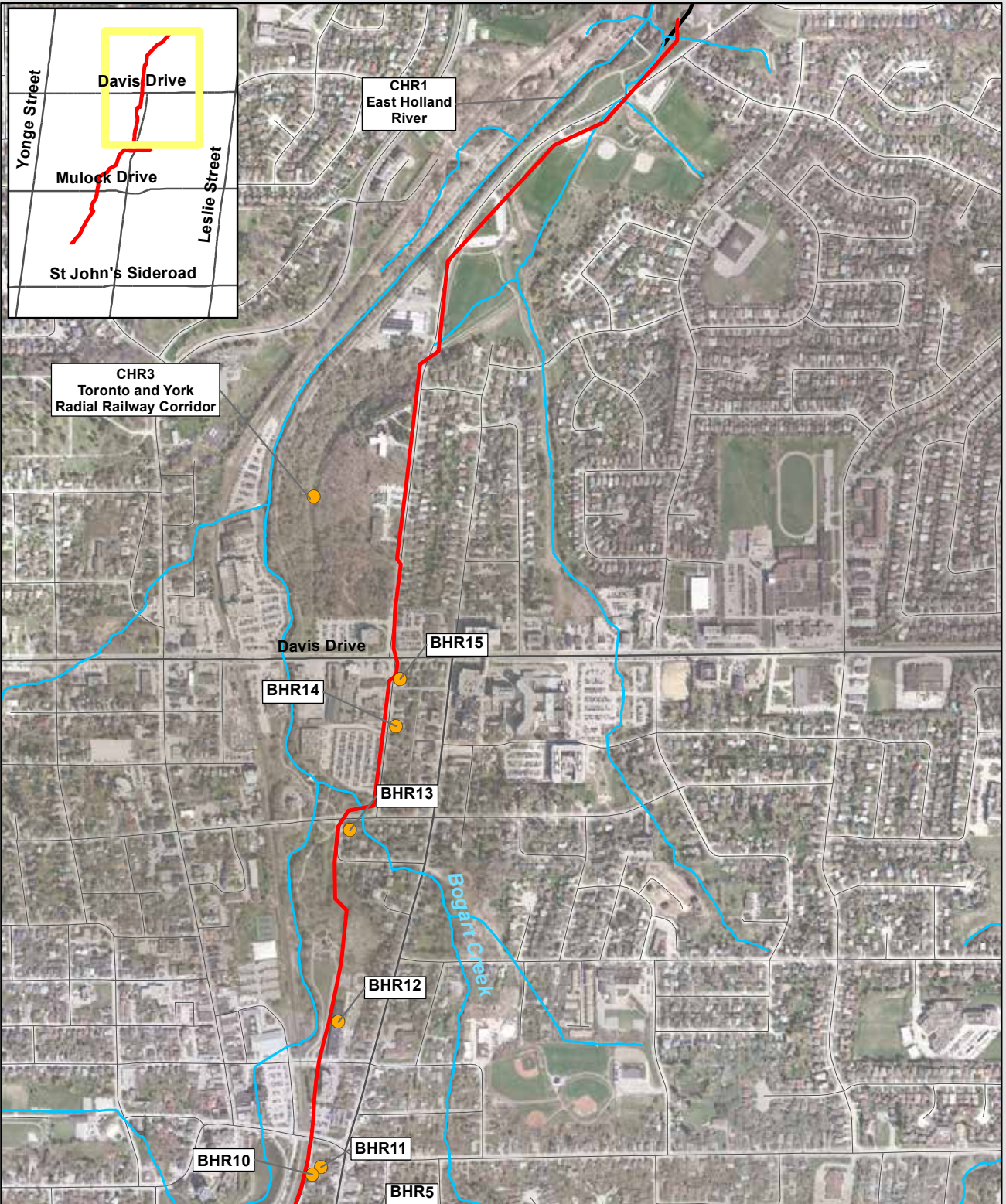


Figure 2.21: 85 Concession Street (BHR 13)
Residence built in 1891



Figure 2.22: 602 Pearson Street (BHR 9)
Residence built circa 1843





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0 100 200 400 Meters
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- Legend**
- Cultural and Build Heritage Resources
 - Route
 - Utility Line
 - Watercourse/drainage ditch

