Highway 427 Expansion Project

Design and Construction Report

Project Number 16M-01172-11

Document Number	**H427-0-ENV-REP-074-B**

January 31, 2019

THE PUBLIC RECORD

This Design and Construction Report (DCR) is being carried out in accordance with the approved environmental planning process for projects under the Ontario Ministry of Transportation (MTO) *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000).

A copy of this document has been submitted to the following office of the Ontario Ministry of the Environment, Conservation and Parks (MECP) to fulfill the requirements of the MTO Class EA.

Ministry of the Environment, Conservation and Parks
Central Region Office
5775 Yonge Street, 8th Floor
North York, Ontario M2M 4J1

This report is available online for review at www.427expansion.ca, as well as the following review locations between **January 31, 2019** to **March 2, 2019** during regular business hours:

MECP EA File #: TC-CE-02

Ministry of Environment, Conservation and Parks Environmental Assessment and Permissions Branch 135 St. Clair Avenue West, 1st Floor, Toronto, ON M4V 1P5 Tel: (416) 314-8001	**Ministry of Transportation** Central Region Major Projects Office 159 Sir William Hearst Avenue, 7th Floor, Toronto, ON M3M 0B7 Tel: (416) 235-4299
City of Vaughan Clerk's Office 2141 Major Mackenzie Drive, Vaughan, ON L6A 1T1 Tel: (905) 832-2281	**Regional Municipality of York Clerk's Office** 17250 Yonge St., Newmarket, ON L3Y 6Z1 Tel: (905) 895-1231
Kleinburg Library 10341 Islington Avenue N., Vaughan, ON L0C 1C0 Tel: (905) 653-7323	**Toronto Public Library – Humberwood Library** 850 Humberwood Boulevard, Etobicoke, ON M9W 7A6 Tel: (416) 394-5210
Etobicoke Clerk's Office 399 The West Mall, Main Floor, South Block Toronto, ON M9C 2Y2 Tel: (416) 394-2516	**LINK427 Project Office** 1 Royal Gate Boulevard, Woodbridge, ON L4L 8Z7
Regional Municipality of Peel Clerk's Office 10 Peel Centre Drive, Brampton ON L6T 4B9 Tel: (905-791-7800)	**LINK427 Project Website** www.427expansion.ca

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HOW TO COMMENT

Interested persons are encouraged to review this DCR and provide comments by **March 2**, 2019.

Comments and information are being collected to assist LINK427 in meeting the requirements of the Ontario Environmental Assessment Act. Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act.

With the exception of personal information, all comments will become part of the public record. Comments on this DCR can be provided by mail, e-mail, or online to:

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If you have any accessibility requirements to participate in this project, please contact one of the Project Team members listed above.

Des renseignements sont disponibles en français en composant 1-888-595-3152.

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

ACRONYMS

AFP	Alternative Financing & Procurement
ANSI	Area of Natural and Scientific Interest
AODA	Accessibility for Ontarians with Disabilities Act
CEAA	Canadian Environmental Assessment Act
CISEC	Certified Inspector of Sediment and Erosion Control (CISEC)
CMP	Compliance Monitoring Program
CPR	Canadian Pacific Railway
COS	Contamination Overview Study
DCR	Design and Construction Report
DSS	Designated Substance Survey
DSMP	Drainage and Sediment Management Plan
EA	Environmental Assessment
EASR	Environmental Activity and Sector Registry
EMP	Earth Management Plan
EMS	Environmental Management System
EQMP	Environmental Quality Management Plan
ESA	Endangered Species Act
ESAs	Environmentally Significant Areas
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
FoS	Factor of Safety
GHG	Green House Gas
GPL	General Purpose Lanes
HOV	High Occupancy Vehicle
HVA	Highly Vulnerable Aquifers
IO	Infrastructure Ontario
LPD	Litres Per Day
MAG	Municipal Advisory Group
MASL	Metres Above Sea Level
MBCA	Migratory Birds Convention Act
MBGS	Metres Below Ground Surface
MBR	Migratory Bird Regulations
MECP	Ministry of the Environment, Conservation and Parks
MNRF	Ministry of Natural Resources and Forestry
MTO	Ministry of Transportation
NBL	Northbound Lanes
NOX	Oxides of Nitrogen
ORM	Oak Ridges Moraine
OEAA	Ontario Environmental Assessment Act

OPSS	Ontario Provincial Standard Specification
OHSA	Occupational Health and Safety Act
PIC	Public Information Centre
PSW	Provincially Significant Wetlands
PTTW	Permit to Take Water
PVMS	Portable Variable Message Signs
ROW	Right-Of-Way
SAR	Species at Risk
SBL	Southbound Lanes
SCS	Site Condition Standard
SWM	Stormwater Management
TESR	Transportation Environmental Study Report
TRCA	Toronto and Region Conservation Authority
TSP	Total Suspended Particulates
TMP	Traffic Management Plan
TSS	Total Suspended Solids
VRP	Vegetation Restoration Plan
WCMP	Waste and Contamination Management Plan
ZOI	Zone of Influence

Executive Summary

The Ministry of Transportation (MTO) and Infrastructure Ontario (IO) has selected LINK427 to undertake the design, build, finance and maintenance of the Highway 427 Expansion project in the City of Vaughan and the City of Toronto. The scope of work includes the design and construction of the following:

- A new 6.6 km extension of Highway 427 from Highway 7 to Major Mackenzie Drive, including:
  - eight lanes from Highway 7 to Rutherford Road;
  - six lanes from Rutherford Road to Major Mackenzie Drive;
  - three new interchanges (Langstaff Road, Rutherford Road and Major Mackenzie Drive); and
  - new median managed lanes.
- The widening of the existing Highway 427 corridor from Finch Avenue to Highway 7 for a total length of 4.0 km, including:
  - from six to eight lanes between Finch Avenue to south of Steeles Avenue;
  - from four to eight lanes, from south of Steeles Avenue to Highway 7; and
  - new median managed lanes

This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the Ministry of Transportation (MTO) *Class Environmental Assessment for Provincial Transportation Facilities* (2000) (MTO Class EA) and builds upon the approved Environmental Assessment Report (EA) (January 2010) for the Highway 427 Extension. A separate TESR was completed in 2013 for the widening of the existing Highway 427 between Albion Road to Highway 7. Subsequently a Transportation Environmental Study Report (TESR) was completed in 2016 to add additional lanes to the proposed Highway 427 extension.

This Design and Construction Report (DCR) (referred to as DCR #4, because it is the fourth in a series of DCRs completed to date for this project) includes an overview of the refinements that have been made to the preliminary design through the detail design process as the project has proceeded through the detail design process. Additionally, DCR #4 documents the public and stakeholder consultation undertaken as part of the detail design, an assessment of the potential effects of the proposed detail design and identification of measures proposed to mitigate the anticipated adverse effects.

Consultation included correspondence, meetings and/or conversations with Government Ministries (Ministry of Environment, Conservation and Parks, Ministry of Natural Resources), local municipalities (City of Toronto, City of Vaughan, Regional Municipality of York) and the Toronto and Region Conservation Authority (TRCA). Consultation also includes a 30-day public review period from **January 31, 2019** to **March 2, 2019**. Notice of this public review period has been issued by letter, through newspaper notices and on the project website to advise the public, project stakeholders and agencies of the start of the review period and locations where the DCR will be available for review. Any subsequent DCRs for this project will also be made available for public review for a period of 30 days.

During detail design, LINK427 undertook a design optimization process to refine the preliminary design presented in the Individual EA (2010), and subsequent TESRs (2013 and 2016) in order to reflect available opportunities for improvement. The most substantial refinements from the preliminary design documented in this DCR are to the design of new overpass structures at the future extension of John Lawrie Street, Rutherford Road, and the approach to stormwater management and drainage, including roadside swales and ponds in the Extension of Highway 427 (north of Highway 7). In addition, this DCR #4 also documents the design and associated construction works relating to new Overpasses at Rutherford Road, pavement markings, roadside barriers, electrical lighting, traffic lights, traffic signage Intelligent Transport Systems (ITS). This work is scheduled to commence in the spring of 2019, and will continue until project completion which is anticipated by 2021.

Both public and stakeholder consultation have been carried out in accordance with the approved environmental planning process for Group 'A' projects under the MTO Class EA. This involved issuing a Notice of Commencement for detail design and construction, which included newspaper notifications, a project website and letters to project

contacts/stakeholders carried forward from the preliminary design phase of the project. Consultation was also carried out with Indigenous Communities, the Ministry of Natural Resources and Forestry (MNRF), the Ministry of Environment, Conservation and Parks (MECP), TRCA, municipalities, utility companies and property owners within a 2.0 km radius of the project. A Public Information Centre (PIC) was also held (the third in the series of PICs undertaken for this project) to provide the public and stakeholders an opportunity to review and comment on the proposed works, including mitigation measures regarding DCR #4.

The Project Lands are composed largely of agricultural, residential, industrial, commercial and recreational land uses. There are no Provincially Significant Wetlands (PSWs), provincially or regionally Significant Areas of Natural or Scientific Interest (ANSIs) or Environmentally Significant Areas (ESAs) within the Lands. Rainbow Creek and West Robinson Creek are the two main vegetated valley crossings.

Appropriate mitigation measures will be implemented to minimize potential impacts to wildlife and wildlife habitat. The contractor will avoid works within the migratory bird nesting period and will follow best management practices related to encounters with wildlife during construction.

Rainbow Creek and West Robinson Creek including their associated valley systems are main tributaries of the Humber River. Mitigation measures will be implemented to minimize impacts to these watercourses during construction which include sediment and erosion control measures to prevent sediment laden runoff from entering the watercourses.

There are potential construction related impacts to groundwater, however environmental impacts due to groundwater pumping during construction are not anticipated as dewatering at the sites will be low volume, from less than 50,000 Litres per day (LPD) to 100,000 LPD. The Transportation Environmental Study Report (TESR), dated January 2016 describes in detail the potential impacts from construction and the proposed mitigation measures that are to be followed when impacts are identified. The hydrogeological assessment report prepared by Link427 in October 2018 also provide the guidelines for the monitoring and mitigation plan that will remain effective during construction period of this project. The impacts identified were re-evaluated and updated based on LINK427's review and assessment of dewatering requirements and are outlined further in **Section 6.1**.

There are no impacts to the existing or future land uses within the Lands as a result of the proposed DCR #4 works as these works are contained with the existing MTO Right-of-way (ROW) outlined in the previous EAs. No additional property is required for the construction works proposed in DCR #4.

A Noise By-law exemption has been obtained from the City of Vaughan for the construction activities associated with DCR #4. Some night work construction is anticipated in the City of Vaughan as the project construction schedule dictates. All works within the City of Vaughan that are included in this DCR will be completed adhering to the applicable Noise Control By-laws, LINK427's Construction Noise and Vibration Plan and the MECP Conditions of Approval. The City of Toronto has stated LINK427 that no noise bylaw exemption is required for works within the City of Toronto.

The construction activities for DCR #4 are not anticipated to result in the production of excess soils that require offsite management. However, should there be any excess soils, they will be managed in accordance with the projects Waste and Contamination Management Plan, the projects Earth Management Plan and with Ontario Provincial Standard Specification (OPSS) 180 (Management of Excess Materials).

Mitigation measures to minimize impacts to air quality are focused on managing equipment and vehicles. Non-chloride dust suppression methods will be applied whenever possible during construction of the highway. Other dust suppressants will be examined if safety or performance concerns warrant.

The results of previous archaeological assessments in the Lands indicated that the Lands are clear of archaeological potential and no further archaeological assessments are required. The construction activities covered in DCR #4 are within the vicinity of the Colerain Cemetery and McKinnon Site which are protected heritage features; however, construction will not impact any built or cultural heritage landscapes within the Lands.

1 Project Overview

1.1 Project Team and Background

The Ministry of Transportation (MTO) and Infrastructure Ontario (IO) has selected LINK427 to undertake the design, build, finance and maintenance of the Highway 427 Expansion project in the City of Vaughan and the City of Toronto.

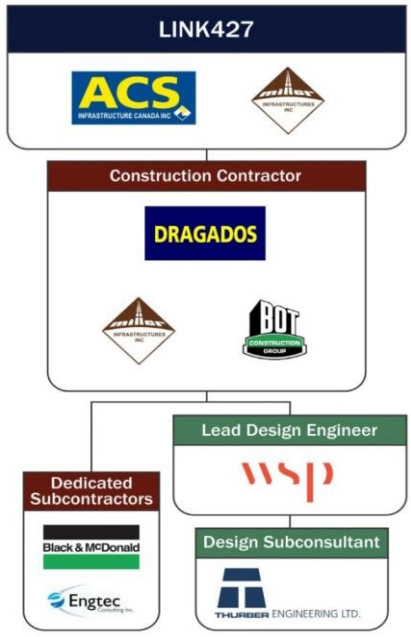
The project has been procured as an Alternative Financing & Procurement (AFP) project, which is an innovative way of financing and procuring large, complex infrastructure projects. Under the AFP model, provincial ministries and/or project owners establish the scope and purpose of a project while design and construction work is financed and carried out by the private sector. In the case of the Highway 427 Expansion, LINK427 will be responsible for the maintenance, construction, lifecycle repair and renewal of the highway for the next 30 years.

The organizational structure of LINK427 is shown in **Figure 1** and is composed of the following private sector companies:

Developer: ACS Infrastructure Canada Inc. and Brennan Infrastructures Inc. (a member of the Miller Group of Companies)

- Construction: Dragados Canada Inc., Brennan Infrastructures Inc. and BOT Infrastructure Ltd.
- Design: WSP Canada Group Ltd. and Thurber Engineering Ltd.
- Maintenance: ACS Infrastructure Canada Inc. and Brennan Infrastructures Inc.

Figure 1: Organization Structure



1.2 Previous EA Studies: Preliminary Design

1.2.1 Highway 427 Extension Transportation Corridor Environmental Assessment Report (2010)

In July 2006, the Province of Ontario released the *Growth Plan for the Greater Golden Horseshoe* which was referred to during preliminary design. An updated version of the Growth Plan was released in 2017 which was referred to during detail design. The Growth Plan outlines objectives and policies for the management of growth and development and planning decisions within the Greater Golden Horseshoe over the next 30 years.

The *Growth Plan* supports improving access to inter-modal facilities to enhance the movement of people and goods and to provide access to major employment areas. As per this direction, the MTO initiated an Individual Environmental Assessment (EA) under the Ontario *Environmental Assessment Act* (OEAA) in 2010 for the extension of Highway 427 to address transportation problems at the existing Highway 427 terminus (referred to as the Individual EA (2010) in this report). The Individual EA was conducted in accordance with the planning process documented in the *Highway 427 Transportation Corridor Environmental Assessment Terms of Reference* that was approved by the Minister of the Environment, Conservation and Parks (MECP) in November 2005.

The purpose of Individual EA was to develop the Recommended Plan for the extension of Highway 427 to meet the following objectives:

- Addressing the existing and short-term transportation problems related to the current Highway 427 terminus, truck traffic accessibility to and from the Canadian Pacific (CP) Vaughan Intermodal Facility, and the impact on inter-regional traffic in the Peel-York boundary area;
- Identifying and protecting required property for any proposed transportation corridor and allowing planned development to occur outside of the transportation corridor;

- Ensuring that the alternatives / preferred solution would not preclude or predetermine planning for the other future transportation corridors or a future extension of the transportation corridor northerly, if ever required.

In November 2010, the Ontario Minister of Environment and Climate Change, with the approval of Cabinet, decided to allow the Highway 427 Extension Transportation Corridor Environmental Assessment Report (Individual EA) (January 2010) to proceed, subject to conditions. The approved Recommended Plan was for a 6.6 km transportation corridor from Highway 7 to Major Mackenzie Drive, including a highway and dedicated transitway, located in the City of Vaughan, York Region.

The detail design accounts for future expansion of Rutherford Road, which accommodates 6 lanes of traffic and future 1.9 m boulevards on both sides of the road, a sidewalk on the north side and a multi-use path on the south. The Recommended Plan also includes the construction of 4 lanes of traffic lanes from Rutherford Road to Major Mackenzie Drive, a 60 m wide transitway right-of-way (ROW) from Highway 7 to north of Major Mackenzie Drive in each direction, and commuter parking lot facilities. The highway expansion also included construction of new interchanges at Langstaff Road, Rutherford Road, and Major Mackenzie Drive.

1.2.2 Highway 427 from Albion Road to Highway 7, Preliminary Design and Class EA Study (2013)

In 2013, the MTO undertook a Class EA to develop a long-term strategy to address needs along the existing Highway 427 transportation corridor between Albion Road and Highway 7. The study followed the approved environmental planning process for Group 'B' undertakings under the MTO *Class Environmental Assessment for Provincial Transportation Facilities* (2000) and was documented in a Transportation Environmental Study Report (TESR, 2013).

The purpose of the Class EA was to develop the Recommended Plan for the existing Highway 427 between Albion Road and Highway 7, to meet the following objectives:

- Identifying interim and ultimate transportation needs of Highway 427 between Albion Road and Highway 7;
- Completing a preliminary design of the technically preferred plan; and
- Completing a Feasibility Study for the widening of the four Highway 427 Overpasses at Highway 407 and the 427N-407E ramp, and identifying ultimate bridge cross section requirements to allow for the ultimate widening of Highway 427 through the 407 Interchange.

The key elements of the Recommended Plan included widening the existing Highway 427 from 4 to 8 lanes from 1.5 km south of Albion Road to Highway 7 for a total length of 4 km. The Recommended Plan also included median managed lanes; widening and rehabilitation of existing bridges where required to accommodate the widening of Highway 427; modifications to the Highway 407 / Highway 427 interchange; and drainage and illumination improvements.

1.2.3 Highway 427 Extension Widening from Highway 7 to Major Mackenzie Drive, Preliminary Design and Class EA Study (2016)

Subsequent to the completion of the Individual EA (2010) for the Highway 427 extension and in response to future projected traffic demands, MTO reviewed the original approved EA and determined a potential need for one additional lane in each direction. For that reason, MTO undertook a Class EA in 2016 to amend the Recommended Plan for the proposed Highway 427 extension to allow for an additional lane in each direction. The study followed the approved environmental planning process for Group 'B' undertakings under the MTO *Class Environmental Assessment for Provincial Transportation Facilities* (2000) and was documented in a Transportation Environmental Study Report (TESR, 2016).

The purpose of the Class EA was to develop the Recommended Plan for the widening of the Highway 427 Extension within the median (one northbound lane and one southbound lane).

The key elements of the Recommended Plan include the widening of the Highway 427 Extension by one additional lane in each direction (to a total of 8 lanes from Highway 7 to Rutherford Road, and 6 lanes from Rutherford Road to Major Mackenzie Drive), median managed lanes, and drainage and illumination improvements.

1.3 Current Undertaking: Detail Design Project Description

The purpose of the current detail design study is to refine the approved Recommended Plan from the preliminary design for the Highway 427 Expansion, as documented in the Individual EA (2010) and subsequent TESRs (2013 & 2016). As the project is being undertaken using an AFP approach, it is LINK427's responsibility to carry forward commitments identified during preliminary design into the detail design for project implementation and construction.

The overall scope of work being undertaken as part of detail design includes the design and construction of the following components:

- The widening of the existing Highway 427 corridor from Finch Avenue to Highway 7 for a total length of 4.0 km, including:
  - from six to eight lanes between Finch Avenue to south of Steeles Avenue;
  - from four to eight lanes, from south of Steeles Avenue to Highway 7; and
  - new median managed lanes.
- A new 6.6 km extension of Highway 427 from Highway 7 to Major Mackenzie Drive, including:
  - eight lanes from Highway 7 to Rutherford Road;
  - six lanes from Rutherford Road to Major Mackenzie Drive;
  - three new interchanges (Langstaff Road, Rutherford Road and Major Mackenzie Drive); and
  - new median managed lanes.

The location of the proposed works are shown in **Figure 2**.

This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the MTO *Class Environmental Assessment (*Class EA) *for Provincial Transportation Facilities* (2000).

To fully document all of the components of the detail design for the Highway 427 Extension Project while allowing construction to commence, it was necessary to divide the works into multiple DCRs. To date, three DCRs have been prepared and published. The public consultation, which commenced with DCR #1, will continue throughout the project and will be documented in each subsequent DCR. DCR #2 was completed and made available for a 30-day public review period from **April 10, 2018** to **May 11, 2018**. DCR #3 was completed and made available for a 30-day public review period from **August 2, 2018** to **August 31, 2018**. This is the fourth DCR completed for this project and will be referred to as DCR #4 throughout this report.

Table 1 provides a summary of how the project components have been divided amongst all the previous DCRs and the division of project components for the current fourth DCR and the anticipated fifth DCR.

DCR #4 documents the detail design for the following components:

- Construction of new Overpasses at Rutherford Road and at the future extension of John Lawrie Street
- Electrical (street lighting, traffic lights etc.)
- Guiderail, barriers and pavement markings
- Intelligent Transport Systems (ITS)
- Traffic Signage
- Stormwater Management and Drainage

Table 1: DCR Phasing

DCR #	Project Area	Construction Work Addressed
1	■ Finch Avenue to Major Mackenzie Drive	■ Vegetation / brush clearing ■ Preloads (including grubbing) at the Major Mackenzie Drive and Rutherford Road Interchanges and CP Rail / McGillivray Road overpass. ■ Concrete stockpiling south of Langstaff Road within the lands ■ Advanced utility works
2	■ South of Finch Avenue to Major Mackenzie Drive	■ Construction Staging including detours on Highway 427, Finch Avenue, Albion Road, Steeles Avenue, Highway 7, Zenway Boulevard, Huntington Road, and McGillivray Road. ■ Rehabilitation and/or Widening of Highway 427 from South of Finch Avenue to Highway 7. ■ Electrical works along Highway 427 from South of Finch Avenue to Highway 7. ■ Fencing (security fencing throughout the limits) ■ Foundations – bridge/retaining wall footings and / or deep foundations (piles/caissons) at the CNR Overpass, Albion Road Overpass, 407ETR off-ramp over Albion Road, Steeles Avenue Overpass, Highway 7 retaining walls, and Zenway Boulevard Underpass. Grubbing, stripping of top soil, ditching, highway construction and final grading from south of the Finch Avenue to Highway 7 inclusive of the Finch Avenue Interchange, Albion Road, Steeles Avenue, the 407ETR Interchange, Highway 7, and the Highway 7 Interchange. Components of the new interchanges at Langstaff Road, Rutherford Road, and Major Mackenzie Drive will be constructed as well. New ramps will be constructed at Highway 7 in addition to the rehabilitation and reconstruction of the existing ramps. Zenway Boulevard will be detoured to the south to allow for the reconstruction of Zenway Boulevard over the proposed 427. ■ Highway Drainage and Water Resources (ditching, subdrains, sewers and culverts) throughout the Highway 427 corridor from south of Finch Avenue to north of Major Mackenzie Drive. ■ Removals of select portions of existing roads, existing drainage structures etc. along the existing Highway 427 from south of Finch Avenue to north of Major Mackenzie Drive. ■ Pavement (granulars, concrete paving, and asphalt) throughout the Highway 427 corridor from south of Finch Avenue to north of Major Mackenzie Drive. ■ Structures (overpass and underpass) including the widening/rehabilitations on the Finch Avenue Underpass, three Humber River water crossings, CNR Overpass, Albion Road Overpass, 407ETR off-ramp over Albion Road Overpass, Steeles Avenue Overpass, 407ETR Overpass, Highway 7 Underpass, and construction of the new Zenway Boulevard Underpass. ■ Traffic (lane closures) consisting of short term off-peak hours traffic management on Highway 427 from south of Finch Avenue to Zenway Boulevard (including ramps at Finch Avenue, 407ETR, and Highway 7), Finch Avenue, Albion Road, Steeles Avenue, 407ETR, Highway 7, Zenway Boulevard, Rainbow Valley Boulevard, Vaughan Valley Boulevard, New Enterprise Way, Langstaff Road, Rutherford Road, McGillivray Road, Major Mackenzie Drive, Huntington Road, and Barons Street. ■ Utility relocation, including but not limited to Rogers, Bell, Enbridge, Alectra, Hydro One, Toronto Hydro and others throughout the limits of the Project. ■ Seeding and sodding throughout the limits of the Project.

DCR #	Project Area	Construction Work Addressed
		■ Demolition of Farm Structures (once ESA permits for Species at Risk (SAR) Bat and Barn Swallow is received). ■ Closure of Huntington Road north of Major Mackenzie Drive and south of CP Rail line. ■ Closure of McGillivray Road at Rutherford Road. ■ Lane detours, diversions and traffic Management for Highway 427 (from south of Finch Avenue to Zenway Boulevard, ramps included), Finch Avenue, Albion Road, Steeles Avenue, Highway 7, and Zenway Boulevard.
3	■ Highway 7 to Major Mackenzie Drive	The works necessary to undertake the following: ■ The construction of new Highway 427 bridges (NBL & SBL) over Rainbow Creek; ■ Replacement of the existing Langstaff Road culvert with a new precast concrete arch structure over Rainbow Creek; ■ Construction of a new interchange bridge structure at Langstaff Road including detours/staging for the construction of Langstaff Road using previously constructed components (as described in DCR #2); ■ Construction of new Highway 427 bridges (NBL & SBL) over West Robinson Creek; ■ Construction of new Highway 427 bridges (NBL & SBL) over the CPR rail corridor & McGillivray Road; ■ Replacement of the existing Major Mackenzie Drive culvert with a bridge over West Robinson Creek; and ■ Construction of a new interchange bridge structure at Major Mackenzie including detours/staging for the construction of Major Mackenzie Drive using previously constructed components (as described in DCR #2).
4	■ Highway 7 to Major Mackenzie Drive	The works necessary to undertake the following: ■ Construction of new Overpasses at Rutherford Road and at the future extension of John Lawrie Street. ■ Electrical (street lighting, traffic lights etc.) for the Widening and Extension of Highway 427. ■ Guiderail and barriers for the Extension of Highway 427. ■ Intelligent Transport Systems (ITS) for the Widening and Extension of Highway 427. ■ Pavement Markings for the Extension of Highway 427. ■ Traffic Signage for the Extension of Highway 427. ■ Stormwater Management and Drainage for the Extension of Highway 427.
5	■ South of Finch Avenue to Major Mackenzie Drive	■ Landscaping (planting of trees and shrubs) from south of Finch Avenue to north of Major Mackenzie Drive, including the existing and new interchanges at Finch Avenue, Highway 407, Highway 7, Langstaff Road, Rutherford Road, and Major Mackenzie Drive, and all crossing roads. ■ Vegetation restoration from south of Finch Avenue to north of Major Mackenzie Drive, including the existing and new interchanges at Finch Avenue, Highway 407, Highway 7, Langstaff Road, Rutherford Road, and Major Mackenzie Drive, and all crossing roads. ■ Fisheries and Endangered Species Act mitigation.

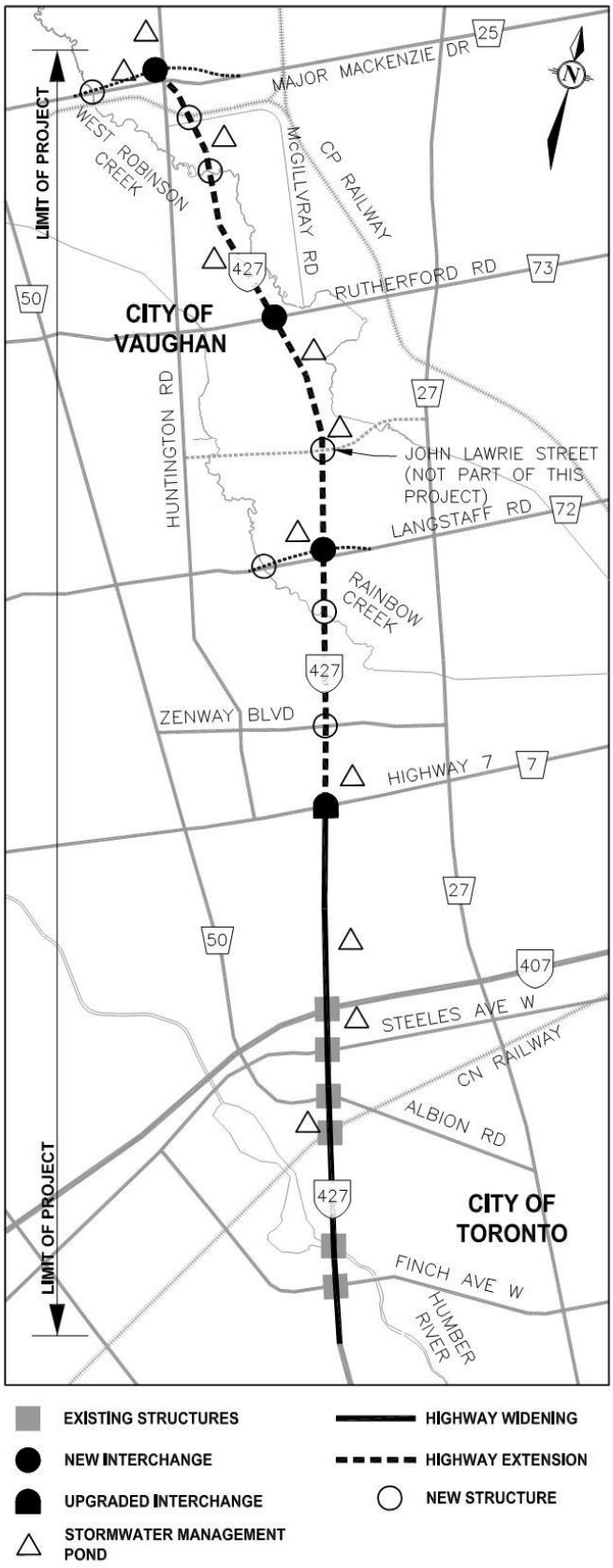


Figure 2: Project Limits Key Map

1.4 Purpose of the Design and Construction Report

This DCR #4 has been prepared in accordance with the requirements of the approved environmental planning process for Group 'A' undertakings under the MTO Class EA. DCR #4 is intended to document the following:

- The Class EA process followed;
- Description of the consultation program carried out during detail design;
- Changes in existing environmental conditions from those documented during preliminary design;
- Description of the Recommended Plan developed during detail design for the works outlined in DCR #4;
- Description of the rationale for any changes to the design as approved in preliminary design;
- An explanation of how commitments during preliminary design have been incorporated into the detail design; and
- Anticipated environmental impacts, proposed mitigation measures and commitments to future work.

As required under the Class EA, this DCR is being made available to the public, stakeholders, agencies and Indigenous communities for a 30-day review period between **January 31, 2019** to **March 2, 2019** online at www.427expansion.ca, as well as the following review locations:

- Ministry of Environment, Conservation and Parks, Environmental Assessment and Permission Branch
- Ministry of Transportation, Major Projects Office, Central Region
- City of Vaughan (Clerk's Office)
- Regional Municipality of York (Clerk's Office)
- Kleinberg Library, Vaughan
- Toronto Public Library – Humberwood Library
- Regional Municipality of Peel (Clerk's Office)
- Etobicoke Civic Centre
- LINK427 Project Office

Any concerns during this review period should be discussed with LINK427 and all comments will be considered by LINK427. Significant concerns will be resolved through ongoing consultation with concerned / affected stakeholders and additional studies will be undertaken to address concerns, if required. If significant concerns are not identified during the review period, further documentation will not be prepared and LINK427 may commence construction of the elements as described in DCR #4 without further notice, subject to receiving required permits and approvals and the commitments in this DCR.

2 Environmental Assessment Process

2.1 Ontario Environmental Assessment Act

The MTO's *Class Environmental Assessment for Provincial Transportation Facilities* was approved under the *Ontario Environmental Assessment Act* (OEAA) in fall 1999, and was amended in 2000. This planning document defines groups of projects and activities and the environmental assessment process that MTO has committed to follow for these undertakings. Provided that this process is followed, projects and activities included under the MTO Class EA do not require formal review or approval under the OEAA. There is an opportunity at any time during the MTO Class EA process for interested persons to provide comments and review outstanding issues.

The MTO Class EA process is principle-based. Where appropriate, this DCR references the principles applied and how they were achieved during the environmental assessment process.

The following principles underlie the MTO Class EA process:

Transportation engineering principles

The transportation engineering principles ensure that the project provides an effective and safe transportation system.

Environmental protection principles

The environmental protection principles ensure that the project provides effective environmental protection. Existing environmental conditions, sensitivities and environmental protection requirements were assessed and are documented in this DCR. Mitigation measures have been developed to avoid, prevent, and/or reduce any residual adverse effects.

External consultation principles

The consultation principles ensure that there is effective consultation with stakeholders early and throughout the study process. Throughout this study, local elected representatives, Indigenous communities, provincial and federal agencies, local municipalities, interest groups, and members of the general public were encouraged to participate through a proactive consultation plan that included letters, newspaper notices, brochures and a Public Information Centre (PIC).

Evaluation principles

The evaluation principles ensure that an effective evaluation process is in place to provide a balance between transportation engineering and environmental protection principles and to fulfill the project goals. The evaluation process used to assess planning and design alternatives was traceable, replicable and understandable by those who may be affected by the decisions.

Documentation principles

The documentation principles ensure that there is effective environmental documentation and that the opportunity to challenge the project is provided. The environmental documentation required for this project is this DCR, which will be filed for a 30-day public review period.

Environmental clearance principles to proceed

As part of the preliminary design, an Individual EA for the Highway 427 Extension was approved, with conditions, by the MECP in November 2010, as described in **Section 1.1.1**. Subsequent TESRs were completed in 2013 for the widening of existing Highway 427 between Albion Road to Highway 7 and again in 2016 to add additional lanes to the proposed Highway 427 extension.

Following the 30-day public review of this DCR, the project will have met the requirements of the MTO Class EA. Any comments and concerns received through the 30-day public and agency review process, will be incorporated into the final design. LINK427 will obtain permits and approvals to implement the works in accordance with the EA.

2.2 Canadian Environmental Assessment Act

On July 6, 2012 *Canadian Environmental Assessment Act* (CEAA) (2012) came into effect which focuses on assessment of "designated projects". Projects can be designated projects under CEAA (2012) if they meet the criteria for physical activities under the schedule, Sections 2 to 4.

The expansion of Highway 427 is not considered a "designated project". Therefore, an assessment under CEAA is not required.

3 Consultation Process

3.1 Previous Consultation Undertaken during Preliminary Design

Consultation during preliminary design was consistent with the requirements for the Individual EA under the OEAA, and Group 'A' projects under the MTO Class EA. Consultation activities included on-going consultation with federal, provincial, and municipal agencies, Indigenous communities, local elected representatives, interest groups and members of the public.

The following is a summary of preliminary design consultation activities:

External Agency Consultation

The Project Team consulted and held meetings with federal and provincial agencies, local elected officials, municipalities, utilities, interest groups and Municipal Advisory Groups (MAG). The MAG included representatives from the Region of Peel, City of Brampton, Town of Caledon, York Region and City of Vaughan.

Meetings with GO Transit / Metrolinx, the Toronto Transit Commission (TTC), and the 407 ETR were held as part of the 2013 EA study.

Meetings were held with the MECP, the Ministry of Natural Resources and Forestry (MNRF), as well as the Toronto and Region Conservation Authority (TRCA), regarding various elements of the Highway 427 Extension and proposed widening as outlined in the TESR (2016).

Public Information Centres

Three rounds of PICs were held during the Individual EA and one PIC was held for each of the subsequent EAs (2013 and 2016). The PICs were organized as "drop-in" style sessions with representatives from MTO and the Project Team available to answer questions and discuss the project. An advanced session was offered for any interested local elected representatives, Indigenous community representatives and external agency representatives.

3.2 Consultation Undertaken during Detail Design

Consistent with the requirements for Group 'A' projects under the MTO Class EA, consultation with federal, provincial, and municipal agencies, Indigenous communities, local elected representatives, interest groups and members of the public was on-going over the course of the Detail Design study.

The consultation program was carried out based on the following principles:

- All reasonable efforts are made to ensure that potentially affected or interested parties are given the opportunity to participate in the consultation process;
- Stakeholders may provide input at any time during the study; however, structured opportunities for input occur at key study stages;
- LINK427 shall constructively address input received during the consultation process;
- LINK427 shall make reasonable efforts to resolve concerns; and
- Consultation plans and processes are sufficiently flexible to permit responses to new issues that arise as the study proceeds.
- Stakeholders and the public were kept informed of the study and were asked for input through the use of conventional, effective consultation methods including:
- Notices published in local newspapers;
- Direct letter mailings to external agencies, local elected officials, and Indigenous communities;
- A PIC to provide stakeholders with an opportunity to review and comment on the overall study process, the Class EA process, the proposed design, and the proposed mitigation measures; and
- Notice to all study participants and the public announcing submission of the DCR for public review and comment.

3.2.1 Project Website

A project website (www.427expansion.ca) was created and provides project information, updates, and documents to interested stakeholders. The website includes information on the project background, LINK427, frequently asked questions, public involvement, and provides a comment submission tool.

3.2.2 Study Contact List

A contact list of local elected officials; Indigenous communities; local, provincial and federal agencies; local municipal government; utilities; school boards; and interest groups was developed, building on contact lists developed during preliminary design. Over the course of the study, any individuals or organizations expressing interest in the project were added to the contact list.

The contact list includes the following individuals and organizations:

Local Elected Officials	MPP – Etobicoke North MPP – Vaughan – King MPP – Vaughan - Woodbridge	MP – Etobicoke North MP – Vaughan-King MP – Vaughan - Woodbridge
Provincial and Federal Government Agencies	Environment Canada Transport Canada Fisheries and Oceans Canada Ministry of Natural Resources and Forestry Ministry of Health & Long-Term Care Ministry of Tourism, Culture and Sport Ministry of Agriculture, Food & Rural Affairs Ministry of the Environment and Climate Change	Ministry of Indigenous Relations and Reconciliation Ministries of Citizenship, Immigration & International Trade Ministry of Community Safety and Correctional Services Ministry of Municipal Affairs and Housing Ministry of Energy Metrolinx Infrastructure Ontario Toronto and Region Conservation Authority
Municipalities	City of Brampton City of Vaughan Regional Municipality of Peel Town of Caledon City of Toronto Regional Municipality of York Township of King	
Indigenous Communities	Mississaugas of Scugog Island Chippewas of Rama First Nation Hiawatha First Nation Alderville First Nation Huron-Wendat Nation Six Nations of the Grand River Territory	Chippewas of Georgina Island First Nation Beausoleil First Nation Curve Lake First Nation Mississaugas of the New Credit First Nation Huron-Wendat Nation

	Wahta Mohawks First Nation Oneida Nation of the Thames Association of Iroquois and Allied Indians	Kawartha Nishnawbe First Nation Mohawks of the Bay of Quinte Union of Ontario Indians
Utilities	TransCanada Pipeline Hydro One Networks CPR Rogers Enbridge Bell Alectra	
School Boards	York Catholic District School Board Conseil scolaire de district catholique Centre-Sud Credo Christian School Toronto District School Board Conseil scolaire Viamonde	
Emergency Services	York Region Emergency Medical Services York Region Paramedic Services York Regional Police Brampton Fire and Emergency Services Peel Ambulance Dispatch City of Toronto EMS City of Toronto Fire Services City of Toronto Fire Services North Command City of Toronto Fire Services West Command	Toronto Police Service No. 33 Division Toronto Emergency Medical Services Toronto Paramedic Services Toronto Police Service Ontario Provincial Police Ontario Provincial Police - Highway Safety Division Ontario Provincial Police Facilities Section Vaughan Fire & Rescue Service notification system Vaughan Fire Chief and Deputy Fire Chief
Interest Groups	407ETR Canadian Pacific Railway CN Rail Toronto Transit Commission (TTC)	York Federation of Agriculture Toronto Environmental Alliance Toronto Coalition for Active Transportation Greater Toronto Airports Authority

3.2.3 Notice of Commencement of Detail Design and Construction

3.2.3.1 Public Notification

English and French Notices were published in the following local newspapers and posted on the project website to inform the general public of the detail design study commencement and to solicit questions, concerns, and pertinent information:

- Toronto Star: August 23, 2017
- Etobicoke Guardian: August 23, 2017
- Vaughan Citizen: August 24, 2017
- Brampton Guardian: August 24, 2017
- L'Express: August 29, 2017

The notices were also distributed to the following municipal offices to be displayed on their websites and posted on community bulletin boards:

- Region of York
- City of Vaughan
- Region of Peel
- City of Brampton
- City of Toronto

In conjunction with the publication of the newspaper notice, a brochure was distributed via Canada Post Neighbourhood Mail to all residents and businesses within a 2-km radius of the project. The brochure provided details about the project, as well as provided an opportunity to submit information, comments, or questions. The brochure was distributed on August 23, 2017.

Copies of the newspaper notices and brochure are provided in **Appendix A**.

3.2.3.2 Stakeholder Notification

Individuals and organizations on the study contact list were sent a Notice of Commencement of Detail Design letter on August 23, 2017.

The purpose of the letter was to inform stakeholders of the project, as well as provide an opportunity to submit information, comments, or questions.

Copies of the notification letters are provided in **Appendix A**.

3.2.4 DCR #4 Stakeholder Consultation

Consultation with the stakeholders included on the Study Contact List have been on-going throughout the study. A number of comments were received from the stakeholders listed below relating to the scope of works addressed in DCR #4. Correspondence with Agencies such as the Ministry of Natural Resources & Forestry (MNRF) and Toronto and Region Conservation Authority (TRCA) have been ongoing regularly. Members of the LINK427 Design, Environmental, Traffic and Communications Teams, along with MTO representatives, consulted with Municipal Representatives on November 20th, 2018 to provide an overview of DCR #4. Correspondence with Municipalities including the City of Vaughan and York Region will continue throughout the project. Correspondence with emergency services and CP Rail have also been ongoing throughout the study. A summary of all comments received and how they were addressed are provided in **Appendix B – Agency Correspondence Table**. Personal information has been redacted in accordance with the *Freedom of Information and Protection of Privacy Act*.

DCR #4 stakeholder correspondence:

- Chippewas of Rama First Nation
- Regional Municipality of York
- Regional Municipality of Peel
- City of Vaughan
- Ministry of Natural Resources & Forestry
- Toronto and Region Conservation Authority
- Vaughan Bicycle User Group (BUG)

3.2.5 Indigenous Communities Consultation

In response to the Notice of Commencement of Detail Design letter, two comments were received from Huron-Wendat Nation requesting copies of the Archaeological Assessments related to the Highway 427 Expansion. The Archaeological Assessment Reports were provided.

In response to the PIC #1 Notice, a comment was received from the Chippewas of Rama First Nation advising that the letter was reviewed and shared with Council and the information was forwarded to the Williams Treaties First Nation Process Co-ordinator/Negotiator. In addition, a comment was received from Curve Lake First Nation requesting copies of any Environmental and Archaeological Assessments, as well as Design and Construction Report #1 and #2. All reports were provided. In response to the PIC #2 Notice, a comment was received from the Chippewas of Rama First Nation advising that the letter was reviewed and shared with Council and the information was forwarded to the Williams Treaties First Nation Process Co-ordinator/Negotiator. In response to the DCR #3 Notice, a comment was received from the Chippewas of Rama First Nation advising that the notice was reviewed and shared with the Council and the information was forwarded to the Williams Treaties First Nation Process Co-ordinator/Negotiator. In response to the PIC #3 Notice, an email was received from the Chippewas of Rama First Nation advising that the notice was reviewed and that the community has no concerns regarding the project but would like to stay informed of any project updates.