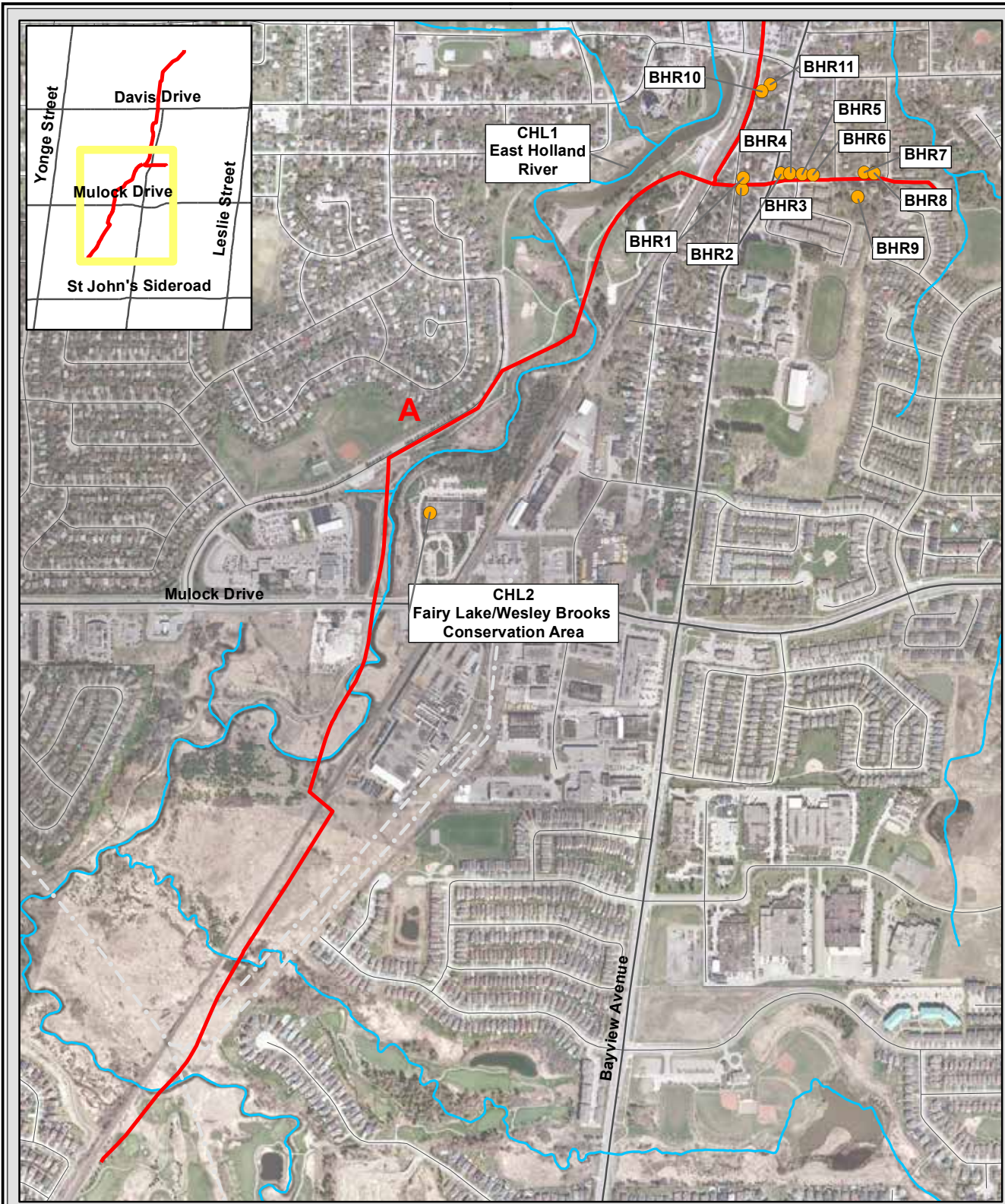
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Figure 2.23

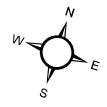
Cultural Heritage Resources Located Within or Adjacent to YDSS Modifications Route (Northern Portion)

July 2014





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0 100 200 400 Meters
 UTM Zone 17N, NAD 83 1:11,500

- Legend**
- Cultural and Built Heritage Resources
 - Route
 - Utility Line
 - Watercourse/drainage ditch

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Figure 2.24

Cultural Heritage Resources Located Within or Adjacent to the YDSS Modifications Route (Southern Portion)

July 2014



2.3 Net Effects on the Environment

Since the new forcemains associated with the YDSS Modifications would be built entirely underground from the existing Newmarket and Bogart Creek Pumping Stations to its upstream connection to the Newmarket gravity sanitary sewer essentially mirroring the existing YDSS in the Town of Newmarket, no long term or operational potential adverse effects are anticipated. As a result, the net environmental effects are temporary in nature associated with construction of the two new forcemains.

2.3.1 Natural Environment

Surface Water, Geomorphology and Aquatic Species, and Habitat

Various mitigation and compensation measures would be implemented to protect surface water quality and quantity; channel form, function and stability; and aquatic species and habitat at the 17 watercourse crossings along the YDSS Modifications Route. The mitigation and compensation measures have been specified according to the watercourse crossing as follows:

- The temporary changes in surface water quantity and quality at all 17 surface water crossings would be mitigated by implementing a Stormwater Management Plan, including an Erosion and Sediment Control Plan (in accordance with a permit obtained under Ontario Regulation 179/06).
- The temporary change to channel form, function and stability at eight open-cut watercourse crossings would be minimized and compensated for by implementing an Erosion and Sediment Control Plan, undertaking construction during low flow or frozen conditions, limiting vegetation removal, and implementing site-specific mitigation measures (i.e., maintain existing channel gradient, enhance cross-section width, stabilize watercourse, etc.) and post-construction restoration.
- The temporary sediment loading and loss of floodplain pool/wetland functions at six open-cut watercourse and wetland crossing locations situated adjacent to the East Holland River would be minimized by stabilizing exposed soil in construction areas, implementing an Erosion and Sediment Control Plan, re-establishing native vegetation, and stabilizing exposed soil following construction to prevent erosion and sediment loading into the wetland/watercourses and the East Holland River.
- The temporary loss of aquatic habitat and function at all 17 watercourse crossings would be minimized by implementing appropriate construction Best Management Practices (BMPs), such as dewatering and fish relocation during construction works; undertaking construction outside of the relevant fish spawning timing window; limiting removal of riparian vegetation; stabilizing watercourse banks; implementing an Aquatic Habitat Restoration Plan; and restoring/stabilizing disturbed areas returning run-off water quality to pre-construction conditions.
- The temporary disturbance to aquatic habitat at the nine watercourse crossings to be constructed using trenchless construction methods would be minimized by implementing an Erosion and Sediment Control Plan, ensuring appropriate drilling depth, and implementing a 'Frac-out' Contingency Plan, if required.

- The permanent interference with future channel processes and fish passage from installing the new forcemains at a insufficient depth beneath the watercourses (including the East Holland River) would be avoided by conducting a scour assessment prior to construction to confirm the appropriate depth for building the new forcemains so that they do not become exposed on the channel bed during operation.

Terrestrial Species

Amphibian breeding habitat has been identified near the new forcemains along the YDSS Modifications Route. While no vegetation removal is proposed within these amphibian breeding habitats, some amphibians moving between breeding habitat and their summer home ranges may be temporarily disturbed during construction. This temporary disturbance would be minimized by installing and maintaining sediment fencing around open-cut areas and staging areas near watercourses or wetlands, and undertaking daily monitoring of open-cut and excavated areas and relocating any trapped amphibians to nearby suitable habitats if required.

Sections of the new forcemains would intersect upland and wetland vegetation communities along the East Holland River and within conservation areas (i.e., Mabel Davis Conservation Area, Wesley Brooks (Fairy Lake) Conservation Area, and Bailey Ecological Park) that provide breeding habitat for common bird species. The temporary disturbance to breeding birds during construction would be mitigated by scheduling vegetation removal outside the breeding bird season (April 15 to July 31) to prevent the destruction of active bird nests and re-vegetating areas of upland and wetland vegetation removed during construction with native plants as soon as possible after construction.

The spread of invasive species into upland and wetland communities due to construction disturbance would be minimized by re-vegetating construction related disturbed areas with native plants after construction (expected to reduce the incidence invasive species colonization), and implementing corrective measures such as the applying an LSRCA-approved herbicide, if required, based on the results of post-construction monitoring.

Terrestrial Habitat

The temporary loss of 2.4 ha of cultural meadow, thicket, plantation and deciduous forest communities and of up to 0.7 ha of unevaluated wetland communities during construction would be minimized and compensated for by reducing vegetation removal within conservation areas/wetlands to the extent possible, installing and maintaining temporary construction fencing, re-vegetating disturbed areas with native species, implementing a Wetland Habitat Restoration and Compensation Plan developed in consultation with LSRCA, and undertaking corrective measures if necessary (e.g., replanting) based on the results of post-construction monitoring.

The temporary effect on unevaluated wetland communities located within the dewatering zone of influence as a result of construction dewatering would be compensated for by implementing a Wetland Habitat Restoration and Compensation Plan developed in consultation with LSRCA, and undertaking corrective measures if necessary (e.g., replanting) based on the results of post-construction monitoring.

Construction activities such as access roads, staging areas, and open cut construction areas have the potential to act as barriers to wildlife movement. Since construction of the new forcemains along YDSS Modifications Route would generally be parallel to the East Holland River, it would not create north-south barriers, but may be a barrier to animal movements that follow the small stream valleys (e.g., between Mabel Davis Conservation Area and the Newmarket Pumping Station). Consequently, small mammals may potentially become trapped in the open-cut trenches. The temporary disturbance to wildlife movement would be minimized by limiting construction to daylight hours, undertaking daily monitoring of open-cut and excavated areas, and relocating any trapped animals to nearby suitable habitats if required.

Geology and Hydrogeology

Since the majority of the YDSS Modifications Route is low permeable till, temporary construction dewatering would only be required along Bayview Parkway and near Wellington Street. Construction methods would be used that minimize the amount of temporary dewatering required to protect groundwater quantity and quality, such as limiting excavations below the water table or using temporary groundwater cut-off structures where appropriate.

2.3.2 Built Environment

Existing Residences, Businesses, Community, Institutional and Recreation Facilities, and Agricultural Operations

Residences, businesses, and community, institutional, and recreational facilities potentially affected by construction within the rights-of-way would be provided with temporary access and arrangements would be made for waste collection as appropriate. Those affected would be notified prior to construction in their area of the alternate arrangements. In total, accesses to approximately 64 residences, 14 businesses, and five community, institutional, and recreational facilities would be temporarily affected on Bayview Parkway, Charles Street, Cotter Street and Pearson Street.

There are no agricultural operations along the YDSS Modifications Route.

Existing Buildings Potentially Affected by Vibration

The YDSS Modifications Route is immediately adjacent to approximately 118 existing buildings. Although any potential vibration effects associated with constructing the new forcemains would be temporary in nature, pre-construction surveys and video records would be completed for each of the 118 buildings to document their existing structural conditions.