No requests for meetings with Indigenous Communities have been received at this time.

3.2.6 Public Information Centres

A total of three PICs have been held as part of the detail design study. The first PIC was held to present the Recommended Plan for the scope of work presented in DCR #2 on **January 25, 2018**. The second PIC was held to present the Recommended Plan for the scope of work presented in DCR #3 on **May 22, 2018** and the third PIC was held to present the Recommended Plan for the scope of work presented in DCR #4 on **September 27, 2018** at the Element Vaughan Hotel in Vaughan, Ontario**.** All PICs were held from 4pm and 8pm with a one-hour advanced session from 3pm to 4pm for invited stakeholders, including municipal representatives, MPs/MPPs, and representatives from Indigenous Communities. The PICs were organized as informal 'drop-in' style sessions with representatives from LINK427 available

to answer questions and discuss the project. Attendees were asked to sign a register and were encouraged to complete a comment sheet.

The purpose of the PICs were to provide an opportunity for stakeholders and members of the public to review and comment on the overall study process, the Environmental Assessment process, and the proposed detail design. Display panels included:

- A description of the project;
- An overview of the environmental assessment process;
- A summary of existing environmental conditions;
- A description of the study process;
- A description of the detail design;
- A summary of anticipated environmental impacts and associated mitigation measures; and
- Next steps.

Copies of the Notice of Public Information Centres as well as general comments received during the PICs are available in **Appendix A**.

PIC #3 addressed all works in DCR #4, including the construction of two new overpasses, electrical and Intelligent Transport Systems (ITS) for the entire project limits, guiderail and barriers for the Extension of Highway 427, pavement markings and traffic signage for the Extension of Highway 427 and water resources / stormwater ponds for the Extension of Highway 427. This also included changes made since the initial EA and Preliminary Design.

Eighteen (18) attendees signed the PIC #3 register and two (2) comment sheets were submitted at the PIC. Two (2) comments were submitted by email following PIC #3, one regarding the next PIC, and one clarifying whether the video showed at the PIC would be made available on the website. Comments and responses to comments received at PIC #3 are summarized in **Table 2**. Responses were provided to the individual that submitted a comment and provided contact information.

A copy of the PIC #3 display materials is included in **Appendix C**.

Table 2: Summary of Comments Received at PIC #3

Highway 427 Expansion Project Comments received from PIC #3 held September 27, 2018	Highway 427 Expansion Project Responses sent by LINK427 on October 30, 2018
Public Comment Form 1 What is the plan for maintenance of dry ponds e.g. how excess sedimentation will be removed and where to.	**Response** Thank you for your interest in the Highway 427 Expansion project. This is a response to your comment regarding the maintenance of stormwater ponds submitted at our third Public Information Centre on September 27, 2018 at the Element Vaughan Southwest. The detailed plan of the maintenance of dry ponds is still in development. Our proposed plan is currently being reviewed by the Ministry of the Environment, Conservation and Parks. We will follow-up with more details regarding stormwater maintenance once our plan has been approved. For up to date information related to project details, you can sign up for notifications at http://427expansion.ca/wp/.

Highway 427 Expansion Project Comments received from PIC #3 held September 27, 2018	Highway 427 Expansion Project Responses sent by LINK427 on October 30, 2018
	Please call 1-888-352-8085 or email ask@427expansion.ca if you have any more questions.
Public Comment Form 2 - I am happy that the project appears to be on schedule. - 2 comments: - 1) Consider a progressive opening going north. 2) Please consider providing 3 lanes northbound to Highway 407 – the merge at Finch to 2 lanes results in huge jams in the afternoon. A large volume exits onto the 407, so the 2 lanes north of that would not be as big of a bottleneck.	**Response** Thank you for your interest in the Highway 427 Expansion project. This is a response to your comments submitted at our third Public Information Centre on September 27, 2018 at the Element Vaughan Southwest. The Highway 427 Expansion Project will extend the highway 6.6 km, from Highway 7 to Major Mackenzie Drive and widen the existing highway to 8 lanes between Finch Avenue and Highway 7. Plans for north of Major Mackenzie Drive are beyond the scope of LINK427's contract with the Ministry of Transportation (MTO) and Infrastructure Ontario (IO). Please visit the MTO contact page at: http://www.mto.gov.on.ca/english/about/contact-us.shtml to inquire about future routes. Regarding the congestion northbound on Highway 427 at the Highway 407 interchange, it was through consultation between MTO staff and contractors where it was determined that the current lane configuration is the best transition from an operational and safety perspective. I would like to point out that the original configuration of Highway 427 from Finch Avenue northerly to Highway 7, prior to recent construction, has always been limited to two continuous through lanes and any additional lanes were intended for merging traffic to and from the interchange crossing roads. As part of LINK427's design submission to the Ministry of Transportation, we will take the public's concerns into consideration and explore opportunities to minimize impacts related to construction. For up to date information related to traffic disruptions, you can sign up for notifications at http://427expansion.ca/wp/. Please call 1-888-352-8085 or email ask@427expansion.ca if you have any more questions. Thank you again for taking the time to express your concerns.

4 Refinements to the Preliminary Design

The MTO Class EA process recognizes that as the design progresses through detail design more information is made available and changes to the approved preliminary design may be required. During this advancement from preliminary design to detail design, specific elements of the design are further developed which can reveal constraints and opportunities that were unknown or not fully understood at the preliminary design level of detail.

When developing the detail design for the Highway 427 Expansion project, LINK427 undertook a design optimization process using past experience and all available information to reflect the potential opportunities to refine and improve the preliminary design presented in the Individual EA (2010), and subsequent TESRs (2013 and 2016) (discussed in **Section 1.2**). This process was based on current site conditions, available/updated information and engineering technologies, and industry experience.

In general, changes to the preliminary design may occur due to:

- Unforeseen site-specific problems encountered only during subsequent detail design phases;
- Improvements in the design to provide greater environmental benefits and/or fewer adverse effects;
- Identification of opportunities that weren't prevalent during preliminary design;
- Elements of the project that were not previously envisioned;
- Circumstances that develop at time of construction;
- Issues identified in other approval processes; and
- Changes to the regulatory framework (i.e. new legislation or regulations).

The EA process must be able to account for design changes as more specific information is made available. It may be necessary to amend the EA because of such changes, so a process must be followed to consider the changes within the context of the approved EA to determine if an amendment is required based on the significance of the change. Section 9.2 of the Individual EA (2010) outlines the process to be followed to consider the changes within the context of the approved Highway 427 Transportation Corridor EA (referred to as the Individual EA (2010) in this report) and determine if an amendment is required based on the significance of the change.

MTO and/or its agent will determine the significance of the change in terms of its potential effects on the environment, a stakeholder (including the public), and/or a commitment made in the Minister approved 427 Transportation Corridor EA.

If the significance of the change is determined to be negligible or of a minor nature, no amendment to the EA would be required and the change could be documented in the DCR and implemented by MTO and/or its agent.

In this case, the detail design optimization process undertaken by LINK427 did not result in a significant change to the net effects of the design, therefore an amendment to the preliminary design is not required. The following sections provide a description of the changes and optimizations that occurred between preliminary design and detail design, and the determination that these changes result in an insignificant change from the preliminary design.

4.1 Stormwater Management and Drainage

A key component of successful road design is the ability to manage stormwater appropriately and safely. The MECP defines both stormwater and the hydrologic cycle in the following way:

> *Stormwater is rainfall and snowmelt that seeps into the ground or runs off the land into storm sewers, streams, ponds and lakes. The ultimate goal of stormwater management is to maintain the health of streams, lakes and aquatic life as well as provide opportunities for human uses of water by mitigating the effects of urban development. To achieve this goal, stormwater management strives to maintain the natural hydrologic cycle, prevent an increased risk of flooding, prevent undesirable stream erosion, and protect water quality.*

The hydrologic cycle describes the continuous circulation of water between the oceans, atmosphere and land. Water is supplied to the atmosphere by evaporation from water and other surfaces, and transpiration from plants. It is returned to the land through precipitation. Within the land phase of the hydrologic cycle, water is stored by vegetation, snowpacks, land surfaces, water bodies and subsurface soils. Water is transported between these storage compartments via overland runoff, streamflow, infiltration, groundwater recharge, groundwater flow and groundwater discharge, among other processes as shown in ***Figure 3****.*

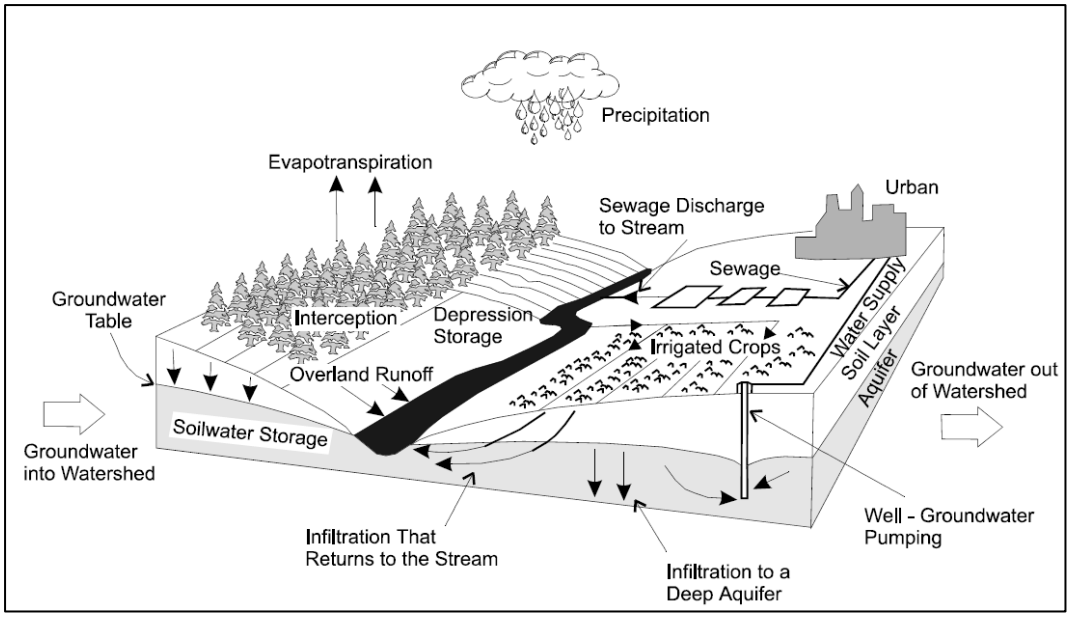


Figure 3: Hydrological Cycle

The following stormwater management requirements have been provided in order to achieve the set criteria:

- Quality Treatment – All areas must meet the standard Enhanced Protection (Level 1) quality treatment.

  Enhanced protection corresponds to the end-of-pipe storage volumes required for the long-term average removal of 80% of suspended solids.

- Extended Detention – The greater of 40 m^3/ha of the contributing upstream drainage area or the 25 mm storm storage requirements released over a minimum 48 hours provided; and

- Quantity Treatment – Where runoff from the proposed extension may have possible negative impact on the downstream peak flows, quantity control is to be provided within the receiving watercourse and meet post-to pre-development condition.

There are several methods for providing both quality and quantity treatment controls. Stormwater runoff can be controlled at the source (lot level or conveyance controls) and at the end of a conveyance (end-of-pipe).

Lot level and conveyance controls can be used on individual lots or to convey stormwater to another location. They are divided into two categories by the function: storage or conveyance. Storage can include roof top storage, super pipe storage, and rear yard storage. These storage options are ideal for development of neighborhoods and subdivisions. They assist by reducing the peak flows of stormwater runoff to levels that can be handled by the receiving watercourse. Conveyance controls can provide quality improvements while also allowing stormwater to be directed to other locations. These can include enhanced swales, ditches, storm sewers. Each method of conveyance has a different level of quality improvement associated with it. Quality improvements can be provided along the way with vegetated filter strips and using particular grasses to ensure that sediment can be trapped along the conveyance.

End of pipe controls can provide both quality and quantity improvements. These are designed to both reduce peak flows of runoff as well as provide time for settlement of suspended solids within the runoff to improve quality to meet the specified criteria. End of pipe controls include but are not limited to wet ponds, dry ponds, wetlands and infiltration basins. End-of-pipe stormwater management facilities receive stormwater from a conveyance system (ditches, sewers) and discharge the treated water to the receiving waters. The purpose of end-of-pipe SWM Practices (SWMP) is to control the impacts of urbanization which remain after lot level and conveyance controls have been applied. In most cases, new urban developments (unless they are small or of very low density) will require some sort of end-of-pipe SWMP (MECP Guidelines 2003).

A sequence of multiple stormwater treatments, conveyance and end of pipe controls are often used to provide high level quality control and ensure that adequate quantity control is provided in areas with limited space for stormwater storage. This is called a treatment train approach.

As part of the Highway 427 Expansion, Stormwater Management (SWM) quality and quantity control measures have been achieved to ensure there will be no negative impacts on local water systems as a result of development. The quality control measures successfully meet the Enhanced Level treatment, which is defined by the MECP guidelines as the removal 80% of total suspended solids (TSS). Quantity control measures have also been met to ensure post-development runoff flow rates do not exceed pre-development runoff flow rates for the 2 to 100 year storm events.

4.1.1 Overview of the Stormwater Management Approach developed in Preliminary Design

The EA (2010) proposed that the stormwater management strategy consist of utilizing flat-bottomed grassed swales in all locations and stormwater management facilities to provide quality and quantity control to runoff. The EA (2010) also noted that in addition to the ponds, enhanced ditches, bio-swales and plunge pools would be utilized along critical highway areas where access to a Stormwater management pond is limited, and to provide localized erosion control measures. The latest EA Report (2016 Final Transportation Environmental Study Report) specifies that quality control is to be achieved through the combined use of grassed swales and wet pond facilities. From the EA assessment, wet ponds would capture stormwater runoff from approximately 151.3 ha of the proposed ROW, or 82% of the study area. The total impervious ROW area is 51.28 ha; and approximately 37 ha, or 72%, of the total impervious ROW area will be controlled by wet ponds and 14.28 ha or 28% will be uncontrolled.

Seven (7) wet ponds and two (2) linear ponds were proposed in the preliminary design to treat runoff from the proposed highway. Wet ponds are artificial water bodies with vegetation around the perimeter, a permanent pool of water is included in their design. The storage capacity of a pond, is estimated using the catchment area draining to it, and depends upon the catchment area land use and topography.

During the preliminary design, the selection of proposed stormwater management practices was determined based on the drainage area contributing flows to local watercourses. The drainage area considered for stormwater management consisted of the complete ROW including the highway, the proposed transitway and transitway stations. The EA also noted that in areas where a wet pond was not feasible, enhanced grass lined swales would be utilized to provide some measure of quality treatment. At the time of the preliminary design, pond property requirements were sized for the ultimate requirement, noting that a specific design would be developed during detail design.

4.1.2 Rationale for the Stormwater Management Approach developed in Detail Design

As the design advanced through the engineering process from preliminary design to detail design, additional comprehensive information was gathered, which was not available at the preliminary design stage. This new information and greater level of detail revealed some opportunities and some constraints that resulted in the refinement of the design.

As the detail design evolved, it was determined that there would be various constraints to the use of wet ponds, that were unknown at the preliminary design stage. These constraints include spatial limitations, an existing utility conflict, high groundwater throughout most of the extension section, and grading issues. Therefore, after a detailed optimization process and review of the engineering alternatives available to overcome these constraints, it was decided that the use of dry ponds as part of a treatment train approach would be better suited to achieve quality and quantity controls. The main difference between a dry pond and a wet pond is the absence of a permanent pool in the dry pond. Wet ponds introduce inherent

thermal impacts to receiving waterbodies due to warming of the permanent pool between rainfall events, whereas dry ponds do not have permanent pools and therefore do not introduce thermal impacts.

LINK427 has developed a treatment train approach that uses a combination of enhanced grassed swales, grassed embankments, vegetation and dry ponds to provide quality and quantity controls.

There are eight (8) dry ponds and six (6) enhanced grassed swales proposed as part of the detail design to treat runoff from the proposed highway, in comparison to the seven (7) wet ponds and two (2) linear ponds proposed in the preliminary design.

The detail design use of a treatment train approach with dry ponds will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using wet ponds. The treatment train approach to address water quality control in the detail design uses: vegetated embankments, grassed swales, and dry ponds. According to the MECP guidelines, the treatment train approach meets the criteria for water balance, water quantity, erosion control and water quality. Quality control measures of the proposed treatment train approach meet the MECP Enhanced Level Treatment for 80% total suspended solids (TSS) removal. All dry ponds being proposed were designed to control peak flows of runoff and are lined with a special mix of vegetation on the bottom (Meadow Marsh species) to allow for settlement and uptake of pollutants, as they only hold water temporarily after rain events.

The detail design has a total impervious ROW area of 44.10 ha. Approximately 30.94 ha, or 70% of the total impervious ROW area, will be controlled by ponds, and approximately 13.15 ha or 30%, will be uncontrolled.

4.1.3 Key Constraints considered in the Detail Design Changes

As mentioned in **Section 4.1.2**, there are four key constraints in the preliminary design using wet ponds that were discovered as the detail design progressed. These constraints were:

1. spatial limitations;
2. an existing utility conflict;
3. high groundwater throughout most of the extension section; and
4. grading constraints

Although there were no changes to the area available for the SWM strategy between the preliminary design and detail design, there are technical limitations to implementing wet ponds. The following paragraphs describe why each of these are classified as constraints in the design for stormwater management at the detail design stage.

Figures showing the geometric constraints are provided in **Appendix D**.

Spatial Limitations

Spatial limitations can simply be defined as the area available within the MTO owned lands for stormwater management and the criteria to avoid expansive excavation. These spatial limitations can affect the geometry/shape of the pond depending on the constraints around it. If the required minimum wet pond geometry recommended in the MECP guidelines (MECP Guidelines Table 4-8) cannot be provided, target water quality control of 80% TSS removal cannot be achieved. The ways in which spatial limitations play a role in each pond in the proposed detail design are explained in **Section 4.1.4**.

Utility Conflict

Utility conflicts with stormwater facilities can be considered a physical constraint, as adequate access to utility lines for repair or replacement need to be provided. In ideal conditions, SWM facilities should be located clear of any utility conflicts, this may require that a particular stormwater design strategy might be better suited for the available site conditions than others. Pond 5 explained further in **Section 4.1.4**is an example of this.

High Groundwater

The interaction between highway runoff and groundwater is not desirable, due to the potential presence of contaminants in the highway runoff. Therefore, the design must account for keeping the highway runoff separated from groundwater.

However, since the groundwater table is very high within the project Lands it is very difficult to use wet ponds and maintain the separation of highway runoff and groundwater. Excavation of wet ponds in the area would extend beyond the depth of the water table, so groundwater would attempt to maintain its natural water table elevation, and press against the bottom of the pond. This would require additional construction efforts to create a water tight barrier heavy enough to counteract the pressure build up from the groundwater. Conversely, dry ponds are not as deep as wet ponds, therefore there would be less groundwater pressure buildup. Additionally, a commitment from the preliminary design (2010 & 2016) states that a minimum of 3 metres is required to facilitate the discharge of cooler water, therefore the implementation of wet ponds with such deep permanent pools would increase the pressure buildup.

Grading

When preparing stormwater management plans, grading is a key factor to take into consideration. Grading is the construction works involved in ensuring that a level foundation is provided for the base, or one with a specified slope, is achieved. Final grading cannot be undertaken in preliminary design because the final design of the roadway is not available. Therefore, the final grading for stormwater is undertaken during detail design. The ways in which grading limitations play a role in each pond in the proposed detail design are explained in **Section 4.1.4**

4.1.4 Detail Design Refinements to each Pond

Based on the rationale and key constraints identified above, the decision-making process for development of the dry ponds instead of wet ponds is provided in this section. The location of each dry pond can be found in **Figure 4** below.

Prior to discussing each pond in detail, some of the terms used are explained below for better understanding.

- *Short-circuiting* is an issue that negatively impacts the treatment process performance of a SWM facility. This occurs when some or all the runoff entering the SWM facility flows along a nearly direct pathway from the inlet to the outlet. This is undesirable, as it will result in shorter settling time in comparison with the designed detention time.
- *Length to width ratio* is the average length of the pond divided by its width. This ratio is used to maximize the runoff flow path and minimized short-circuiting potential. For best results, the MECP Manual specifies a minimum ratio of 3:1 and a preferred ratio between 4:1 and 5:1.
- *Forebay* or *sediment forebay* facilitates maintenance and improves pollutant removal by trapping larger particles near the inlet of the pond.

Enhanced Grassed Swales

When more detailed grading information became available during the detail design process, it showed that in some areas the stormwater would not drain efficiently to the preliminary design SWM ponds, and could not be directed to any of the these SWM facilities. As a result, the addition of new enhanced grassed swales was required. Therefore, four new enhanced grassed swales were added to the detail design in addition to the two ponds proposed in the preliminary design, making for a total of six enhanced grassed swales.

Pond 1

Pond 1 is a new pond introduced during the detail design stage that was not part of the preliminary design. The new grading information available during the detail design stage showed that some areas did not drain to the SWM ponds as found in the preliminary design. Therefore, dry Pond 1 was introduced in the detail design to provide quality control to surface water runoff from areas that could not be directed to other SWM facilities. The treatment train approach for Pond 1 uses a combination of grassed swales, grassed embankments, vegetation and the dry pond to provide quality quantity controls.

Therefore, the use of a treatment train approach and Dry Pond 1 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using wet ponds.

Pond 2

In the detail design, the capacity of this pond is being used to its maximum to control post- to pre-development peak flows. The configuration of this pond in the detail design is such that the pond footprint cannot be expanded or extended any further, as it would encroach into the highway. The length to width ratio for this pond is currently 3.98:1, which is above the MECP Design Manual minimum ratio of 3:1. Wet ponds require a forebay, therefore berms would need to be added which would have an impact on the length to width ratios and storage capacity of the pond. If the storage capacity of the pond is decreased by adding berms, storage targets required to control peak flows to pre-development conditions would not be met. Due to the location of the inlet, it would be difficult to provide a functional forebay. The location of the inlet matches the lowest point in the area and the outlet is in a fixed location. The outlet and the inlet are currently close to each other causing potential for short-circuiting to occur. To relocate the inlet to avoid short circuiting would require regrading of the area and probably locally modifying the profile of the highway and the outlet cannot be relocated.

As a result, the use of a treatment train approach and Dry Pond 2 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using wet ponds.

Pond 3

In the detail design, the capacity of this pond is maximized to control post- to pre-development peak flows. Therefore, the configuration of this pond in the detail design is such that the pond footprint cannot be expanded or extended any further, as it would encroach into the highway.

The length to width ratio for this pond is currently 3.98:1, which is above the MECP Design Manual minimum ratio of 3:1. If this pond were designed as a wet pond, it would require a forebay, and therefore berms would need to be added which would have an impact on the length to width ratios and the storage capacity of the pond. If the storage capacity of the pond were decreased by adding berms to make this into a wet pond, the storage targets required to control peak flows to pre-development conditions would not be met. Also, due to the location of the inlet, it would be difficult to provide a functional forebay. This is because the location of the inlet matches the lowest point in the area and the outlet is in a fixed location. Since the outlet and the inlet are currently located close to each other causing the potential for short-circuiting to occur, relocating the inlet to avoid short circuiting would require regrading of the area and probably locally modifying the profile of the highway. The outlet cannot be relocated.

As a result, the use of a treatment train approach and a dry pond instead of a wet pond for Pond 2 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design for a stormwater management strategy using wet ponds.

Pond 4

Similar to the previous two ponds, the capacity of this pond in the detail design is being maximized to control post- to pre-development peak flows. The length to width ratio is currently 3.21:1, which is above the minimum MECP Design Manual recommended ratio of 3:1. Since wet ponds require a forebay, a berm would need to be added to the pond design, which would worsen the length to width ratio and decrease the total storage volume of the pond. Due to the location of the inlet, it would be almost impossible to provide a functional forebay. The location of the inlet matches the lowest point in the area and the outlet is in a fixed location. The outlet and the inlet are currently close to each other causing the potential for short-circuiting to occur. To relocate the inlet to avoid short circuiting would require regrading of the area and locally modifying the profile of the highway. The outlet cannot be relocated.

As a result, the use of a treatment train approach and a dry pond design for Pond 4 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using wet ponds.

Pond 5

There is an existing utility (Trans Canada Pipeline) crossing underneath the proposed pond location. Although wet ponds and utilities can coexist, wet ponds are excavated deeper than a dry pond because a wet pond requires a permanent pool. The depth of excavation required for a wet pond would reduce the cover over the utility to a level that is below the minimum

cover required. Pond 5, therefore, must be a dry pond to provide a safe distance between the utility and the bottom of the pond. The use of a treatment train approach and a dry pond design for Pond 5 will continue to provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using a wet pond.

Pond 6 (labelled Pond 7 in the EA)

Similar to previously discussed ponds, the capacity of this pond is being used to its maximum in the detail design to control post to pre-development peak flows. The length to width ratio is currently 3.34:1, which is above the MECP Design Manual minimum recommended ratio of 3:1. However, since a forebay is required for wet ponds, berms would need to be added to the design which would impact the length to width ratio. The addition of berms would also have an impact on storage capacity and storage targets required to control peak flows to pre-development conditions would not be met.

As a result, the use of a treatment train approach and a dry pond design for Pond 6 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using a wet pond.

Pond 7 (labelled Pond 8 in the EA)

The length to width ratio for this pond is currently 6.93:1, which is more than the maximum MECP Design Manual recommended ratio for proper water quality control of 5:1. Additionally, only 0.52 ha or 7.4% of the total drainage area is impervious, and the remaining 6.48 ha, or 92.6%, is grassed areas. Therefore, a wet pond at this location would not add any value in terms of SWM quality improvement.

As a result, the use of a treatment train approach and a dry pond design for Pond 7 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using a wet pond.

Pond 8 (labelled Pond 9 EA)

The detail design of this pond has a triangular shape with several inlets. The shape of the pond cannot be modified due to the location of the pond and the surrounding constraints, as seen in **Appendix D**. Furthermore, the inlets cannot be unified. This would require either an excessively large forebay that would not meet the design criteria, or multiple forebays that would also not meet the design criteria. The length to width ratio is currently 1.73:1, which is less than the minimum MECP Design Manual recommended ratio for proper water quality control of 3:1. The proposed wet pond would not meet the MECP's design criteria for quality improvements. Therefore, for this location, the proposed treatment train approach will provide the required quality and quantity controls.

As a result, the use of a treatment train approach and a dry pond design for Pond 8 in the detail design will provide the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy using a wet pond.

4.1.5 Consultation with MNRF, TRCA and MECP

As part of the detail design process, LINK427 engaged the MNRF, TRCA and MECP in discussions regarding the identified constraints and recommended detail design changes. The following modifications in the detail design of the stormwater management strategy have since occurred:

- At the request of the MNRF, meadow marsh areas at the bottom of the dry ponds have been included in the design to enhance quality control of stormwater runoff.
- In response to comments from the MNRF, the Pond 3 outlet channel is being designed with stabilization measures to avoid potential erosion concerns due to an increase in discharge rates from the pond and crossing culvert.

- The TRCA recommended relocation of the Pond 4 outlet from discharging directly into Robinson Creek to discharging into a tributary of Robinson Creek, which addressed potential erosion concerns related to the steep embankment.
- The TRCA recommended moving Pond 5 slightly southwards to avoid encroachment with an existing wetland.
- Minor modifications to Pond-1W and the Drainage and Stormwater Management Report requested by the MECP are being addressed to ensure that the maximum amount of freeboard is provided to Pond 1W and the Drainage and Stormwater Management Report provides as clear a rationale as possible for the works outlined.

Overall, through consultation with the TRCA, MNRF and MECP, they have expressed no concern with the proposed LINK427 stormwater management strategy of using dry ponds as part of a treatment train approach instead of wet ponds. Agency correspondence demonstrating acceptance of the LINK427 detail design stormwater management approach can be found in **Appendix B**.

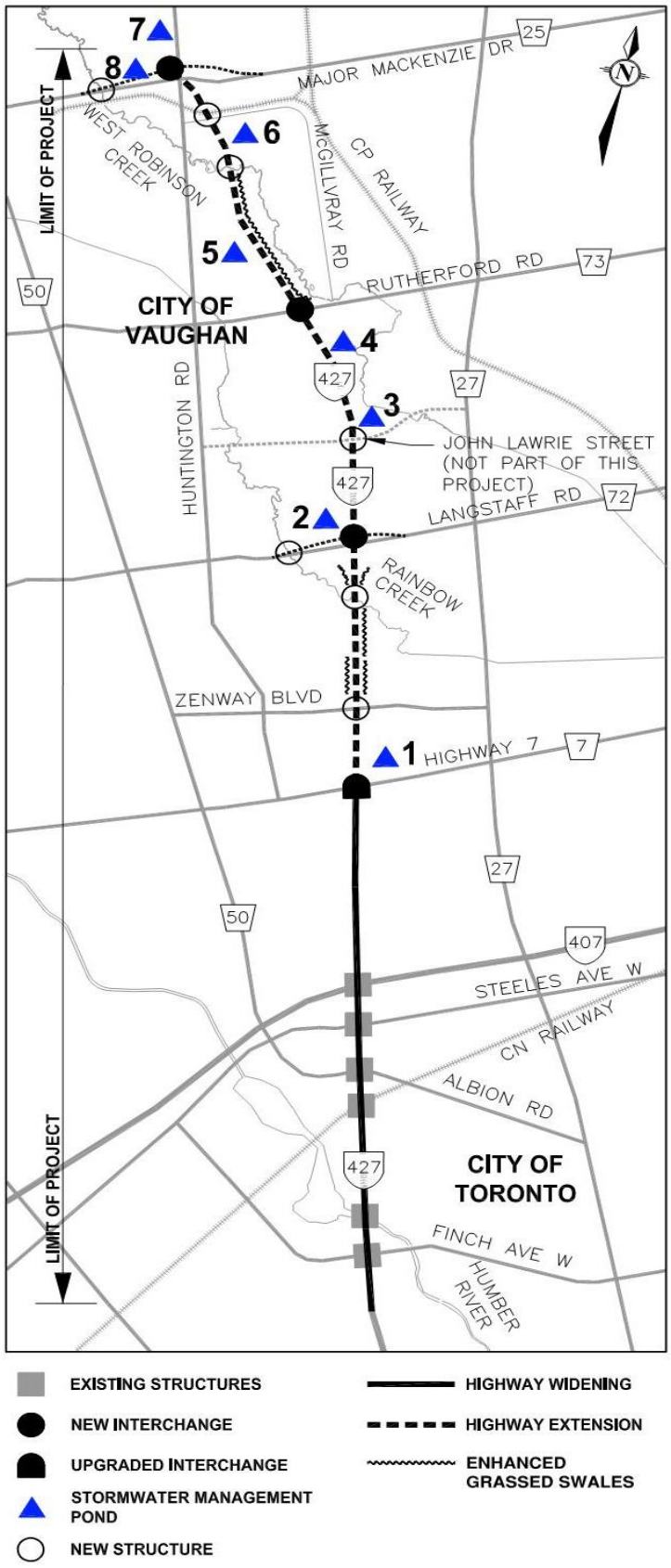


Figure 4: Stormwater Management Ponds and Enhanced Grassed Swales Locations

4.1.6 Drainage and Stormwater Management Strategy Conclusion

As the design advanced through the detail design process, more information became available and a greater level of detail was provided on all aspects of the design. This advancement in the design provided information such as updated hydrogeological considerations; a more refined grading plan; a greater understanding of the spatial limitations and constraints facing the SWM design; the potential interactions with the groundwater table; a more precise understanding of utility conflicts; and so forth.

As a result of this advancement in understanding through the detail design process, refinements to the preliminary design stormwater management strategy were required. It was concluded that the use of dry ponds instead of wet ponds would overcome the constraints, address opportunities and meet the stormwater management needs of the project. The following provides a summary of the rationale for this decision:

- Based on the high upwelling pressure produced by the high groundwater table elevation in the project area and all the geometric, utility, and grading constraints, it was decided through the detail design process to convert the above noted wet ponds to dry ponds.
- Dry ponds mitigate the adverse thermal effects of stormwater runoff. Wet ponds introduce inherent thermal impacts to receiving waterbodies due to warming of the permanent pool between rainfall events, which has an adverse effect on the receiving aquatic habitat. Whereas a dry pond has no permanent pool and therefore, no inherent thermal impacts.
- The same level of quality treatment and quantity control provided by wet ponds will be afforded by the proposed detail design stormwater management strategy, which uses a treatment train approach to address water quality treatment involving: vegetated embankments, grassed swales, enhanced grassed swales and dry ponds. According to the MECP guidelines, the treatment train approach meets the criteria for water balance, water quantity, erosion control and water quality. Quality control measures of the proposed treatment train approach meet the MECP Enhanced Level Treatment for 80% total suspended solids (TSS) removal.
- The dry ponds will discharge into existing watercourses and the appropriate erosion control measures/protection will be applied to mitigate potential erosion impacts, as per the Toronto and Region Conservation Authority (TRCA) stormwater management criteria.
- There will be no significant change in potential adverse impacts to the natural environment with the proposed changes.
- The TRCA, MNRF and MECP have accepted the detail design stormwater management strategy outlined in this DCR.

Since the LINK427 detail design achieves the same level of quality treatment and quantity control provided by the preliminary design stormwater management strategy (wet ponds), the significance of the change has been determined to be negligible or of a minor nature, therefore an EA amendment is not required. Additional information can be found in the Drainage and Stormwater Management Report (available upon request).

4.2 Overpass Structure over the Future John Lawrie Street

As noted earlier, it is expected that with the advancement from preliminary design to detail design, more information is made available, and the final design will naturally reflect this greater level of detail and understanding. As such, LINK427's detail design process resulted in optimizations and refinements to the preliminary design of the Highway 427 overpass structures at the future John Lawrie Street.

LINK427's detail design has refined the overpass structures while still providing the necessary lane configuration, roadway elevations and vertical clearances to meet the needs of the future John Lawrie Street as identified in the City of Vaughan's preliminary design and documented in their 2015 Environmental Study Report (ESR). Most notably, the LINK427 detail design optimizations from the preliminary design include:

- Selection of Integral vs. Semi-Integral abutments
- Reduction in girder size from CPCI 2330 (2.3 m tall) to NU 1200 (1.2 m tall)
- Reduction in girder spans from 42.0 m to 27.6 m (northbound) and 27.8 m (southbound) respectively

A component of the rationale for these changes includes the requirement from Hydro One Networks Inc. (HONI) to maintain an overhead vertical clearance of 15.7 m between overhead conductors and structures. This resulted in a reduced profile of Highway 427 underneath the HONI corridor. Since the future John Lawrie Street roadway elevation has been kept consistent, and the overpass profile of Highway 427 has been reduced, LINK427 was required to reduce the girder depth at the superstructure.

4.2.1 Municipal Class EA for the Future John Lawrie Street

The City of Vaughan and Block 59 Landowners Group completed a Municipal Class EA (MCEA) study in accordance with Schedule 'C' in 2015 for the Proposed Collector Street between Huntington Road and Regional Road 27 through Block 59. An Environmental Study Report (ESR) was filed for this undertaking.

The Recommended Design Concept was based on a preliminary design for the future John Lawrie Street that uses a minimum 26 m right-of-way (ROW) (four 3.5 m lanes and 6.0 m on either side), which will vary through the corridor at the proposed structure and intersection locations. The preliminary general arrangement for the Highway 427 overpass structures identifies a 26 m roadway width and a 42 m bridge span over the future John Lawrie Street.

The LINK427 detail design for the Highway 427 overpass structures will maintain the required 26 m width identified in the ESR for future John Lawrie Street, including the same lane configuration, roadway elevations and vertical clearances depicted in the preliminary design. Therefore, the LINK427 detail design will allow for the same functional requirements as the preliminary design, but the span has been reduced to 27.6 m (northbound) and 27.8 (southbound).

4.2.2 Consultation with the City of Vaughan

As part of the detail design process, LINK427 will continue consultation with the City of Vaughan regarding the final design of the Highway 427 overpass structure at the future John Lawrie Street. LINK427 and the City of Vaughan have had numerous discussions regarding the design optimizations outlined above, and at this time LINK427 does not anticipate any changes. LINK427 and the City of Vaughan are specifically working together to optimize maintenance and constructability of the future John Lawrie Street, and the overall incorporation of the street within the City's Urban Design plan for the surrounding areas.

4.2.3 Potential Effects from the Detail Design Refinements

The LINK427 detail design for the Highway 427 overpass structures will maintain the required 26 m width identified in the ESR for the future John Lawrie Street, including the same lane configuration, roadway elevations and vertical clearances depicted in the preliminary design. Therefore, the LINK427 detail design will allow for the same functional requirements as the preliminary design, including options for multi-modal travel. Since the LINK427 detail design will maintain the original roadway elevations and vertical clearances, there are no anticipated changes from a drainage perspective. Therefore, overall, there are no technical/engineering significant adverse impacts associated with the refinements to the detail design of the Highway 427 overpass structures.

Similarly, since the footprint of the structures will remain the same in both size and location, there are no anticipated differences in impacts on the natural and socio-economic environments to those of the preliminary design.

Finally, since LINK427 is required to maintain the structures for 30 years after substantial completion, the operation and maintenance performance requirements of the overpass structures will be no different than the preliminary design.

Consequently, the LINK427 detail design refinements to the preliminary design represent an insignificant change to the anticipated impacts presented in the City of Vaughan ESR.

4.2.4 Future John Lawrie Street Conclusion

The LINK427 detail design refinements to the preliminary design of the Highway 427 overpass structures do not represent a significant modification. This is because the refinements do not change the ability of the structures to fulfill the same transportation / engineering requirements as the preliminary design. The refinement also does not cause any changes to the potential effects on the natural and socio-economic environments. The LINK427 detail design will allow for the same functional requirements as the preliminary design, including options for multi-modal travel. A review of the potential effects presented in the City of Vaughan ESR has concluded that the refinements introduced by the LINK427 detail design represent an insignificant change, therefore an EA amendment is not required.

4.3 Overpass Structure over Rutherford Road

As with the John Lawrie Overpass outlined above, design optimizations have taken place with the Rutherford Road Overpass to take advantage of opportunities and address constraints.

LINK427's detail design has refined the overpass structures while still providing the necessary lane configuration, roadway elevations and vertical clearances to meet the needs of the future Rutherford Road expansion. Most notably, the LINK427 detail design optimizations from the preliminary design include:

- Removal of the center pier from the bridge structure
- Increase in girder size from CPCI 1600 (1.6 m tall) to NU 2000 (2.0 m tall)
- Reduction in girder spans from 68.0 m to 42.7 m (northbound & southbound)
- Replacement of concrete sloped paving with retaining walls at the abutments

This design was chosen as it allows for reduced construction resources and timing, while still providing the required vertical and horizontal clearances needed for the future Rutherford Road expansion.

4.3.1 Consultation with York Region

As part of the detail design process, LINK427 engaged York Region to present and discuss the optimized design at Rutherford Road. York Region has confirmed acceptance of the design optimizations provided by LINK427 (as outlined in the bullet list above). LINK427 and the Region have been specifically working together to provide this optimized design including allowances for space for the future Rutherford Road expansion. This will allow the Region to perform elements of the future Rutherford Road expansion without any preparation work required. LINK427 will continue to consultant with York Region as the design is finalized.

4.3.2 Potential Effects from the Detail Design Refinements

The LINK427 detail design for the Highway 427 overpass structures will maintain the required lane configuration, roadway elevations and vertical clearances depicted in the preliminary design. Therefore, the LINK427 detail design will allow for the same functional requirements as the preliminary design, including options for multi-modal travel. Since the LINK427 detail design will maintain the original roadway elevations and vertical clearances, there are no anticipated changes from a drainage perspective. Therefore, overall, there are no technical/engineering adverse impacts associated with the refinements to the detail design of the Highway 427 overpass structures.

Similarly, since the footprint of the structures will be reduced, there are no anticipated differences in impacts on the natural and socio-economic environments to those of the preliminary design.

When it comes to the potential effects from construction of the Rutherford Road overpass, the preliminary design consisted of a two-span bridge with a center pier located in the middle of Rutherford Road (one direction of traffic passing on either side of the pier). In order to construct this center pier, it would be necessary to implement long term lane closures at the

bridge structure crossing to accommodate the required work zone. This work zone would include an approximate 2.0 m clearance on either side of the pier to allow for construction worker access and formwork installation. Further, a temporary concrete barrier would have to be installed on the outside of the work zone to protect the workers inside the work zone from traffic. These concrete barriers would further encroach into the current lanes of traffic on both sides of the pier resulting in the loss of one lane of traffic in each direction. This long-term lane closure would be needed for several weeks, and would result in Rutherford Road being reduced to one lane in each direction for this duration.

By removing the center pier from the preliminary design and shortening the bridge, the LINK427 detail design has eliminated the need for that long-term lane closure, therefore reducing direct traffic impacts. The remaining works involved in construction of the Rutherford Road overpass structures, which include median construction, interchange construction, paving and line painting, will involve the same activities as the preliminary design and therefore result in no significant change from the preliminary design in terms of impacts on the travelling public.

Finally, since LINK427 is required to maintain the structures for 30 years after substantial completion, the operation and maintenance performance requirements of the overpass structures will be no different than the preliminary design.

Consequently, the LINK427 detail design refinements to the preliminary design represent an insignificant change to the preliminary design.

4.3.3 Rutherford Road Conclusion

The LINK427 detail design refinements of the Rutherford Road overpass structures do not represent a significant modification to the preliminary design. This is because the refinements do not change the ability of the structures to fulfill the same transportation / engineering requirements as the preliminary design. The LINK427 detail design will allow for the same functional requirements as the preliminary design, including options for multi-modal travel. The refinements also do not cause any changes to the potential effects on the natural and socio-economic environments. Finally, the potential effects associated with construction of the detail design bridge structures will not be significantly different from the preliminary design, and are anticipated to reduce adverse effects on the travelling public. Overall, the refinements introduced by the LINK427 detail design represent an insignificant change compared to the preliminary design, therefore an EA amendment is not required.