Also, any increase in vibration associated with construction would be minimized by implementing BMPs such as:

- Staging construction such that earth moving and ground impacting activities do not occur at the same time
- Relocating heavy equipment travel routes away from buildings
- Limiting heavy construction to daytime hours

- Using specialized drilling equipment and methods (avoid sheet piling, jackhammer, vibratory rollers, etc.)

As well, minimum setback distances between the new forcemains and historic buildings would be established prior to construction based on the type and degree of construction, sub-surface soil conditions, and building condition to minimize or buffer potential adverse vibration effects.

Roadways and Utility Infrastructure

Since portions of Bayview Parkway, Charles Street, Cotter Street, Pearson Street, Queen Street, and Concession Street would be closed during construction as well as access to Heman Street and Granby Place, a Traffic Management Plan would be implemented during construction to minimize disruption, which includes detours for road closures and/or lane closures. As well, construction would be staged so that road/lane closures would be limited to the duration necessary.

Temporary disruption to local utilities within the road rights-of-way (i.e., watermain, sanitary sewer, storm sewer, local gas, local hydro, local cable, and local telephone) would be minimized by identifying utility locations prior to construction based on consultations with municipal and utility providers and relocating any if required. Trenchless construction methods would be used to cross underneath four major roads (Davis Drive, Timothy Street, Water Street, and Mulock Drive) to avoid road closures.

Since trenchless construction methods (i.e., pipe jacking) has the potential to cause ground settlement, appropriate construction methods would be used to reduce the excessive ground movement and settlement monitoring would be implemented in close proximity to transportation corridors (i.e., rail corridor and high traffic Regional roads).

Property

Along some portions of the YDSS Modifications Route, the available area within the road right-of-way and/or existing easement is limited and construction would need to take place on private property. York Region would provide compensation for temporary construction easements in accordance with York Region policies and applicable laws. Temporary construction easements are anticipated to be required on approximately 43 properties.

In addition, the new forcemains would require a permanent surface easement to accommodate future maintenance activities. York Region would provide compensation for permanent easements in accordance with York Region policies and applicable laws. Permanent easements are anticipated to be required on approximately 46 properties.

2.3.3 Social Environment

Private Wells

Since water servicing in the Town of Newmarket is provided via a municipal water supply, there are no private wells in the Town of Newmarket that would be affected by the construction of the new forcemains.

Noise and Vibration Levels

Any increase in noise associated with construction of the new forcemains at nearby sensitive receptors would be temporary in nature and minimized by implementing BMPs such as:

- Limiting impact noise from uncontrolled tailgate use by dump trucks
- Using construction equipment that meets the requirements of the Ministry of the Environment and Climate Change's Construction Equipment Publication (NPC 115)
- Adhering to the Town of Newmarket's Bylaw requirements
- Installing temporary noise barriers, if required

Similarly, construction related vibration would be temporary in nature and minimized by carrying out the following BMPs:

- Staging construction such that earth moving and ground impacting activities do not occur at the same time
- Relocating heavy equipment travel routes away from buildings
- Limiting heavy construction to daytime hours
- Using specialized drilling equipment and methods (avoid sheet piling, jackhammer, vibratory rollers, etc.)

A complaint protocol would be developed prior to construction and implemented during construction to respond to potential noise and vibration related complaints from area residents.

During operation, the new forcemains would not generate any environmentally significant noise emissions and ground-borne vibration.

Odour

No odours would be generated during construction or operation of the new forcemains.

2.3.4 Economic Environment

Approved/Planned Land Uses and Agricultural Soil Resources

Since there are no approved/planned land uses along the YDSS Modifications Route, there would be no adverse effects on approved/planned land uses associated with construction or operation of the new forcemains.

No Official Plan or Zoning Bylaw Amendments would be required because the forcemains would be a permitted use under Section 14.2.4 of the Town of Newmarket's Official Plan (2006) and Section 4.1.4 of the Town of Newmarket's Zoning Bylaw (2010).

As well, since there are no agricultural soil resources along/adjacent to the YDSS Modifications Route, there would be no loss of agricultural soil resources associated with construction or operation of the new forcemains.

2.3.5 Cultural Environment

Archaeological Resources

No archaeological resources or subsurface cultural features would be affected along the portion of the YDSS Modifications Route previously assessed (considered clear of archaeological concern (approximately 5 km)).

As a result, no archaeological resources or subsurface cultural features would be adversely affected by the construction of the new forcemains.

Built Heritage Resources and Cultural Heritage Landscapes

Disruption to the 15 built heritage resources located within and adjacent to the YDSS Modifications Route would be minimized by avoiding character defining landscape features (i.e., structures, fencing, vegetation, hedgerows, and internal circulation routes) and by re-establishing pre-construction conditions through post-construction landscape treatment. Surveys and video records would be completed for the 15 built heritage resources prior to, during and after construction to ensure they are not adversely affected by construction related vibration.

Disruption to the East Holland River/Newmarket Canal due to the temporary bridge to be built during construction of the YDSS Modifications would be minimized by re-establishing pre-construction conditions by removing the temporary bridge and through post-construction landscape treatment.

Disruption to the Fairy Lake/Wesley Brooks Conservation Area through alteration and removal of landscape features such as vegetation would be mitigated and minimized, where possible, by refining the extent and locations of staging areas during detail design and by implementing a plan to erect hoarding to preserve trees if necessary. Affected portions would be returned to pre-construction conditions through post-construction landscape treatment.

Disturbance to the former Toronto and York Radial Railway corridor would be minimized by implementing a plan to erect hoarding to preserve trees and re-establishing pre-construction conditions through post-construction landscape treatment.

2.4 Implementation of the YDSS Modifications

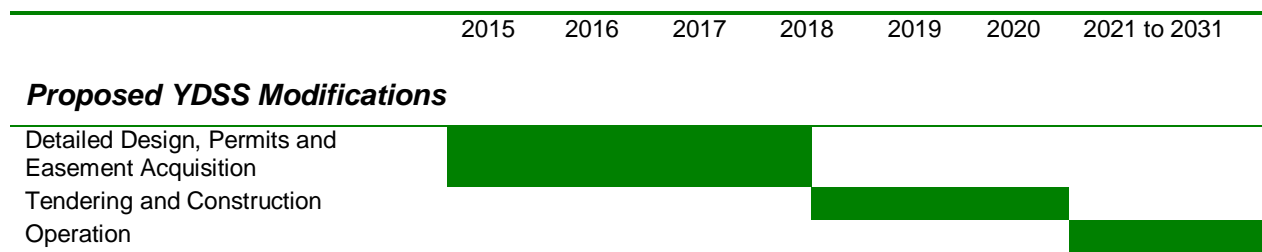
York Region is planning to implement the proposed YDSS Modifications through the following major steps:

1. Detailed Design and Permits
2. Tendering and Construction
3. Operation

In concert with carrying out the preceding steps, York Region is also proposing to implement the commitments associated with the proposed YDSS Modifications (i.e., mitigation/compensation measures, monitoring, permits and approvals, future consultation, etc.).

The timeframe presently expected by York Region for implementing the YDSS Modifications is shown in **Figure 2.25** and described in the following subsections.

Figure 2.5: Anticipated Implementation Timeline for the YDSS Modifications



The anticipated implementation timeline is based on known information at this time and is subject to change.

Any opportunities to synchronize project implementation would be explored further during the detailed design stage.

2.4.1 YDSS Modifications

Detailed Design and Permits

The following activities associated with the proposed YDSS Modifications would be undertaken during detailed design:

- Implement mitigation measures outlined in **Section 2.3** associated with detailed design of the YDSS Modifications
- Implement monitoring programs outlined in **Section 3.1** associated with the pre-construction stage of the YDSS Modifications
- Implement commitments outlined in **Section 3.2** associated with the pre-construction stage of the YDSS Modifications
- Obtain permits and approvals required prior to construction of the YDSS Modifications
- Conduct additional geotechnical investigations and confirm construction methodology based on results of geotechnical investigations
- Confirm areas where permanent easements are required
- Confirm areas where temporary working easements are required for construction
- Confirm location of temporary access roads and rail crossings required for construction
- Develop groundwater management strategies for forcemains, given that forcemains will be constructed using open cut and trenchless methodologies and will typically be installed at depths of greater than 3.0 m
- Detailed design of the new Newmarket and Bogart Creek forcemains
- Detailed design of the modifications to the Newmarket Pumping Station for connection to the new Newmarket forcemain
- Detailed design of the modifications to the Bogart Creek Pumping Station for connection to the new Bogart Creek forcemain
- Prepare and submit application for amendment to the existing Environmental Compliance Approval for the Newmarket Pumping Station
- Prepare and submit application for amendment to the existing Environmental Compliance Approval for the Bogart Creek Pumping Station

Tendering and Construction

The following activities would be undertaken during construction of the proposed YDSS Modifications:

- Implement mitigation measures outlined in **Section 2.3** associated with construction of the proposed YDSS Modifications
- Implement monitoring programs outlined in **Section 3.1** associated with the construction stage of the proposed YDSS Modifications

- Implement commitments outlined in **Section 3.2** associated with the construction stage of the proposed YDSS Modifications

Operation

It is anticipated that the proposed YDSS Modifications would be operational starting sometime in 2021. Once operational, the new forcemains would be subject to York Region's standard operations and maintenance activities similar to the existing forcemains.

Section 3.0 Commitments and Monitoring for the YDSS Modifications

The purpose of environmental effects monitoring is to monitor the net effects associated with the construction, operation, and maintenance of the YDSS Modifications, as necessary, and implement further mitigation measures, monitoring, and contingency plans, where possible, so that:

1. Predicted net negative effects are not more than expected
2. Unanticipated negative effects are addressed
3. Predicted benefits are realized


The purpose of compliance monitoring is to ensure that the YDSS Modifications have been constructed, implemented, and/or operated in accordance with the commitments made by York Region.