5 Detailed Description of the Undertaking

5.1 Major Features of the Proposed Works

The Recommended Plan for the DCR #4 works includes the following components:

- Construction of a new overpass at the future extension of John Lawrie Street
- Construction of a new overpass at Rutherford Road.
- Electrical (street lighting, traffic lights etc.) for the Widening and Extension of Highway 427
- Intelligent Transport Systems (ITS) for the Widening and Extension of Highway 427
- Guiderail and barriers for the Extension of Highway 427
- Pavement Markings & Traffic Signage for the Extension of Highway 427
- Water Resources / Stormwater Ponds for the Extension of Highway 427

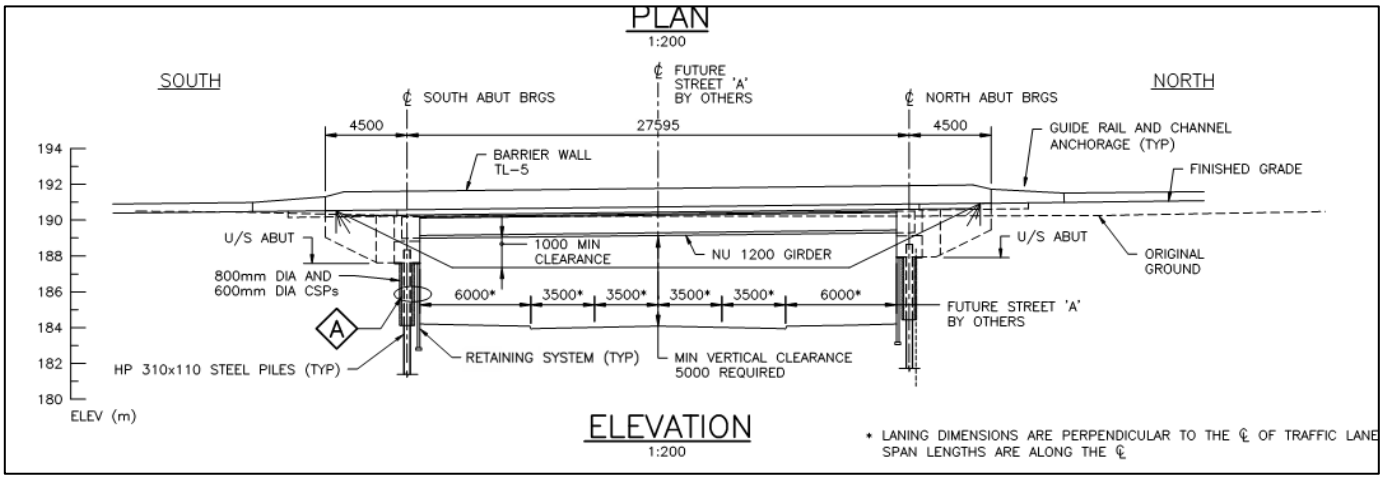
The following sections detail the major features of the proposed works to be undertaken as part of DCR #4. The scope of work incorporated into this DCR is scheduled to commence in the spring of 2019, and will continue until the completion of the project which is anticipated by 2021.

5.1.1 Structures

The following provides a detailed description of each of the structures to be constructed as part of DCR #4. General Arrangement drawings for the following structures are provided in **Appendix E**.

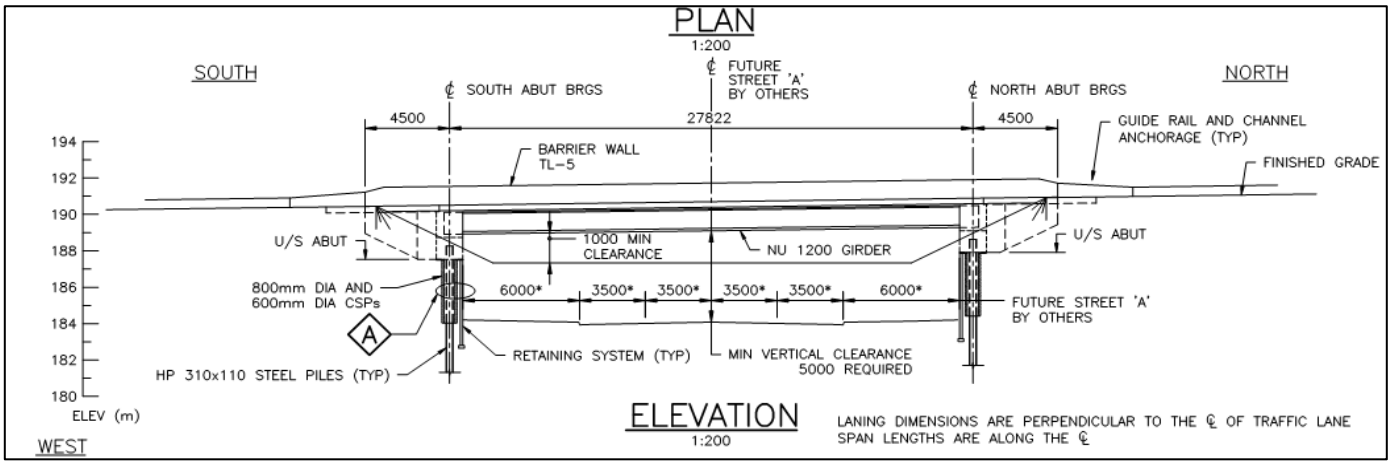
5.1.1.1 Highway 427 over Future John Lawrie Street (NBL)

The northbound Highway 427 structure over the future John Lawrie Street is a single-span bridge with a total length of 27.6 m and an average width of 27.4m. The structure will carry four lanes and one managed lane of Northbound Highway 427 over the future proposed John Lawrie Street. The superstructure will consist of NU 1200 prestressed concrete girders, precast deck panels and a concrete topping. The superstructure will be supported on a substructure with H-Piles and a concrete cap. The structure will provide a minimum vertical clearance of 5.00 m to the future alignment of the future John Lawrie Street, however a 1.0 m clearance will be provided until this street is constructed (outside of the scope of this Project). The detail design process has resulted in a reduction of the bridge span from the preliminary design of 42 m to 27.6 m, the bridge abutment design has also changed from a semi integral to an integral abutment. Other design factors such as Hydro One overheard wire clearances have necessitated design changes to this bridge. This does not result in any change to the future John Lawrie Street road surface dimensions.



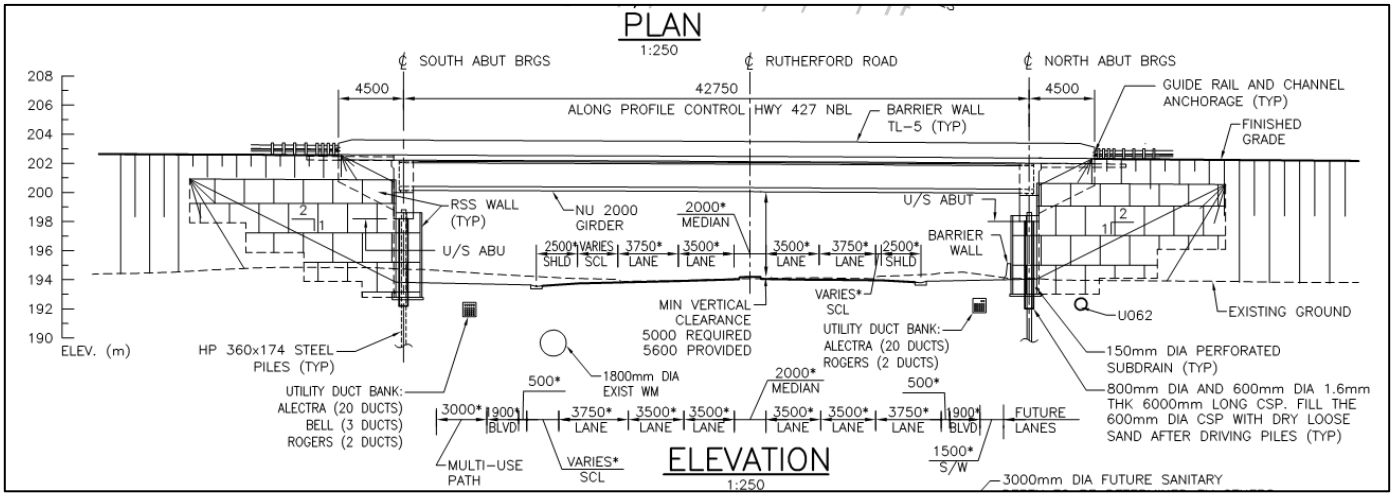
5.1.1.2 Highway 427 over Future John Lawrie Street (SBL)

The southbound Highway 427 structure over the future John Lawrie Street is a single-span bridge with a total length of 27.8 m and an average width of 28.4m. The structure will carry four lanes and one managed lane of southbound Highway 427 over the future proposed John Lawrie Street. The superstructure will consist of NU 1200 prestressed concrete girders, precast deck panels and a concrete topping. The superstructure will be supported on a substructure with H-Piles and a concrete cap. The structure will provide a minimum vertical clearance of 5.00 m to the future alignment of John Lawrie Street, however a 1.0 m clearance will be provided until this street is constructed (outside of the scope of this Project). The detail design process has resulted in a reduction of the bridge span from the preliminary design of 42 m to 27.6 m, the bridge abutment design has also changed from a semi integral to an integral abutment. Other design factors such as Hydro One overheard wire clearances have necessitated design changes to this bridge. This does not result in any change to the future John Lawrie Street road surface dimensions.



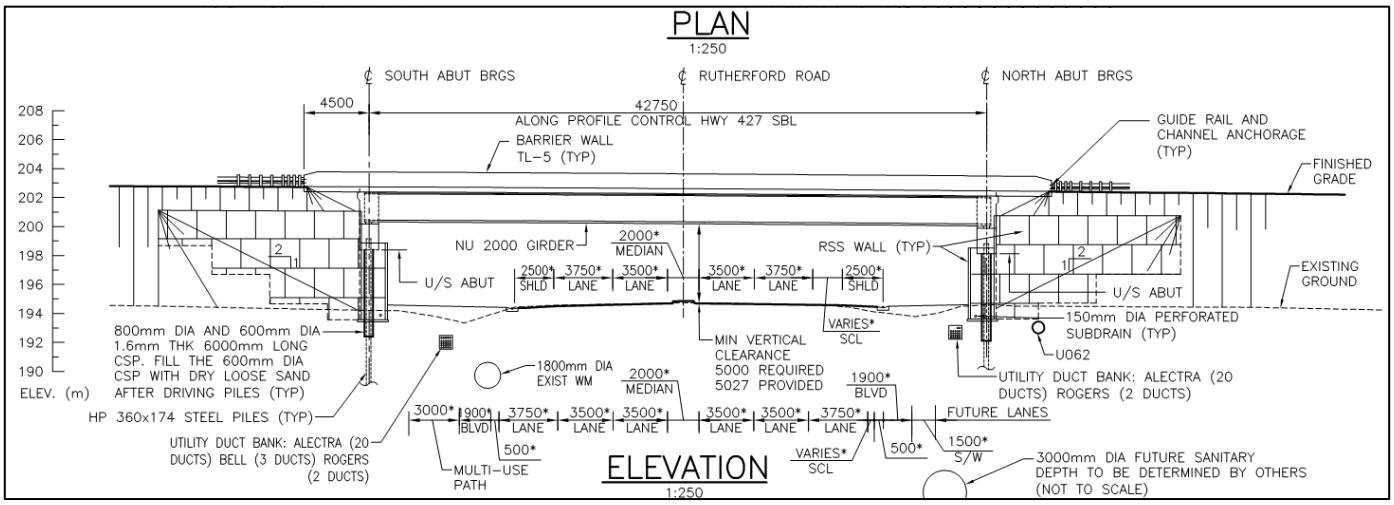
5.1.1.3 Highway 427 over Rutherford Road (NBL)

The northbound Highway 427 structure over Rutherford Road is a single-span bridge with a total length of 42.8 m and an average width of 24.2m. The structure will carry three lanes and one managed lane of northbound Highway 427 over Rutherford Road. The superstructure will consist of NU 2000 prestressed concrete girders, precast deck panels and a concrete topping. The superstructure will be supported on a substructure with H-Piles and a concrete cap along with retaining walls. The structure will provide a minimum vertical clearance of 5.85 m to Rutherford Road.



5.1.1.4 Highway 427 over Rutherford Road (SBL)

The southbound Highway 427 structure over Rutherford Road is a single-span bridge with a total length of 42.8 m and an average width of 25.0m. The structure will carry three lanes and one managed lane of southbound Highway 427 over Rutherford Road. The superstructure will consist of NU 2000 prestressed concrete girders, precast deck panels and a concrete topping. The superstructure will be supported on a substructure with H-Piles and a concrete cap along with retaining walls. The structure will provide a minimum vertical clearance of 5.49 m to Rutherford Road.



5.1.1.5 Construction Methods

Due to the similarity in scope of these structures, the construction methods are generally similar and will consist of the following:

- Construction will commence by excavating an area for the construction of the bridge abutments using excavators and trucks to haul the material for reuse on the site. In the event seepage or water infiltration occurs, water will be pumped out from the excavation, contained / treated in filter bags, and dispersed over a vegetated area prior to infiltration to the ground or re-entry to an existing waterway. No large-scale or long-term pumping requirements are anticipated.
- Once the required elevation is achieved, deep foundations and H-Piles will be installed using cranes with either hydraulic or pneumatic hammers to support the weight of the structure.
- After the H-Piles have been installed the abutments (pile caps) shall be formed and poured with reinforced concrete which will serve as the substructure.
- Following construction of the abutments and retaining walls, the precast girders and deck panels will be installed using cranes and transport trailers. The decks will then be cast which will tie the girders, deck panes, and abutments together into one continuous element.
- Construction of barrier walls, approach slabs, and sleeper slabs will follow soon after.
- Final road construction along Rutherford Road will incorporate construction staging that utilizes single lane closures during off peak hours. Two lanes of traffic in each direction will be maintained outside of these off-peak hour closures. These off-peak hour lane closures will be required for median removal and replacement, paving operations, interchange construction and line painting. There are no anticipated changes in the construction impacts compared to the preliminary design.

- The impacted areas, including the access roads will be reinstated at the end of the construction period.

5.1.2 Illumination, Signalized Intersections, Intelligent Traffic Management System (ITS)

Similar to the Highway 427 Widening Section south of Highway 7 (the subject of a previous DCR), the Highway 427 Extension Section from Highway 7 to Major Mackenzie Drive will be fully illuminated with new lighting, including the interchanges at Langstaff Road, Rutherford Road, and Major Mackenzie Drive. This will include the installation of numerous high mast poles with Light Emitting Diode (LED) lamps along the entire length of the highway, with the exception of Zenway Boulevard where municipal standards will be used.

New signalized intersections (ramp terminals) will also be constructed at each new interchange (Langstaff Road, Rutherford Road, Major Mackenzie Drive) to traffic exiting the highway. All these intersections will be constructed based on standard government specifications and procedures including the Accessibility for Ontarians with Disabilities Act (AODA). Highway exit ramps will be supplemented with induction loops (as needed) for sensing queues, and timing of traffic light cycles will be optimized for peak travel directions.

LINK427 will also provide an Intelligent Transportation System (ITS) for the entire project limits of the Highway 427 Expansion. ITS elements will include the following subsystems: electrical power supply, variable message signs, vehicle detection, queue warning, closed circuit television and video/data communication. Elements of the ITS will provide rapid detection, response and dissemination of incidents, roadway condition and travel time information to all users including local communities, emergency service providers, commercial fleets, and broadcast media.

Finally, LINK427 will also provide civil provisions for a future Managed Lane system.

Construction Methods

Civil provisions for mainline highway lighting and ITS infrastructure will occur concurrently with roadway construction works. Infrastructure (i.e. conduits, sensors, pads, etc.) will be placed by hand depending on the depth of placement, and subsurface installations such as directional drilling or jack-and-boring will be used in complex situations such as deeper elevation placement underneath live-lanes or placement under watercourses (works will be conducted from the disturbed ROW and will not occur in valley lands).

For high mast lighting poles, foundations will be installed using augers mounted on cranes to excavate the caissons to their desired depth. The excavated material will be hauled away using trucks for reuse elsewhere on the site. The caissons will then be constructed using reinforced concrete. The associated poles will then be erected into place using cranes.

Permanent traffic lighting will be constructed on sectional steel poles protected by curbs and/or guide rails and will be installed in accordance with Ontario Traffic Manual Book 12. New traffic lights will be bagged until the roadway or ramp is ready for use, and will be commissioned by certified personnel prior to use.

5.1.3 Guiderail and Barriers

The design of the new extension of Highway 427 includes guiderails and barriers where necessary based on explicit safety analysis performed by LINK427 as well as independent Road Safety Audits performed by third party specialists. North of Highway 7, Steel Beam Guiderail will primarily be utilized as the choice of guiderail/barrier to ensure user safety, and crash systems/attenuators will be used to prevent user collisions with hard surfaces (i.e., at ramp bullnoses, at pier columns, etc.). All barriers, guiderails and crash systems/attenuators will comply with MTO guidelines. In conjunction with the Explicit Safety Analysis in order to minimize the use of guiderails, in some instances the side slopes of the Highway 427 have been graded into the future transitway which runs perpendicular to the highway. In one particular location, approximately 250 m north of the future John Lawrie Street, this grading has slightly encroached into an area designated for protection. This area is classified as a Silver Maple Mineral Deciduous Swamp (SWD3-2), however the impacted area is very small (20.3 m^2) and is within the regenerating edge of this feature. The impacted area is dominated by Common Buckthorn shrubs (invasive species) and a few regenerating Bur Oak trees, with a ground layer comprised of common old field species and Reed Canary Grass. No rare or sensitive flora or fauna have been documented in the area of impact. Therefore, there are no anticipated increased negative impacts of this encroachment.

Construction Methods

Steel-beam guiderail will be constructed following MTO guidelines, and will first involve driving H-piles. Once a desired depth has been reached to ensure structural stability, the steel rail is assembled in pieces in a laydown area. Finally, the rail is bolted in place to the driven pile. Ends of each rail are connected to engineered, prefabricated crash attenuators installed on-site.

5.1.4 Pavement Marking and Signage

Durable line markings will be installed throughout the limits of the project with the required lengths and dimensions. Pavement markings combined with road signs provide important information about the direction of traffic, regulations, and driving conditions. LINK427 will provide signage (overhead, ground mounted) at all approaches to and from the highway at each interchange and will also provide signage and line markings to delineate and identify Managed Lanes along the entire project limits of the Highway 427 Expansion. Line markings will assist in vehicle guidance, and will comply with MTO and CSA standards.

5.1.4.1 Construction Methods

Standard line marking equipment will be used to install the equipment such as truck mounted stripers. This work will be taking place during the night to minimize traffic impacts to the existing traffic and during the day for the segments of the highway expansion that currently have no existing traffic.

5.1.5 Stormwater Management and Drainage

Drainage Features

There are eight (8) dry ponds and six (6) enhanced grassed swales for the works proposed in this DCR.

Location of Sedimentation Detention Basins, Swales, and Check Dams

The location of drainage management facilities such as sediment detention basins, swales, and check dams, has been determined prior to commencing the works within each drainage catchment area. A detailed assessment was completed within each drainage catchment area along the Highway 427 Expansion to assess the adequacy of the land in terms of available area, soil characteristics, receiving water characteristics, etc.

Erosion and Sediment control

LINK427 has developed an Erosion and Sediment Control Plan (ESCP) for the project in accordance with the Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects ('Environmental Guide': MTO 2015a). The purpose of the ESCP is to document the environmental protection measures for preventing and controlling erosion and sedimentation during construction.

The ESCP was structured in accordance with the Environmental Guide (2015) and includes the following components:

- Statement of Objectives;
- Project Description;
- Pre-development Site Conditions;
- Critical Areas of Concern;
- Responsibilities and Accountability;
- BMP Selection and Design;
- Monitoring and Maintenance;
- Contingency Plan; and,
- Detailed Site Drawings.

A multiple barrier solution will be used to provide an adequate level of protection for all receiving watercourses. Components of the multiple barrier solution shall include (but are not limited to):

- Dewatering via pumping and isolating the construction zone from outside flows to keep the work in the dry;
- Screening of water prior to dewatering pump intake;
- Heavy duty silt fence at or above the regulatory flood line;
- Temporary sedimentation pond for dewatering prior to discharge to watercourses;
- Temporary diversion swale necessary to convey runoff;
- Straw bale and / or rock check dams in temporary diversion swale as required;
- Stabilization of all disturbed areas where work will not take place for a period of 15 days or more in accordance with OPSS 572;
- Dewatering effluent discharge to be directed to sedimentation basins;
- Energy diffusers to be employed for dewatering effluent lines;
- Use of check dams, sediment barriers, and/or filters prior to discharge to the creek; and,

Regular inspections will be undertaken during installation, prior to forecasted major storm events, during snowmelt and following significant storm events. Environmental inspections for routine maintenance of erosion and sedimentation controls shall occur daily in areas where work is occurring, where maintenance/ repairs have been undertaken, and after significant storm events.

Construction Period Drainage and Sediment Control Plans

Construction Period Drainage and Sediment Management Plans (DSMPs) have been developed for the Project to provide a procedure for water quality treatment of the runoff generated within the Lands before water is discharged to any watercourse. In addition to the water quality treatment, DSMPs also address attenuation of frequent runoff events, and sediment control. Each DSMP is site-specific and based on managing stormwater within each drainage catchment area within the Project limits throughout construction.

Construction Methods

Prior to disturbing the ground and any of the existing drainage, all of the existing watercourses (wet and dry) will be protected with the required erosion and sediment control measures outlined in the detailed drawings and the above mentioned ESCP and DSMP's, including but not limited to protections along all watercourses within the Project Limits and all outlets to downstream watercourses. As each catchment area is protected the construction of the ditching, temporary swales, temporary sedimentation basins, and check dams will begin using excavators, bulldozers, and trucks to relocate the fill to other parts of the site. Temporary rock check dams will be installed in the ditch lines at the same time. A topsoiling operation will begin as soon as the final surfaces of the ditches, temporary swales, and sedimentation basins are finished construction. A minimum of 50 mm of topsoil will be placed and further protected with either hydro seeding or hydro seeding with erosion control blankets. The drainage will be constructed from the outlets as to always maintain positive drainage throughout the limits of the Project.

For the structures that do not affect the watercourses, where no in-water work is required, all bridge work will be completed from within the designated areas. Cranes will be utilized to erect the girders over the water. All formwork and access platforms will be installed/removed from above with no impact to the underlying protected areas.