3.1 Environmental Effects Monitoring

Table 3.1 outlines the environmental effects monitoring associated with the YDSS Modifications based on the mitigation and compensation measures described in **Section 2**. In particular, **Table 3.1** lists the environmental effects monitoring by net effect within each Environment category (i.e., Natural Environment, Built Environment, Social Environment, etc.) and includes the anticipated timing of the monitoring (i.e., pre-construction, construction, operation).

Table 3.1: Summary of Environmental Effects Monitoring

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
Natural Environment	<p>No temporary or permanent changes in groundwater quantity and quality would occur along the majority of the YDSS Modifications Route because most of the construction would be in low permeable till.</p> <p>A temporary decrease in groundwater quantity and/or quality locally along Bayview Parkway and near Wellington Street due to dewatering would be mitigated by using appropriate construction methods.</p>	<p>Pre-construction Groundwater Monitoring: Establish baseline groundwater conditions through the existing monitoring well network within the area of influence along YDSS Modifications Route through the following measurement and collection activities (for a two year period prior to construction):</p> <ul style="list-style-type: none"> ▪ Bi-monthly groundwater level measurements from the YDSS Modifications Route monitoring well network ▪ Semi-annual groundwater sample collection at selected wells within the monitoring well network 	Pre-Construction
		<p>Construction Groundwater Monitoring: Verify the amount of the proposed water takings and predicted groundwater level changes at active construction water taking locations locally along Bayview Parkway and near Wellington Street through the following measurement and sampling activities:</p> <ul style="list-style-type: none"> ▪ Weekly to monthly groundwater level measurements from the YDSS Modifications Route monitoring well network locally along Bayview Parkway and near Wellington Street 	Construction
		<p>Post-construction Groundwater Monitoring: Verify aquifer recovery (80 percent) subsequent to the proposed active construction water takings through the following measurement and sampling activities:</p> <ul style="list-style-type: none"> ▪ Bi-monthly groundwater level measurements from the YDSS Modifications Route monitoring well network ▪ Semi-annual groundwater sample collection at selected wells 	Operation

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
	<p>The temporary changes in surface water quantity and quality in the East Holland River, Wesley Creek, Bogart Creek, and unnamed tributaries in George Richardson Park would be mitigated by implementing a Stormwater Management Plan, including an Erosion and Sediment Control Plan (in accordance with a permit obtained under Ontario Regulation 179/06).</p>  <p>East Holland River South of Mulock Drive</p>	<p>Pre-construction Surface Water Monitoring: Establish baseline surface water quantity and quality conditions to characterize the hydrological regime at the established monitoring stations (five stations within the main channel of the East Holland River (SW 4, SW 8, SW 11, SW 42, and SW 44), and other tributaries comprised of Wesley Creek (one station - SW 43), Bogart Creek (one station SW 7) and the unnamed tributaries off Bayview Parkway in George Richardson Park (five stations - SW 31, SW 45, SW 46, SW 47, and SW 48) through the following measurement and sampling activities (for a two year period prior to construction):</p> <ul style="list-style-type: none"> ▪ Monthly manual baseflow measurements at the established monitoring stations ▪ Continuous level/flow measurements at seven locations seasonally (SW 4, SW 7, SW 8, SW 11, SW 42, SW 43, and SW 44 from March or April through November or December) ▪ Monthly measurements of water quality field parameters at the established monitoring stations ▪ Quarterly surface water quality sampling representative of seasonal variances in February, May, August, and November at the established monitoring stations 	<p>Pre-Construction</p>
		<p>Construction Surface Water Monitoring: Verify the effectiveness of the mitigation measures implemented through the Stormwater Management Plan, including the Erosion and Sediment Control Plan through surface water quantity and quality monitoring at established monitoring stations (five stations within the main channel of the East Holland River (SW 4, SW 8, SW 11, SW 42, and SW 44), and other tributaries comprised of Wesley Creek (one station - SW 43), Bogart Creek (one station - SW 7) and the unnamed tributaries off Bayview Parkway in George Richardson Park (five stations - SW 31, SW 45, SW 46, SW 47,</p>	<p>Construction</p>

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
	<p>The temporary loss of aquatic habitat and function at 17 open cut and trenchless watercourse crossings would be minimized by implementing appropriate construction Best Management Practices (BMPs), such as undertaking construction during low flow or frozen conditions; dewatering and fish relocation during construction works; undertaking construction outside of the relevant fish spawning timing window; limiting removal of riparian vegetation; stabilizing watercourse banks; implementing an Aquatic Habitat Restoration Plan; and restoring/stabilizing disturbed areas and returning run-off water quality to pre-construction conditions (Potential effects would depend on the construction methodology, proximity of construction areas to the watercourses,</p>	<p>and SW 48)) via the following measurement and sampling activities:</p> <ul style="list-style-type: none"> ▪ Monthly manual baseflow measurements at the established monitoring stations ▪ Continuous level/flow measurements at seven locations (SW 4, SW 7, SW 8, SW 11, SW 42, SW 43, and SW 44) ▪ Monthly measurements of water quality field parameters at the established monitoring stations ▪ Quarterly surface water quality sampling representative of seasonal variances in February, May, August, and November at the established monitoring stations ▪ Monthly or as needed inspection of erosion and sediment control measures (i.e., silt fences, coffer dams, etc.) 	<p>Operation</p>
		<p>Post-construction Surface Water Monitoring: If construction causes unanticipated adverse impacts as determined through the Construction Surface Water Monitoring, then implement additional corrective measures and conduct surface water monitoring to verify recovery of surface watercourses.</p>	
		<p>Pre-Construction Aquatic Habitat Mapping: Complete detailed habitat mapping prior to construction at all watercourse crossings to establish baseline conditions, including substrate, in-stream cover, riparian cover, flow, morphology, and water quality field parameters.</p>	<p>Pre-Construction</p>
		<p>Construction Aquatic Habitat Monitoring: Verify the effectiveness of the proposed mitigation measures, including BMPs, working outside of timing windows and in the dry, Aquatic Habitat Restoration Plan, bank stabilization measures, and channel realignments through biweekly or as needed inspection of proposed mitigation measures during construction and following construction until restoration is complete.</p>	<p>Construction</p>