Where in-water work is required, including culvert removals and channel restorations at the fishery locations, the work will be done within the specified timing window of July 1 to March 31. Best Management Practices will be used to develop and implement specific plans to:

- install the necessary erosion and sediment control measures;
- install the flow by pass systems (including but not limited to diversion pipes, screened pumps, coffer dams, etc.);
- conduct de-fishing operations;
- excavate the existing stream bed;
- installation of the culvert, substrate, plunge pools, and backfill;
- restoration of the channel; and,
- removal of the flow bypass and any temporary devices in the water course.
- Monitoring of water quality upstream and downstream will be ongoing and continuous.

6 Environmental Impacts, Mitigation Measures and Commitments

This section identifies the impacts to the natural, socio-economic and cultural environments associated with the construction activities covered in this DCR #4, and the proposed measures to mitigate the potential adverse effects. Mitigation measures include planning decisions, design features, construction requirements, construction constraints and the potential for follow-up monitoring requirements. The assessment of impacts is based on the structural designs and related works described in detail in **Section 5**, which have been refined by LINK427 through the detail design process.

This section also describes and documents how the commitments outlined in the Individual EA (2010), the associated MECP Notice of Approval (November 2010), and TESR (2016) have been addressed with respect to the works proposed within DCR #4.

Construction works associated with this DCR #4 will not commence until the applicable permits, approvals and authorizations for those works are in place.

A number of commitments for additional work or environmental impact mitigation measures related to this project have been identified and are summarized below.

The key to ensuring effective environmental quality control and risk management during the project is the development and proactive implementation of an approach that:

- Identifies the environmental sensitivities;
- Presents the environmental protection measures in a way that can be translated into requirements and for which compliance can be verified; and,
- Includes a monitoring program that verifies that the environmental protection measures are being implemented and are effective.

LINK427 is committed to ensuring that this approach is applied proactively, and consistently throughout the project. LINK427 has developed an Environmental Management System (EMS) and an Environmental Quality Management Plan (EQMP) to oversee implementation of this commitment throughout design and construction of the project.

6.1 Natural Environment

6.1.1 Terrestrial Ecosystems

6.1.1.1 Existing Conditions

Terrestrial field investigations were undertaken for the Individual EA (2010), TESR (2016), and in 2017 by LINK427 in accordance with the MTO Environmental Reference for Highway Design (2013). Background information was reviewed to determine the locations where detailed mitigation / restoration plans are required, including compliance with the Individual EA commitments, as well as to understand the activities performed by MTO since the approval of the EA studies. This review clarified the scope and responsibilities for future work to be performed by LINK427.

Background information documented in the Individual EA (2010) and TESR (2016) identified the predominant natural environmental features as those areas associated with the West Robinson Creek and Rainbow Creek watercourses and their respective valley systems.

The Highway 427 structures over the Future John Lawrie Street, and Highway 427 structures over Rutherford Road are located outside of these valley systems and within disturbed lands / agricultural fields with no defining terrestrial features or sensitivities. Similarly, the SWM ponds are located outside of the valley systems and within disturbed lands / agricultural fields.

6.1.1.2 Potential Impacts

As clearing and grubbing of the lands has already been addressed through a previous DCR, and has already occurred, there are no direct impacts to vegetation communities anticipated as a result of the works associated with DCR #4.

Nevertheless, construction activities have the potential to result in the following indirect effects to adjacent vegetation that is retained (as previously documented in the Individual EA [2010] and TESR [2016] and updated herein):

- Release of construction-generated sediment to adjacent vegetation areas;
- Vegetation clearing / damage beyond the working area;
- Spills of contaminants, fuels and other materials that may reach natural areas;
- Changes in drainage patterns (groundwater and/or surface runoff) that can affect dependent vegetation / wetland areas located either upgradient or downgradient of the ROW. Blocking of existing surface / subsurface drainage patterns can result in vegetation dieback or condition changes through impoundment within or diversion of water away from a wetland. An increase or focused concentration of runoff can also result in erosion and associated sedimentation impacts on receiving vegetation.
- Spread of invasive plant species through improper disposal of grubbed materials, stockpiled topsoil containing invasive plant seed and root materials and/or improperly cleaned equipment moving around the Lands.

6.1.1.3 Mitigation Measures

In order to prevent unintended impacts to adjacent vegetation, all vegetation not requiring removal was protected with fencing prior to the clearing works that were documented in DCR #1 and will remain fenced throughout construction, including during construction of the works identified in this DCR #4. These protected vegetation areas were identified in the preliminary design as locations outside of the anticipated construction impact areas and they have been respected through the detail design. Fencing and other mitigation measures designed to protect and limit the impacts to adjacent vegetation are outlined below.

Mitigation measures from the Individual EA (2010) and TESR (2016) have been carried forward and integrated herein as applicable to the construction works and potential impacts identified in DCR #4. The following measures will be implemented during construction works associated with DCR #4.

General Vegetation Protection Mitigation Measures

- LINK427 has carefully reviewed construction impacts throughout the detail design process and has made extensive efforts to minimize vegetation removals during all phases of the project.
- LINK427 will protect and retain existing vegetation and trees, within identified protected vegetation areas.
- Prior to heavy machinery working adjacent to identified natural areas and vegetation communities, tree protection barriers shall be installed outside the drip-line of the significant features to protect any vegetation that is to be retained and is in the vicinity of exposure to damage by machinery or other sources. This includes, but is not limited to, where vegetation removals will occur within forested communities. LINK427 shall ensure that all protection fencing conforms to the OPSS for the Protection of Trees (OPSS 801.07.02) and that the fencing is installed outside of the drip-line of the identified vegetation communities or natural heritage features. The boundaries of the Lands and protected vegetation have been clearly delineated on construction specifications and will be fenced prior to the start of works associated with DCR #1. The fencing will be retained in place throughout the duration of works associated with DCR #4.
- Erosion and sediment control (ESC) measures will be installed according to the ESC Plan and as located on the design drawings, and will be maintained throughout construction.
- In the event that adjacent vegetation communities or planted trees are accidently damaged during construction activities, LINK427 will implement appropriate contingency measures such as pruning tree limbs or roots that are accidently damaged using proper arboricultural techniques.

- Exposed surfaces shall be stabilized and seeded with a temporary seed mix in areas where woody vegetation planting is not to occur within 45 days from completion of the works. Other exposed surfaces will be seeded as per the Landscape Plan discussed in a future DCR.
- Temporary stockpiles will be seeded with a temporary seed mix consisting of Oats (*Avena sativa*) in spring/summer and winter wheat (*Triticum aestivum*) in fall as recommended by MNRF to quickly stabilize these areas.
- LINK427 will restrict earth movement immediately adjacent to woodlands during periods of high dust generation. Non-chloride dust suppression methods will be applied whenever possible during construction and processing activities. Other dust suppressants will be examined if safety or performance concerns warrant.
- Construction vehicle access will be limited to the existing roadways and construction paths, away from the protected vegetation.
- Vehicle re-fueling stations will be located within a centralized location on-site away from the protected vegetation.
- For areas immediately adjacent to the protected vegetation, supervision of the construction will occur.
- LINK427 shall undertake environmental inspection during construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are initiated where warranted.
- There shall be no storage of materials within adjacent natural areas.
- LINK427 will ensure appropriate clearing and disposal of all construction-related debris following construction.
- A Vegetation Restoration Plan (VRP) has been developed in consultation with the MNRF and the TRCA. Once completed, the VRP will be used as the guiding document for future vegetation restoration activities. A final copy of the VRP will be provided to the MECP. The VRP will be integrated with the erosion control plan, the invasive species management plan and requirements of the ESA permit for SAR Bats. The VRP and Landscape Plan, which is to be implemented as part a future DCR, include the following elements:
    - Planting at stormwater ponds will be designed to stabilize inlet and outflow areas and provide shading and bank stabilization. Additional planting around each pond will contribute to vegetative cover.
    - Native species will be utilized where possible, particularly adjacent to sensitive areas and valleys.
    - Vegetation enhancement will be performed in areas where it is likely to be successful and will contribute ecological benefit.
    - Areas of meadow marsh habitat will be created and integrated with the stormwater management system.
    - Site-specific mitigation will be performed at key locations such as woodlands and valleys, to enhance existing vegetation and habitat.
    - Other locations along the highway such as interchanges and embankments will be vegetated with a combination of aesthetic and naturalized plantings.

6.1.2 Wildlife, Wildlife Habitat and Species at Risk

6.1.2.1 General Wildlife and Wildlife Habitat

6.1.2.1.1 Existing Conditions

As per the Individual EA (2010), no significant wildlife habitat[1] was identified by MNRF within the Lands. In general, the wildlife recorded within the Lands are common, generalist species tolerant of urban or semi-urban conditions. The 2016 TESR confirmed this finding through the statement that: "it has been confirmed that no significant wildlife habitat exists within the Lands and the removal of non-specialized and non-significant marginal habitat can be mitigated as to avoid adverse effect on the non-specialized wildlife observed within the Lands" (p.33). As noted in the Individual EA (2010), the two valley systems within the Lands (i.e. Rainbow Creek and West Robinson Creek) provide "some opportunities for wildlife usage and movement however, these systems are limited in terms of width, natural vegetation cover, habitat diversity and wildlife habitat elements. They would not generally fall into the category of significant 'animal movement corridor', but would function more on a local linkage scale" (p.5-19).

Additional field investigations for wildlife conditions were undertaken in 2015 and 2016 and included targeted SAR Surveys for SAR bats and Barn Swallow. Amphibian Surveys were completed in 2016. No calling amphibians (i.e. Western Chorus Frog) were recorded. Breeding bird surveys were completed according to the Ontario Breeding Bird Atlas Field Program.

The observed species assemblage was consistent with the cultural habitat mosaic, proximity to development and moderate to high levels of disturbance within the Lands.

6.1.2.1.2 Potential Impacts

The wildlife and wildlife habitat community types are generally common on the landscape and impacts are considered minor and can be mitigated. Much of the loss of habitat has been addressed in DCR #1 through the vegetation communities that were cleared. Nevertheless, there remains potential for the following impacts to wildlife and wildlife habitat resulting from the works associated with DCR #4.

The following are potential impacts to wildlife and wildlife habitat:

- Localized potential impact to migratory birds and their nests.
- Potential incidental encounters with wildlife during construction.
- Localized changes to wildlife movement opportunities across the Project Lands.

6.1.2.1.3 Mitigation Measures

The mitigation measures outlined earlier to minimize the potential adverse effects to vegetation and to protect adjacent vegetation areas will in turn protect the associated wildlife habitat features and functions. However, it is also necessary to ensure the protection of breeding birds, as well as all wildlife that may nest or otherwise use areas where construction is proposed, as outlined below.

Migratory Birds

Nesting migratory birds are protected under the *Migratory Birds Convention Act* (MBCA, 1994). No work is permitted to proceed that would result in the destruction of active nests (nests with eggs or young birds), the wounding or killing of birds, of species protected under the MBCA, 1994 and / or Regulations under that Act.

Mitigation measures to address potential impacts to Migratory Birds include:

[1]Significant Wildlife Habitat (SWH) is identified by the MNRF in the Significant Wildlife Habitat Technical Guide (MNR, 2000) as the following broad categories: 1) seasonal concentration areas (e.g., conifer forests for deer wintering); 2) rare vegetation communities or specialized habitats for wildlife; 3) habitats of species of conservation concern, excluding the habitats of endangered and threatened species; or 4) animal movement corridors.

- All construction activities which may be disruptive to migratory birds will comply with the MBCA, 1994 and Migratory Bird Regulations (MBR 2012).
- Measures to prevent nesting in structures identified for removal will be implemented as necessary (e.g., installing netting).
- Should nesting migratory birds be encountered during construction, all activities in that area will cease and LINK427's Avian Biologist will be consulted for guidance.

General Wildlife Protection

The landscape mosaic within the Lands provides habitat for tolerant, urban-adapted and open-country species (e.g. open-country / generalist birds and mammals, amphibians and reptiles).

Mitigation measures to address potential impacts to wildlife include:

- All construction workers will be trained in advance of starting work regarding potential to encounter wildlife while undertaking their activities, and the appropriate response if an encounter occurs.
- Under no circumstances will any animal (e.g., bird, reptiles, mammals etc.) be knowingly harmed, harassed or otherwise disturbed. If an animal is encountered, it will be allowed to move away on its own.
- If small wildlife (e.g. turtles, amphibians) are stranded within the construction zone, LINK427 will be contacted and the animals will be captured and released by a qualified individual (e.g., LINK427 SAR Biologist).
- In the event that small wildlife encountered does not move away from the construction zone and construction activities are such that continuing construction in the area would result in harm to the animal, all activities will stop and LINK427 will be notified immediately.

Wildlife Movement Opportunities

Wildlife movement was a specific consideration in the structure design at the main valley crossings and a Wildlife Fence Plan has been developed for the project with the sole purpose of keeping wildlife off the highway ROW and funneling wildlife to the main valley crossings structures. The type of wildlife fence (e.g., height and size of openings) has been chosen based on the wildlife found in various areas along the length of the highway. The Wildlife Fence Plan will be part of the Vegetation Restoration Plan and Landscape Plan and will be incorporated in a future DCR.

6.1.2.2 Species at Risk

Since the completion of the Individual EA (2010), field investigations completed in 2015 and 2016, confirmed five (5) Species at Risk (SAR) within the Lands. The 2015 field investigations identified Barn Swallow and the spring 2016 field investigations confirmed the presence of four (4) SAR bat species (Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tricoloured Bat).

ESA Overall Benefit Permit

The ESA prohibits the harm and harassment of protected species and damage or destruction of their habitat.

An Overall Benefit Permit is required to perform an activity that is not otherwise allowed under the ESA. The permit authorizes a person, company or organization to perform the activity, as long as an overall benefit to the species is provided in Ontario.

MTO obtained an Overall Benefit Permit for the project. LINK427 will comply with all of the conditions as outlined in the permit approval. Work associated with DCR #4 is not anticipated to have any impacts on the identified SAR therefore details relating to associated mitigation measures and overall benefit activities are not included in this DCR.

Barn Swallow

Registration under the ESA (2007) was completed by MTO for the removal of breeding habitat for Barn Swallow (i.e., the two barns).

LINK427 will implement all mitigation measures outlined in the Barn Swallow Mitigation and Restoration Record prepared in support of the Barn Swallow registration under the ESA, 2007, including 3 years of monitoring identified therein.

SAR Encounters

There is some limited potential for SAR encounters during construction. A SAR Awareness Training Manual has been prepared and is provided as an Appendix to the VRP and a protocol to follow in the event of an encounter is provided in that manual. All construction personnel have and will be trained in SAR awareness prior to initiating work. Specifically, the following measures will be followed in the event of an encounter with a SAR:

- A SAR sighting is defined as an observation of a SAR where no action is required.
- A SAR occurrence is defined as an observation of a SAR where capture and relocation is required.
- In the event that SAR wildlife is encountered in the immediate work area, the protocol outlined below shall be followed:
  - Work in the immediate vicinity of the observation must come to a stop.
  - Should an Ecologist/Biologist not be on-site, one will be contacted immediately.
  - Ecologist/Biologist will notify the District MNRF Biologist within 48 hours of any observation of Endangered and Threatened species and/or immediately for any species going to a wildlife custodian.
  - It is not necessary to notify the District MNRF Biologist with observations of Special Concern species or general wildlife sightings (deer, raccoon etc.).
  - A 30-m setback from the area of the species location will be applied to allow the species to vacate the area naturally within a 24-hour period and then exclusionary fence is to be installed if appropriate.
  - Should a SAR be encountered during construction activities completed during the winter months (e.g. dislodged from hibernation), the species will immediately be placed in appropriate containers and stored in a dark, warm, quiet place and be transported to an appropriate wildlife sanctuary/rehabilitation facility as soon as possible. Onsite Ecologists/Biologist will advise of the transportation arrangements and consult with MNRF to notify them of the transportation.
  - Work is to not commence again in the immediate area of the observation until further instructed by onsite Ecologist/Biologist.
  - Any required SAR relocation must be conducted by a qualified Biologist or Ecologist.

6.1.3 Fish and Fish Habitat

6.1.3.1 Existing Conditions

Surface water features within the Lands originate as first order headwater drainages, which contribute ephemeral flow, sediments and nutrients to downstream habitat. Second-order drainages, including Rainbow Creek, East Robinson Creek and West Robinson Creek, contain permanent flow and provide spawning, rearing, feeding and migratory habitat for fish and generally support a wider variety of ecological features and functions. East Robinson Creek and West Robinson Creek converge to form Robinson Creek outside of the Lands. Rainbow Creek and West Robinson Creek are the two major watercourses within the Lands and are located within the Humber River watershed. There are a number of intermittent tributaries within the Lands that convey seasonal flow to Rainbow Creek, East Robinson Creek, West Robinson Creek and Robinson Creek.

MNRF originally identified Rainbow Creek as 'contributing' Redside Dace habitat in 2015; however, in 2016 MNRF confirmed that detection surveys for Redside Dace in Rainbow Creek (including environmental DNA testing) have been

unsuccessful. MNRF confirmed on April 22, 2016 that Redside Dace ESA habitat regulation for this species no longer applies to the Highway 427 Extension. There are no aquatic SAR within the Lands.

6.1.3.2 Potential Impacts

As all the above noted 8 stormwater management ponds will outflow to existing watercourses supporting direct and indirect fish habitat, the proposed works have the potential to impact to fish and fish habitat if the appropriate mitigation measures are not implemented. The following are potential impacts associated with the construction of new stormwater management ponds without the implementation of mitigation.

- There are no direct impacts to in-water habitat as a result of the stormwater management pond outfalls as all of the outfall structures will be installed above the 2-year water flow elevation level associated with the receiving watercourse. As such, there will be no in-water works. Furthermore, for all outfalls except for pond 5, the outfalls will be installed more than 30 m from the receiving watercourse and allow the flow to continue as diffuse flow through the existing vegetation where the potential for infiltration can occur. This further reduces any potential impacts to the receiving watercourse.
- General potential indirect construction-related impacts (e.g. erosion and sediment influx or disturbance and downstream transfer, other water quality impacts) can be managed using appropriate mitigation and restoration measures.

6.1.3.3 Mitigation Measures

The potential adverse effects are limited to the nominal indirect impacts associated with erosion and sediment influx during construction, which can be addressed through standard mitigation measures. The proposed mitigation measures include:

- Sediment and erosion control measures will be implemented during all phases of construction, clean-up and restoration to prevent sediment laden runoff from entering any of the watercourses directly from the construction zone. At a minimum, the project ESCP and site-specific DSMPs will address the following aspects:
    - Perimeter silt fence will be installed between the work areas and all reaches of those watercourses where works are required.
    - The fencing will be properly installed and regularly inspected and maintained. It will be left in place and maintained until all surfaces contributing drainage to these watercourses are stabilized.
    - All exposed and newly constructed surfaces will be stabilized using appropriate means in accordance with the characteristics of the soil material and slope conditions.
    - These surfaces will be fully stabilized and re-vegetated as quickly as possible (and at a maximum within 15 days) following completion of the works.
- All near-water construction zones will be isolated using standard perimeter silt fencing of the general construction zone up and downstream. The silt fencing will be heavy duty/reinforced fencing for all disturbed areas of the embankments that drain to the streams. Silt fencing will be regularly inspected and maintained as required.
- Temporary dewatering of the construction zones will be required for the outfall installations. All temporary dewatering will be done using appropriate energy dissipation and settling / filtration measures for discharge to ensure no erosion or sediment release occurs in the watercourses. No dewatering discharge will be released directly to the watercourses. If temporary dewatering of the near stream construction zone is required, dewatering will be discharged through a filter bag / splash pad located at least 30 m from the watercourses.
- All dredged, salvaged or stockpiled materials will be located a safe distance from the watercourses edges, stabilized and a physical barrier placed between the stockpile and the watercourse to prevent the migration of any sediment or other material to the watercourse.

- All work areas or other disturbed surfaces draining to the watercourses and/or in the floodplain will either be temporarily or permanently stabilized and re-vegetated with appropriate native, non-invasive species a maximum of 15 days following construction.
- The erosion and sediment control measures will be left in place, monitored and maintained in proper working order until all disturbed areas draining to the watercourses are fully stabilized, including establishment of vegetative cover.
- All activity will be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants / deleterious substances, in addition to sediment as outlined above, to the watercourses. Storage, maintenance or refueling or maintenance of equipment will be conducted at least 30 m away from the watercourses. LINK427 will implement the project Spills Prevention and Emergency Response Plan throughout construction.
- All on-site crew members operating construction vehicles will be appropriately trained in handling a potential spill and have WHMIS Training.
- Every effort will be made to retain as much of the natural vegetation as reasonably possible to expedite the recolonization of the disturbed areas with native plant species.
- All riparian vegetation removed to construct the outfall structures will be replaced with a mix of appropriate native species. Additional riparian plantings may be incorporated to enhance existing conditions along the ROW. Only native shrub and tree species, compatible with the site conditions will be used.
- A CISEC certified inspector will be on-site regularly throughout construction, responsible for ensuring the sediment and erosion control measures are functioning and all mitigation measures are being implemented.

6.1.3.4 Net Effects

There are no long-term residual effects that would result in significant harm to fish associated with the installation of the stormwater management outfalls as there will be no direct construction connection to any receiving watercourse. A summary of net effects is provided below:

- Installing the outfall structures above the 2-year waterflow elevation level will avoid encroachment / infill into bankfull channel and maintain natural fluvial geomorphic processes.
- The outfall locations will accommodate the existing floodplains, and will pose no negative residual effects to fish and fish habitat.
- Permanent loss of riparian vegetation is anticipated to be minimal given that the works will not encroach within the 30 m from the receiving watercourse except for Pond 5. All disturbed areas will be restored as per the Vegetation Restoration Plan.

6.1.4 Groundwater and Hydrogeology

A number of previous studies have been carried out in order to fulfill groundwater and hydrogeological assessment requirements. These studies include:

- A Hydrogeological Assessment completed for the Individual EA (2010);
- A Groundwater Assessment Study Report for the TESR (2013); and,
- A summary of Existing Conditions, Potential Impacts, and Mitigation Measures for the TESR (2016).

Review of the previous studies, published documents and the soil characteristics identified during recently completed geotechnical investigations indicates that the Lands are principally located within the South Slope physiographic region in Southern Ontario. A detailed hydrogeological assessment was completed in October 2018 based on review of the above completed studies, detailed construction design drawings and recent site visits in 2017 and 2018 for groundwater monitoring and hydraulic testing. A small part of the Lands at the northwest between Rutherford Road and Major Mackenzie Drive are classified as lying within the Peel Plain physiographic region. The South Slope physiographic region is mapped from the Oak Ridges Moraine (ORM) to the north and slopes downwards towards Lake Ontario. It is typified by smooth, faintly drumlinized clay till plains. The Peel Plain physiographic region is associated with a former glacial lake (Lake Peel) and is characterized by thin glacio-lacustrine deposits principally comprised of clays and silts, overlying till deposits. The Peel Plain is mapped within the South Slope region (which is found to the north and south of the Peel Plain) and is characterized with a gradual and fairly uniform slope towards Lake Ontario.

The topography within the Highway 427 Expansion Lands is generally flat, gently sloping southward from the northwest to the southeast. According to topographic mapping (Brampton, 30M/12, 1994), ground surface elevations range from approximately 200 m above sea level (masl) at the northern end of the Lands to approximately 180 masl at the southern end of the Lands.

Based on the MECP water well records and previous hydrogeological studies, the quaternary deposits in the vicinity of the Lands have been logged to depths ranging between about 15 mbgs (metres below ground surface) to greater than 47 mbgs (encountered at elevations between 164 and 185 masl). Lenses or discontinuous layers of silt, sand and gravel were logged in the well records within these clayey silt/silty clay deposits.

The Lands are located within the Humber River Watershed. Rainbow Creek and West Robinson Creek are two major tributaries to the Humber River. The regional groundwater flow direction within the Lands are to the southwest, south and southeast. On a local scale, the shallow groundwater flow will mimic the surface topography. The shallow groundwater levels are furthermore influenced by seasonal variation, and can be affected by the presence of underground utilities.

A groundwater monitoring program (consisting of the collection of water levels from existing monitoring wells, water samples from select locations for discharge quality, and an update of private water well survey) has been completed, in accordance with the Individual EA (2010) commitments to establish baseline conditions, to identify potential adverse impacts to groundwater, and to identify environmentally sensitive features or water sources (such as private water wells) related to DCR #4 construction activities. LINK427 staff completed a knock-on-the-door program and made all reasonable efforts to contact the residents for the well survey on three events (once during normal work day time, once during the evening time and the third time on a weekend); however, so far none of the residents responded to the request with their contact information.

A dewatering assessment was completed by LINK427 in 2018 for the Highway 427 Expansion and includes eleven (11) structures and SWM ponds addressed in DCR #4 **(Table 3)**. The results of the hydrogeological assessment indicate that the anticipated dewatering volume at ten (10) of the locations will be very minor (less than 50,000 litres per day (LPD)). At the location of Dry Pond-2 at the northwest corner of future Highway 427 and Highway 7 where the pond bottom will extend below the local groundwater level in the shallow aquifer, higher pumping at rates (approx. 99,000 LPD) may be required. The pumped groundwater during construction will need to be discharged as per the requirements of O. Reg. 63/16 and 64/16. Since the bottom of this pond will be below groundwater, a groundwater discharge collection system with outlets will be required for the long term to release groundwater pressure from underneath the liner. During the long-

term drainage release, the anticipated quality of water will be cleaner with regards to TSS as there will be no ground disturbance involved.

Table 3: Dewatering Assessment Summary

Serial No	Site ID and Reference Drawing (DWG) Number	Station (STA) IDs	Anticipated Dewatering Volumes (LPD)
1	Future John Lawrie Street (DWG-138, 139) B14A/14B	STA. 12+950	Less than 50,000 LPD
2	Highway 427 Overpass at Rutherford Road (DWG-140, 141) B15A/15B	STA. 14+175	No dewatering.
3	Dry Pond-1 at STA. 9+600, Northeast corner of Future Highway 427 and Highway 7 (DWG--H427-D, F, Package 6, 2200/2201)	STA. 9+600	Less than 50,000 LPD
4	Dry Pond-2 at STA. 12+300, Northwest corner of Future highway 427 and Langstaff Road interchange (DWG-H427-D, F, Package 6, 2202/2203)	STA. 12+300	Anticipated pumping rate is 99,000 LPD both in the short and long-term stage.
5	Linear Ponds A, B, C, D and E (dated 2018/06/18, H427-D, Package 6, No. 2204 (A), 2205 (B and C), 2206 (C), 2007 (D and E) also designated as drainage ditches		Dewatering not anticipated.
6	Dry Pond-3 At Sta. 13+100, North of Street-A Crossing of proposed Highway 427 (H-427-D, F, Package 7, No. 2202, dated 2018/04/25)	STA. 13+100	Less than 50,000 LPD
7	Dry Pond-4 At Sta. 13+700, on the Southwest Corner of proposed Highway 427 and Rutherford Road Interchange (H-427-D, F Package 7, DWG No. 2204/2205, dated 2018/04/25)	13+700	Less than 50,000 LPD
8	Dry Pond-5 At Sta. 14+600, Northwest Corner of proposed Highway 427 And Rutherford Road Interchange (H-427-D, F, Package 7, DWG No. 2207/2206, dated 2018/04/25)	STA. 14+600	Less than 50,000 LPD
9	Dry Pond-6 At Sta. 15+800, South of McGillivray Road and on the East side of proposed Highway 427 (H-427-D, F, Package 8, DWG No. 2200/2201, dated 2018/06/08)	STA. 15+800	Less than 50,000 LPD
10	Dry Pond-7 At Sta.16+600, North of Major Mackenzie Drive and proposed Highway 427 (H-427-D, F, Package 8, DWG No. 2202/2203, dated 2018/06/08)	STA. 16+600	Less than 50,000 LPD
11	Dry Pond-8 At Sta. 9+700, West Side of proposed Highway 427 North of Major Mackenzie Drive (H-427-D, F, Package 8, DWG No. 2204/2205, dated 2018/06/08)	STA. 9+700	Less than 50,000 LPD

6.1.4.1 Potential Impacts

An update of the 2010 hydrogeological assessment was completed in September 2016 by AECOM, and the key findings related to potential impacts are summarized below. The updates were reviewed by LINK427 to complete the dewatering assessment and was updated based on recent hydrogeological assessment (2018) derived from geotechnical site investigations by LINK427 (2017) and groundwater monitoring works by LINK427 (2017 & 2018).

Groundwater Susceptibility and Potential Groundwater Impacts

The TESR (2016) indicated groundwater susceptibility to contamination as follows:

- There are coarse textured sand/silt layers present in the glacial till deposits, which serve as the primary aquifers for the private water well supply;
- The hydraulic connectivity between the overburden quaternary aquifer and the deeper bedrock aquifer systems is low due to the fine textured overburden soil. Therefore, the aquifer vulnerability within the Lands are considered low to moderate to the overburden aquifers and deeper bedrock aquifer; and
- The shallow overburden aquifer is considered to have higher vulnerability, especially in the areas where coarse textured soils are found at the ground surface, where the groundwater table is shallow, and/or the aquifer is in close vicinity of the surface water bodies and road infrastructure.

According to the Highly Vulnerable Aquifers (HVAs) mapping from the Assessment Report for the Toronto and the Region Source Protection Area (TRSPA, July 2015), limited areas of HVAs are present along Rainbow Creek, Robinson Creek and their tributaries in the proposed extension portion of Highway 427 north of Zenway Boulevard and Major Mackenzie Drive.

The potential impacts from the Highway 427 Expansion to the local groundwater system as identified in the TESR (2016) was reviewed. The impacts identified were re-evaluated and updated based on LINK427's review and assessment of dewatering requirements. The results of the assessment are summarized below:

- Changes to recharge / discharge regimes resulting from the disturbance of the ground surface, ground clearing, compaction, road cuttings, placement of fill, and the presence of the completed impervious layers of road surface;
- Potential dewatering impacts including a reduction in groundwater levels and reduction in flows to nearby private wells and groundwater-dependent water bodies are not anticipated since the assessment indicates that dewatering pumping to remove groundwater will be less than 50,000 LPD;
- Potential impacts associated with the application of commercial fertilizers during seeding activities to re-establish vegetative cover;
- Potential spills of hydrocarbons and other chemicals used during construction activities, which could especially impact the shallow groundwater aquifer and groundwater-dependent water bodies specially in the areas of high aquifer vulnerabilities; and,
- The future use of salt for road de-icing in winter seasons has the potential to impact the groundwater and surface water resources in the immediate vicinity of the proposed road alignment. Careful thought should be given to use of salt alternative for deicing of the highway.

Due to the presence of low permeability overburden soil of considerable thickness, the potential impacts to the deeper aquifers within the Lands are generally considered to be low to moderate. Higher potential for groundwater impacts are present in the following areas:

- Along the creeks and their tributaries;
- Areas of Highly Vulnerable Aquifers (HVAs);
- Areas where groundwater dewatering is required and private water wells are located within the zone of influence.

Dewatering pumping above 50,000 LPD at the sites listed in **Table 7** are not anticipated, except for one dry pond location where Factor of Safety (FoS) pumping at a rate of approximately 100,000 LPD is anticipated, an Environmental Activity and Sector Registry (EASR) will be required for construction elements included in this phase of construction. A detailed Groundwater Dewatering summary table is provided in **Appendix F**.

Potential Water Supply Well Impacts

The TESR (2016), well survey (AECOM 2016) and the MECP water well database search identified 22 private water supply wells for the extension portion from north of Zenway Boulevard to Major Mackenzie Drive **(Figures 5A – 5D)**. The majority of adjacent areas are used as agricultural farm lands. There are private wells within 500 m of the proposed

Highway 427 extension alignment that are used by residents for their water supply in this area. With the exception of two (2) recorded wells, none of the water supply wells as shown in the MECP database are located within 100 m of any the six (6) potential dewatering locations as part of DCR #4. One of the two wells that are within 100 m of a construction feature is abandoned (a dug well) and the other one is a deep well (Well ID: 6917556) used as a livestock well.

Eleven (11) structures and SWM ponds (as shown in **Table 3**) included in the DCR #4 works will require some form of excavations for construction and foundations. Dewatering at rates more than 50,000 LPD is not anticipated for construction work at ten (10) of these sites. Only at the site of Dry Pond-2, where the excavation will extend below the local groundwater level of the shallow aquifer, the FoS pumping rate (which is 3 times more than the anticipated pumping rate) is estimated to be approximately 100,000 LPD.

The overpass at the future extension of John Lawrie Street for Highway 427 will be founded on H-piles with pile cap at 185.7 masl. The groundwater level in the vicinity as recorded was at 188.8 masl in till which is not conducive to transmission of groundwater. However, during construction, the groundwater may accumulate in the excavated trench due to gravity drainage. Sump pumping at rates less than 50,000 LPD is anticipated to be adequate to address groundwater inflow. The estimated Zone of Influence (ZOI) from pumping may extend to approximately 150 m from the location of pumping. Since sump pumping is likely to be the preferred pumping method, the actual ZOI will be much less. There are no private wells within this estimated ZOI that have the potential to be adversely impacted.

The foundation of the Rutherford Road overpass structure for Highway 427 northbound and southbound lanes as designed will be above ground constructed on driven piles. Therefore, groundwater dewatering will not be an issue at this site. There are no private wells within this estimated ZOI that have the potential to be adversely impacted.

Besides the above mentioned two overpasses, eight (8) rainwater detention structures or dry ponds and six (6) enhanced grassed swales will be constructed as part of the stormwater management system for the construction phase of DCR #4. Dewatering will not be required for construction of the enhanced grassed swales.

Dry Pond-1 will be constructed at the northeast corner of future Highway 427 and Highway 7 with the bottom at 178.3 masl extended to within till. The local groundwater level is at 180.1 masl in till. Sump pumping may be required at rates less than 50,000 LPD to address accumulation of groundwater in the excavation area.

Dry Pond-2 will be constructed at the northwest corner of future Highway 427 and Langstaff Road interchange. The bottom of this pond will extend within till to 178.3 masl while the water level (as recorded) was 188.1 masl. This will create a head of more than 9 m at this location. This head of groundwater has the potential to adversely impact the function and performance of the clay liner unless a groundwater drainage collection and discharge system is incorporated in the construction design. This pond will require pumping of groundwater during construction and also in the post-construction stage due to high hydraulic head. The ZOI is estimated to extend to 150 m from the pumping location. Since sump pumping is anticipated to be the [preferred method of pumping the actual ZOI will be much less than the estimated ZOI of 150 m.

Dry Pond-3 will be constructed north of the future extension of John Lawrie Street. The elevation of pond bottom as designed will be at 186.18 while the groundwater level as recorded was 186.6 masl. Therefore, a very small volume of groundwater accumulation may be anticipated which may need to be pumped using sump pumps.

Dry Pond-4 is proposed to be built on the southwest corner of the future Highway 427 and Rutherford Road crossing. The bottom of this pond will extend to a 189.2 masl elevation within till. The highest groundwater elevation recorded in the nearby monitoring well was 191.8 masl. Therefore, small volume pumping at a rate less than 50,000 LPD may be required to remove groundwater accumulated from gravity drainage. The ZOI is estimated to extend to 72 m from the pumping location. Since sump pumping is anticipated to be the preferred method of pumping the actual ZOI will be much less than the estimated ZOI of 72 m.

Dry Pond-5 will be constructed on the northwest corner of the future Highway 427 and Rutherford Road crossing. The bottom of the pond will extend to 192 masl within till. The highest groundwater elevation as recorded in the nearby monitoring well was 195.8 masl. Therefore, small volume pumping at a rate less than 50,000 LPD may be required to remove groundwater accumulated from gravity drainage. The ZOI is estimated to extend to 95 m from the pumping

location. Since sump pumping is anticipated to be the preferred method of pumping the actual ZOI will be much less than the estimated ZOI of 95 m. Since the groundwater elevation is relatively high, a groundwater drainage collection and discharge system, underneath the clay liner, may be required within the construction design for this pond or the high groundwater table may adversely impact the function and performance of the liner in the long run.

Dry Pond-6 is located on the southeast corner of the crossing of McGillivray Road and Highway 427. The elevation of the bottom of the pond is 196.05 masl extending in to and within the till. The highest groundwater level as recorded in nearby monitoring well was 197.8 masl. Therefore, small volume pumping at a rate less than 50,000 LPD may be required to remove groundwater accumulated from gravity drainage. The ZOI is estimated to extend to 60 m from the pumping location. Since sump pumping is anticipated to be the preferred method of pumping the actual ZOI will be much less than the estimated ZOI of 60 m.

Dry Pond-7 will be built north of the crossing of Major Mackenzie Drive and Highway 427. The elevation of the bottom of the pond is 200.85 masl extending in to and limited within the till. The highest groundwater level as recorded in nearby monitoring well was 203.8 masl. Therefore, small volume pumping at a rate less than 50,000 LPD may be required to remove groundwater accumulated from gravity drainage. The ZOI is estimated to extend to 95 m from the pumping location. Since sump pumping is anticipated to be the preferred method of pumping, the actual ZOI will be much less than the estimated ZOI of 95 m. Since the groundwater elevation is relatively high, a groundwater drainage collection and discharge system to relieve hydrostatic pressure from underneath the clay liner is recommended for proper function.

Dry Pond-8 will be constructed in the north-west corner of the crossing of Major Mackenzie Drive and Highway 427. The elevation of the bottom of the pond is 199.54 masl extending in to and limited within the till. The highest groundwater level as recorded in the nearby monitoring well was 202.5 masl. Therefore, small volume pumping at a rate less than 50,000 LPD may be required during construction to remove groundwater accumulated from gravity drainage. The ZOI is estimated to extend to 93 m from the pumping location. Since sump pumping is anticipated to be the preferred method of pumping, the actual ZOI will be much less than the estimated ZOI of 93 m. Since the groundwater elevation is relatively high, a groundwater drainage collection and discharge system to relieve hydrostatic pressure from underneath the clay liner is recommended for proper function.

Based on the dewatering analysis, the zones of influence (ZOI) from sump pumping is not estimated to extend further then 150 m from the dewatering pumping locations. This form of limited low-volume dewatering is not anticipated to impact water wells in the vicinity, as the private wells based on MECP water well database and survey by AECOM are not located within the ZOI of any potential dewatering pumping locations. However as best management practice approach, a private water well monitoring program is recommended for the total length of the of the proposed construction works. A well survey program was initiated in March 2018 to identify the wells and their location in the field; however, residents did not respond to the request for the well survey. Any wells to be removed during the highway improvement activities will have to be decommissioned properly as per the Ontario Wells Regulation (R.R.O. 1990, Reg. 903). A well monitoring and mitigation plan developed by York Region will remain in effect during the construction period. This plan will be implemented in case an adverse impact from dewatering during construction is identified.