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
	duration of construction activity, and watercourse sensitivity.	Post-construction Aquatic Habitat Monitoring: Assess that proper restoration, stabilization, and overall quality of runoff is returned to pre-construction conditions by monitoring once per quarter for one year following construction. If construction causes unanticipated adverse effects as determined through the Construction Aquatic Habitat Monitoring, then implement additional corrective measures.	Operation
	<p>The temporary disturbance to amphibians moving between their breeding habitat and summer ranges during construction would be minimized by undertaking daily monitoring of open-cut and excavated areas and relocating any trapped amphibians to nearby suitable habitats if required.</p> <p>The temporary disturbance to wildlife moving in the north-south wildlife corridor along the East Holland River would be minimized by implementing daily monitoring of open-cut and excavated areas and relocating any trapped animals to nearby suitable habitats if required.</p>	Amphibian and Wildlife Monitoring: Ensure any amphibians or animals, which have become trapped by falling into open-cut or excavated areas overnight are relocated to suitable habitats by daily monitoring of open-cut and excavated areas for the duration of construction (prior to that day's construction beginning in relation to open-cut and excavated areas).	Construction
	The permanent interference with future channel processes and fish passage from the new forcemains would be avoided by installing forcemains at sufficient depth beneath the watercourse so that the forcemains do not become exposed on the channel bed during operation.	<p>Pre-Construction Scour Assessment: Confirm the appropriate depth of the new forcemains by conducting a scour assessment in the East Holland River taking into consideration the following:</p> <ul style="list-style-type: none"> ▪ Long-term channel bed lowering potential ▪ Even based scour depth ▪ Maximum channel bed profile deviation from average channel bed line 	Pre-Construction
	The temporary change to channel form, function and stability at eight open-cut watercourse crossing locations would be minimized and compensated for by implementing an Erosion and Sediment Control Plan, undertaking construction during low flow or frozen conditions, limiting	Pre-Construction Geomorphologic Monitoring: Establish upstream and downstream baseline conditions at each of the eight open-cut crossing locations for a two year period prior to construction.	Pre-Construction
		Construction Geomorphologic Monitoring: Verify the effectiveness of the construction mitigation measures, and	Construction

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
	<p>vegetation removal, and implementing site-specific mitigation measures and post-construction restoration.</p>	<p>effectiveness of the design through biweekly or as needed inspections at each of the eight open-cut crossing locations during construction and following construction until restoration is complete.</p>	
		<p>Post-construction Geomorphologic Monitoring: Verify surface watercourse recovery via geomorphic monitoring once per quarter for one year following construction. If construction causes unanticipated adverse effects as determined through the Construction Geomorphic Monitoring, then implement additional corrective measures.</p>	Operation
	<p>The spread of invasive plant species into upland and wetland communities due to construction disturbance would be minimized by re-vegetating areas disturbed during construction with native plants after construction (expected to reduce the incidence of invasive species colonization), and implementing corrective measures such as applying an LSRCA-approved herbicide, if required, based on the results of post-construction monitoring.</p>	<p>Terrestrial Planting Survivorship Monitoring: Confirm the survival of new plantings and detect the presence of invasive species in re-vegetated disturbed areas (once per growing season for two years following initial planting season). If unanticipated adverse effects occur as determined through the Terrestrial Planting Survivorship Monitoring, then implement corrective measures such as applying an LSRCA-approved herbicide.</p>	Operation
	<p>The temporary loss of up to 0.7 ha of unevaluated wetland communities would be minimized and compensated for by minimizing vegetation removal within wetlands to the extent possible, re-vegetating disturbed areas with native wetland species, implementing a Wetland Habitat Restoration and Compensation Plan developed in consultation with LSRCA, and undertaking corrective measures if necessary (e.g., replanting) based on the results of post-construction monitoring.</p>	<p>Wetland Vegetation Pre-Construction Inventory: Catalogue the structure and composition of the existing vegetation (i.e., dominant species, cover and community structure) in the SWD4-1 vegetation community where temporary vegetation removal is proposed for a staging area and determine appropriate restoration methods through an inventory prior to construction.</p>	Pre-Construction
	<p>The temporary effect on unevaluated wetland communities from construction dewatering would be minimized and compensated for by implementing a Wetland Habitat Restoration and Compensation Plan developed in consultation with LSRCA, and undertaking corrective measures if necessary (e.g., replanting) based on the results of post-construction monitoring.</p>	<p>Wetland Vegetation Planting Survivorship Monitoring: Verify the survival of new wetland vegetation plantings and document species composition and vegetation structure, including the presence of invasive wetland species in the restored wetland once per growing seasons for two years following construction or as required by the Wetland Habitat Restoration and Compensation Plan. If unanticipated adverse effects occur as determined through the Wetland Vegetation Planting Survivorship Monitoring, then</p>	Operation

Category	Net Effect	Environmental Effects Monitoring	Timing of Monitoring
		implement corrective measures including re-planting and an extended post-construction monitoring period.	
Built Environment	Excessive ground movements in close proximity to transportation corridors (i.e., rail lines and high traffic Regional roads) due to pipe jacking would be reduced through appropriate construction methods.	<p>Ground Settlement Monitoring Program: Ensure ground conditions remain stable underneath transportation corridors during pipe jacking by carrying out the following activities:</p> <ul style="list-style-type: none"> ▪ Pre-construction monitoring to establish baseline ground conditions ▪ Monitoring of ground conditions during pipe jacking activities 	Pre-Construction and Construction
Social Environment	No specific environmental effects monitoring required for the Social Environment based on identified net effects.		
Economic Environment	No specific environmental effects monitoring required for the Economic Environment based on identified net effects.		
Cultural Environment	No specific environmental effects monitoring required for the Cultural Environment based on identified net effects.		

3.2 Commitments and Compliance Monitoring

York Region has made a number of commitments, including the mitigation and compensation measures and monitoring requirements listed in **Table 3.1**. **Table 3.2** summarizes the commitments providing the following information:

- Brief commitment description
- Commitment timing (i.e., when the commitment will be implemented)

The commitments have been grouped into one of the following two categories:

- **Environment** (i.e., Natural Environment, Built Environment, Social Environment, etc.)
- **Consultation** (in response to a particular issue raised by a consulted stakeholder)

Table 3.2: Commitments and Compliance Monitoring

Category	ID #	Commitment Description	Commitment Timing
Environment	1.	No specific commitments associated with the proposed mitigation measures and monitoring requirements identified for the Natural, Economic and Cultural Environments.	Not required
Built Environment	2.	Pre-construction surveys and video records for the 118 existing buildings immediately adjacent to the proposed construction area will be completed.	Pre-construction
Social Environment	3.	A complaint protocol will be developed prior to construction and implemented during construction to respond to potential noise and vibration related complaints from residents.	Pre-construction and Construction
Built Environment	4.	Upon completion of construction, any affected areas will be restored to their original condition including re-establishing onsite landscaping (i.e., plants, trees, etc.).	Post-construction
Social Environment	5.	The construction area or zone will move along the proposed alignment so that construction activities will not remain in any particular location for an extended period of time	Construction
Built Environment	6.	In all cases, the affected roads will be reconstructed to previous or better conditions	Construction and Post-construction
Consultation	7.	Affected residents and business owners immediately adjacent to construction will be notified of construction activities (i.e., road/lane closures, municipal service/utility disruptions, driveway access) a minimum of 24 hours prior to construction in their immediate area.	Construction
Consultation	8.	A Traffic Management Plan, including temporary detours and maintaining local access to residences and businesses during construction, will be prepared and implemented prior to constructing the new forcemains	Pre-construction, construction
Consultation	9.	York Region will contact affected property owners to initiate easement discussions in accordance with their policies	Pre-construction

Section 4.0 Proposed On-going Consultation Plan

York Region is proposing an on-going consultation plan during construction and operation of the proposed YDSS Modifications. In particular, the following activities are proposed:

Review Agencies

- York Region will consult with review agencies through meetings and correspondence on an as-needed basis during design and construction to discuss issues related to their agency's mandate, such as the permits and approvals required prior to construction or operation.
- York Region will consult with local municipalities, as appropriate, to potentially coordinate the construction of local infrastructure projects with the YDSS Modifications.

First Nations

- As outlined in the "Protocol for First Nations Consultation", York Region will consult with First Nations during design and construction to identify and address specific cultural and heritage interests that First Nations may have and potential impacts to established or asserted Aboriginal or Treaty rights or Claims within the Study Area.

Public

- York Region will inform residents of construction activities. Examples of notification and consultation activities that may be undertaken include:
 - Notifications to residents and businesses in the vicinity of the construction activities informing them of the duration and nature of construction, road or lane closures, and the traffic management plan in their area
 - Project webpage on the York Region website with information about upcoming construction activities a repository of reports, and contact information
 - Topic-specific meetings with community groups, or individual stakeholders on an as-needed basis
- York Region will continue to consult with property owners to obtain permanent and temporary easements along the routes for the proposed YDSS Modifications forcemains, where required, during design and construction.

Section 5.0

Approvals Required for the York Durham Sewage System Modifications

There are a number of municipal, provincial and federal approvals anticipated in order to implement the YDSS Modifications. York Region will obtain all the required permits and approvals prior to implementing the YDSS Modifications.