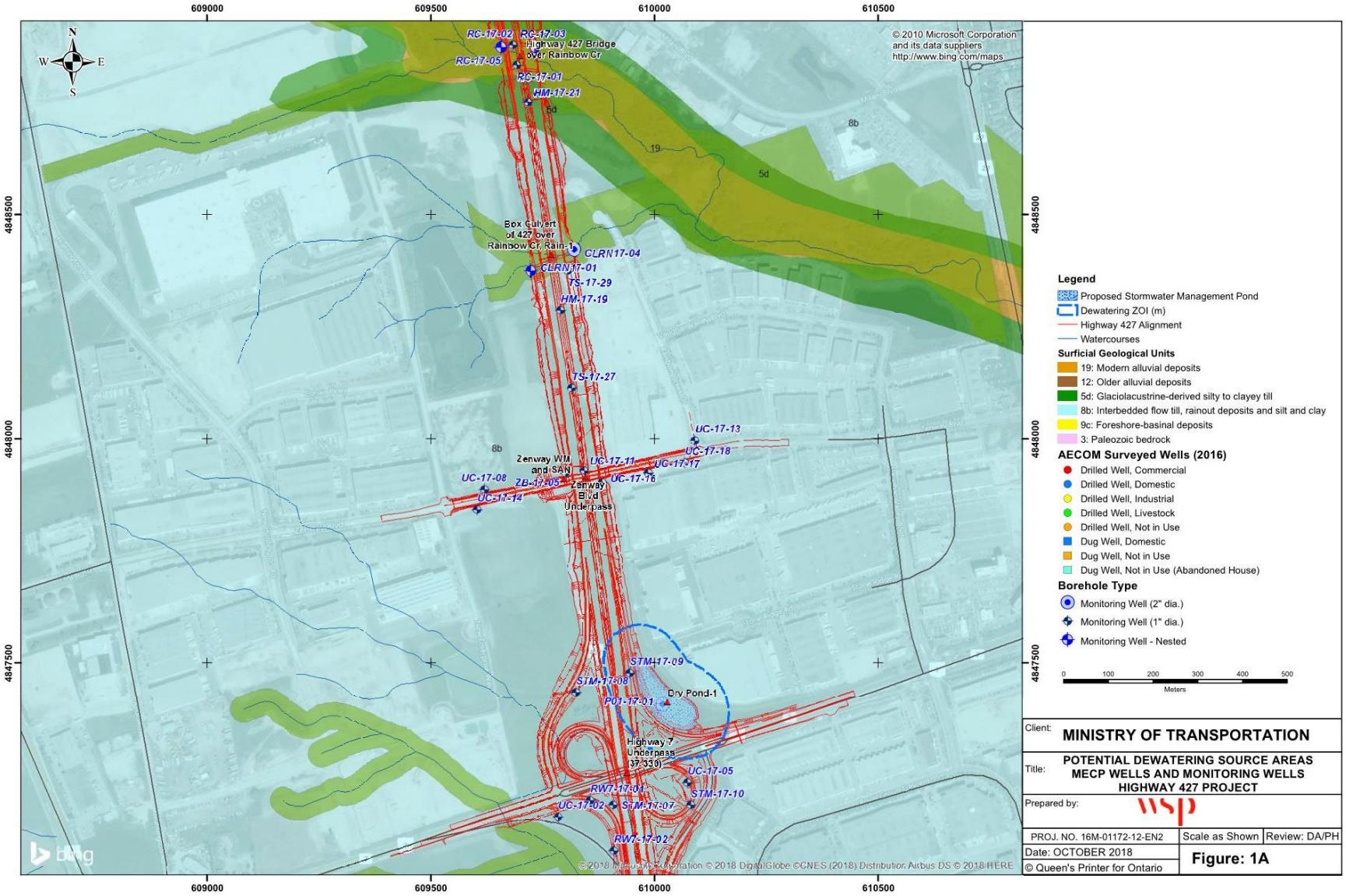


Figure 5A: Existing Water Supply Wells within the Extension of Highway 427

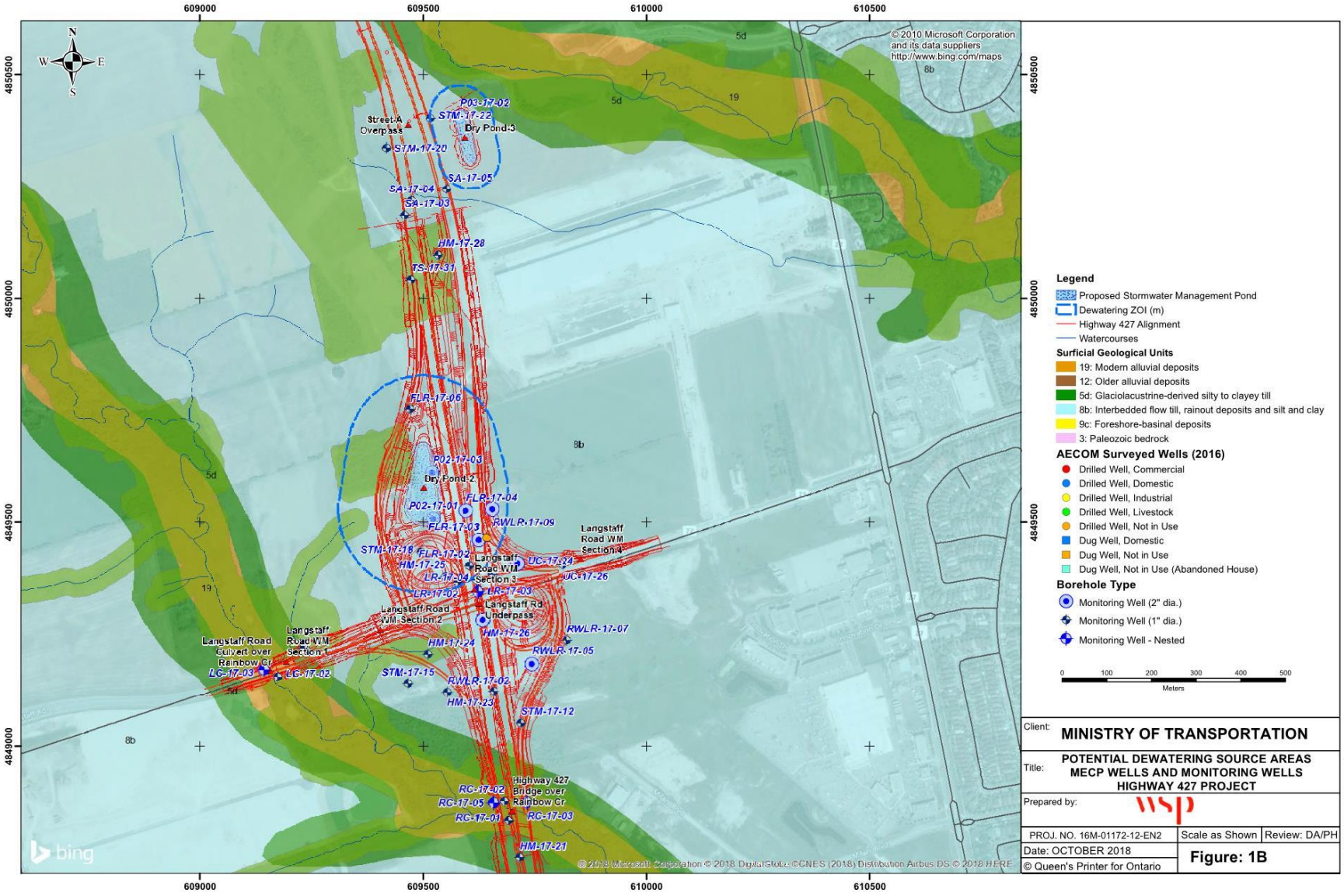


Figure 5B: Existing Water Supply Wells within the Extension of Highway 427

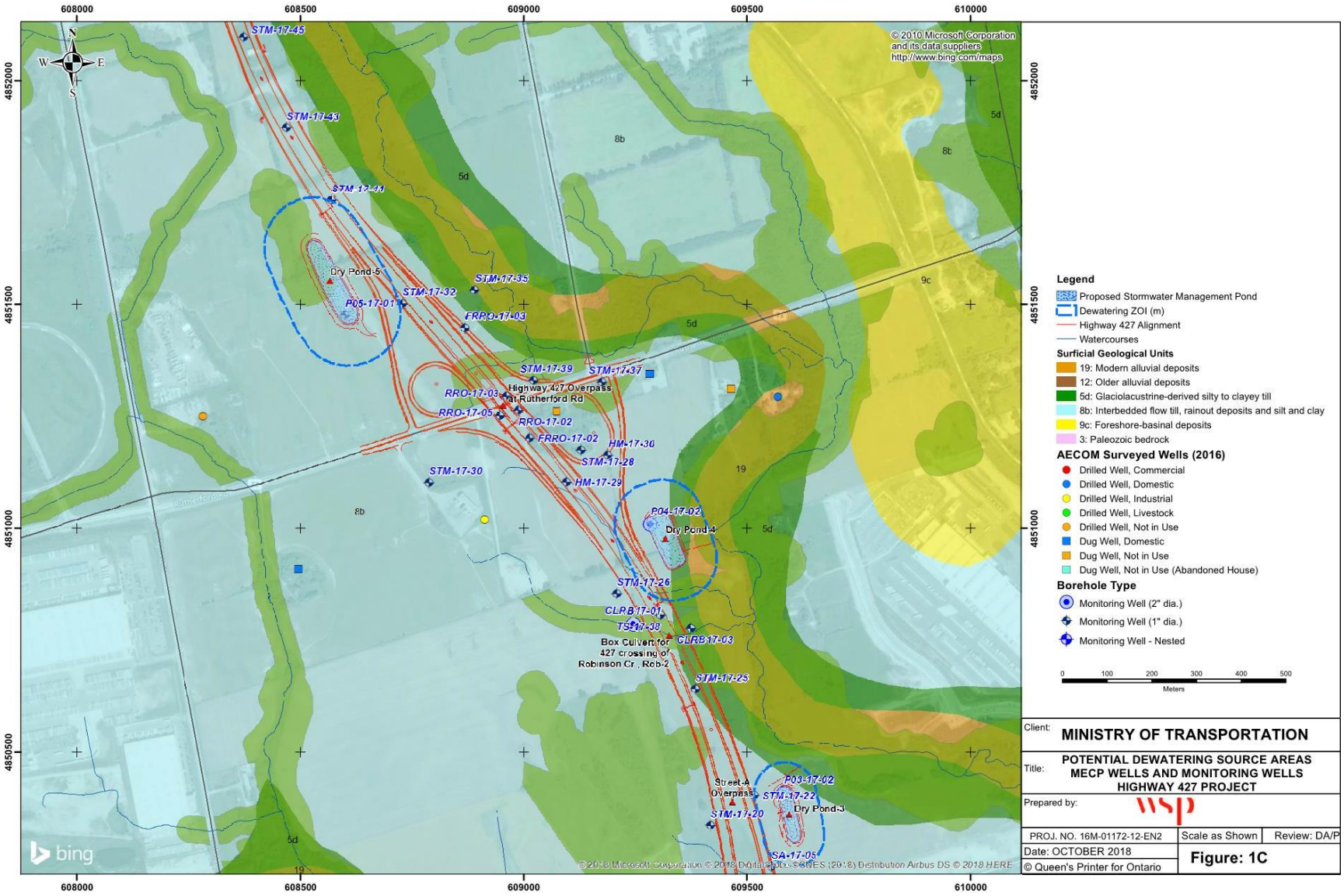


Figure 5C: Existing Water Supply Wells within the Extension of Highway 427

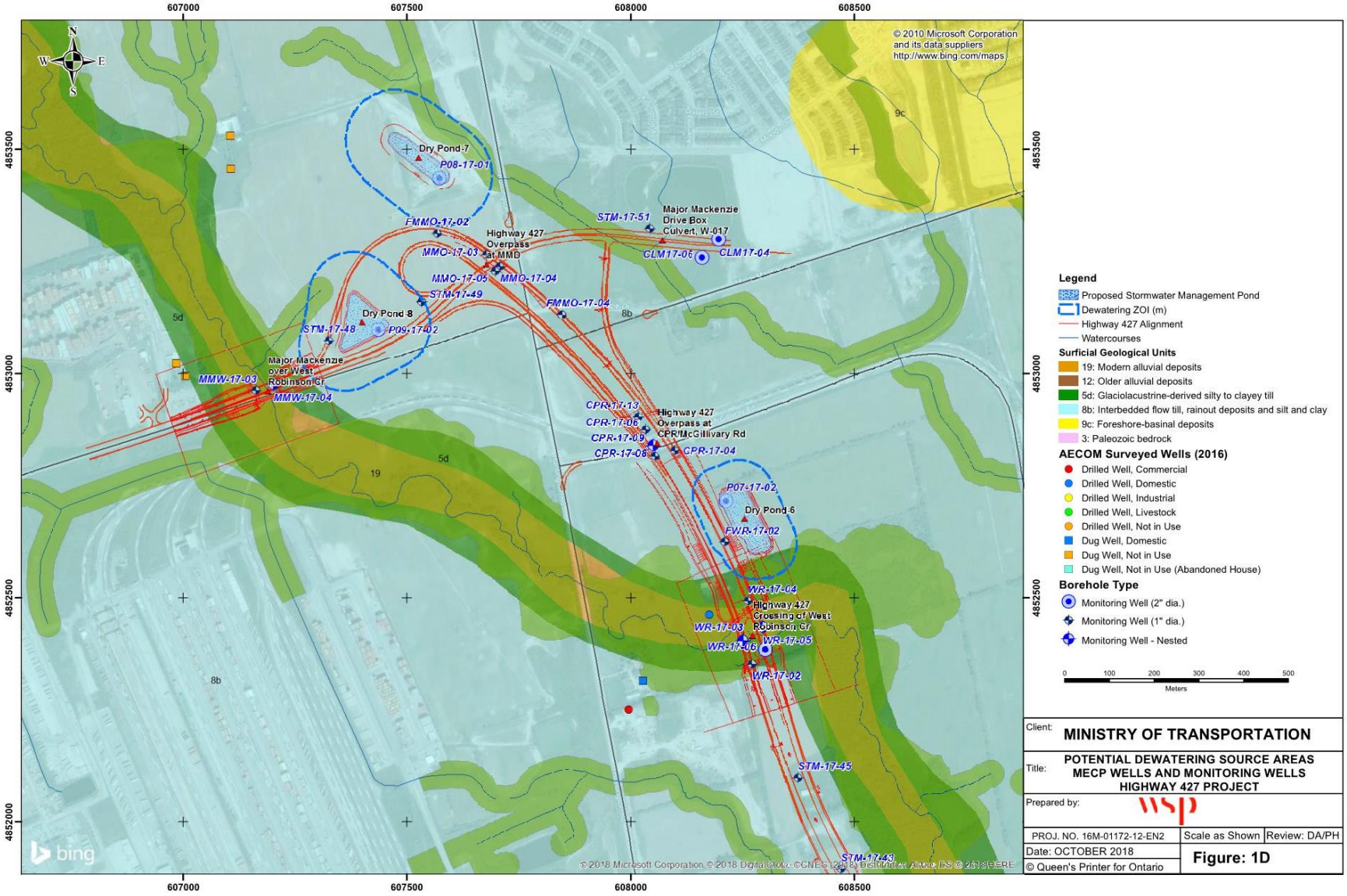


Figure 5D: Existing Water Supply Wells within the Extension of Highway 427

The LINK427 groundwater monitoring program and hydrogeological assessment has been completed as per the EA (2016) commitments.

6.1.4.2 Mitigation Measures

LINK427 recognizes that there is potential for impacts not related to groundwater pumping but due to construction related activities and **Section 6.0** of the Transportation Environmental Study Report (TESR), dated January 2016 describes in detail the potential impacts including from construction and the proposed mitigation measures that are to be followed when impacts are identified. An Environmental Activity and Sector Registry (EASR) for the entire project will be required, however, potential to nearby environmental features are very low due to anticipated low volume pumping. A Groundwater Monitoring Program is also being implemented, in accordance with the EA commitments. If pumping is required to remove minor groundwater and surface water accumulated from storm events from the excavated areas, then best management practices for mitigation are to be followed:

- Dewatering activities shall be conducted in accordance with control procedures as specified in OPSS 518 Control of Water from Dewatering Operations. Appropriate dewatering measures shall be implemented to manage any groundwater encountered during grading activities, and dewatering discharge water will be filtered as necessary to prevent transport of sediment to natural surface water receptors;
- A Spill Prevention and Emergency Response Plan has been prepared;
- Surface runoff will be directed to roadside ditches and ditch conditions shall be improved to minimize groundwater recharge impacts;
- Groundwater monitoring wells (screened in the shallow overburden) will be installed, if not already present, near the groundwater dewatering locations to closely monitor groundwater quantity and quality during the dewatering activities;
- The environmental quality of pumped water discharged to the natural environment must meet the requirements provided in O. Reg. 387/04 and O. Reg. 63/16; and
- Salt usage and runoff will be minimized during road de-icing applications by following best practices consistent with those used across North America and employ the latest winter maintenance technologies (alternative to and environmentally friendlier than using road salt).

The following preliminary design commitments shall be implemented by LINK427:

- Monitoring of private wells will be completed prior to construction to establish background conditions, subject to obtaining permission to access the property and the well(s) by the land owner. Monitoring of private wells located outside of the ZOI of the potential dewatering areas for the Highway 427 extension between Zenway Boulevard and Major Mackenzie Drive are not required. Deep wells located within the ZOI will not need monitoring because the depth of the wells are more than 15 m, significantly deeper than any level of groundwater lowering in a potential dewatering area. Shallow wells, if present within the ZOI, may require monitoring for water quality and quantity.
- The quality of pumping discharge from the excavated areas are to meet the applicable quality objectives for discharge as per O. Reg. 387/04, O., Reg. 64/16 and O.Reg. 63/16 conditions and also shall conform to OPSS 518;
- All groundwater monitoring/observation wells and water wells encountered during construction located within the construction alignment **(Figures 5A – 5D)** shall be decommissioned as per the requirements made under O. Reg. 903 as amended. Any water wells identified by LINK427 within the construction lands will be decommissioned in accordance with the requirements made under O. Reg. 903 as amended; and
- LINK427 will prepare and submit annual monitoring reports by August 31 of each year until construction is completed and for one year after construction completion.

6.1.5 Drainage and Stormwater Management

6.1.5.1 Existing Conditions

The existing Highway 427 does not currently exist between Highway 7 and Major Mackenzie Drive. The extension of the highway will be through a corridor of mainly agricultural lands and some natural valley features, surrounded by employment and industrial areas.

In the proposed extension area, runoff is primarily through the agricultural lands, and in the cases of the industrial areas in this sector, runoff will be collected through storm sewers.

6.1.5.2 EA Commitments

The EA commitments from the 2010 EA were carried forward into the 2016 TESR. Therefore, the following EA commitments (as presented in the 2010 EA and 2016 TESR) that were determined to be relevant to this DCR have been met.

Table 4: Drainage and Stormwater Management EA Commitments / Proposed Mitigation

Commitments / Proposed Mitigation from 2010 and 2016 EA Reports	Commitments Met During Detail Design
Full detail designs of all stormwater management facilities will be conducted during subsequent design phases using TRCA modeling, watershed reports, and unit release rates, where available.	Current and available information is being utilized for the detail design of all stormwater management facilities. These are found in the Stormwater Management Report.
Areas where stormwater management ponds are not feasible, Low-Impact Developments, such as dry swales, will be utilized. Low-Impact Development within the TRCA jurisdiction will be designed using the document "Low Impact Development Stormwater Management Planning and Design Guide", dated 2010.	In areas where SWM ponds are not feasible, grassed embankments and flat bottomed grassed swales are being proposed where grading permits, as a measure of quality control. Multiple oil grit separators units are also being proposed throughout the project. The "Low Impact Development Stormwater Management Planning and Design Guide", dated 2010 is being used for the design. Details are documented in the Stormwater Management Report.
All stormwater management facility designs will incorporate discharge practices in order to mitigate potential negative thermal impacts to receiving watercourses.	Dry pond facilities are not subject to thermal aggradation due to the absence of a permanent pool. As such, no negative thermal impacts to receiving watercourses is expected.
The outlet structure for the 25mm erosion storm for all stormwater management ponds will utilize a "bottom draw" system, which allows the water discharged from the pond to be taken from the lower (cooler) levels of the pond.	Outlet structures for dry ponds are designed to control the 25 mm erosion storm event. A bottom draw system can only be implemented in ponds with permanent pools (wet ponds) to allow the water discharged to be taken from the lower (cooler) levels of the pond. Dry pond facilities are not subject to thermal aggradation due to the absence of a permanent pool. Details of outlet structures for all facilities are documented in the Stormwater Management Report.

For the receiving coldwater watercourses, techniques for providing thermal mitigations to discharged stormwater management pond flows will be provided. Thermal practices include, but not limited to: deepening the permanent pool to a minimum of 3 metres to facilitate the discharge of cooler water; discharging low flows to an infiltration basin; or providing vegetated shade to ponds and outlet channels as per the TRCA's SWM Pond Planting Guidelines.	There are no receiving coldwater watercourses within the project limits, only downstream of the project. However, dry pond facilities are not subject to thermal aggradation due to the absence of a permanent pool.
Outlet structures discharging to a watercourse with sensitive fish habitat or environmental area will be sited during subsequent design phases through a site visit with staff from MTO, MECP, MNRF, and the TRCA.	Outlet structures discharging to a watercourse with sensitive fish habitat or environmental areas have been sited during detail design through a site visit with staff from MTO, MECP, MNRF, and the TRCA.
Stormwater management facilities will not be located within sensitive environmental features or regulated floodline areas.	Stormwater management facilities are not located within sensitive environmental features or regulated floodline areas. Furthermore, the location of all stormwater management facilities remain the same as in the EA studies with the addition of 1 dry pond and 4 enhanced grassed swales at new locations that were added to enhance runoff quality control.
Stormwater management facilities will not discharge to intermittent watercourses that are primarily groundwater fed, as the discharge from the facility may have a negative erosive impact on the receiving watercourse.	Stormwater management facilities will not discharge to intermittent watercourses that are primarily groundwater fed. Furthermore, the location of all stormwater management facilities remain the same as in the EA studies with the addition of 1 dry pond and 4 enhanced grassed swales at new locations that were added to enhance runoff quality control.
Erosion and sediment control measures and contract specifications are to be developed during subsequent design phases. These documents will be reviewed with the TRCA, MTO, MNRF, and MECP prior to construction	Erosion and sediment control measures and contract specifications are being developed and will be provided to the agencies as they are available.
Maintenance schedule for all stormwater facilities will be developed during detail design and provided to MECP.	A maintenance schedule for all stormwater facilities is currently being developed and will be provided to MECP. The maintenance schedule will be included in the Stormwater Management Report.
Flat-bottomed grass-lined swales are proposed throughout the entire study area to provide adequate conveyance capacity of peak flows, while also providing some degree of quality control.	Flat-bottomed grass-lined swales are included throughout the entire study area where possible.
During subsequent design phases, stormwater management facilities will be designed to provide: • Quality Treatment –Enhanced Protection Level (Level 1) quality treatment with special attention given to mitigation of thermal impacts	• Enhanced Protection Level (Level 1) is being provided using dry ponds as part of a treatment train approach. Dry pond facilities are not subject to thermal

downstream on coldwater watercourses beyond the project limits. • Extended Detention – Extended detention of 40m3/ha of the upstream drainage area and erosion control storage for the 25 mm storm to be released over a minimum of 48 hours for all wet ponds. • Quantity Treatment – The quantity treatment is provided to control post to pre-development flows.	aggradation due to the absence of a permanent pool. • Extended Detention is being provided for all ponds, except for Pond-3W. • Post to pre-development flows are matched.
An erosion control assessment will be conducted at the design stage using continuous simulation modeling to confirm stormwater management facility requirements for controlling to non-erosive release rates.	As the SWM strategy proposed in the detail design was approved by the Agencies, this commitment no longer adds value and is therefore not required. Additionally, all SWM facilities have been designed to control post-development peak flows to pre-development conditions for the 2 to 100 year storm events.
In the case of accidental spills in areas treated by stormwater management ponds, a shut-off valve should be installed at the pond outlet in order to prevent the spill material from entering a watercourse. In the case of accidental spills in areas not treated by stormwater management ponds, sandbags should be utilized at culvert openings in order to prevent the spill material from entering a watercourse.	A Spill Prevention and Emergency Response Plan has been prepared, therefore this commitment has been met in the proposed detail design.
Limit the time slopes are exposed prior to stabilization to 45 days where practical. Exposed soil areas will be temporarily stabilized as soon as possible (or tarped) to control sediment transport and erosion. In addition, natural vegetation cover will be retained wherever possible (and root grubbing minimized where possible) to provide natural erosion control.	These commitments are being met as construction progresses.

6.1.5.3 Stormwater Management Strategy

Stormwater management (SWM) measures will be required for quality and quantity control to avoid negative impacts on local water systems as a result of the project. For this project, quality control measures are required to meet 80% total suspended solids (TSS) removal (MECP Enhanced level treatment), and quantity control measures are required to ensure post-development runoff flow rates do not exceed pre-development runoff flow rates for the 2 to 100-year storm events.

6.1.5.4 Potential Impacts

The works related to this project can potentially have adverse impacts on the natural environment and in particular, watercourses, due to sediment in stormwater originating from the erosion of exposed soils. Ineffective and insufficient stormwater management and sediment control measures can increase fine sediment inputs, impact water quality and increase overland runoff inputs into watercourses. These changes lead to increased flood events, reduced base flows due to sedimentation, decrease habitat diversity and increased channel erosion. Sedimentation from construction activities is a major contributor to these problems.

6.1.5.5 Mitigation Measures

Stormwater management is a component in good erosion and sediment control. Reducing runoff velocities and ensuring that settlement time is incorporated into small storm events will reduce erosion potential and reduce sediment loads into receiving water courses. LINK427 has developed individual Construction Period Drainage and Sediment Management Plan(s) (DSMP) that incorporate each watercourse crossing prior to construction. The purpose of the DSMPs is to provide water quality control of the runoff generated within all drainage catchment areas within the Project Agreement Lands before water is discharged to any watercourse. In addition to the water quality control, DSMPs shall also address attenuation of frequent runoff events, and sediment control. Each DSMP shall be site-specific and based on managing stormwater within each drainage catchment area located within the Project Agreement Lands throughout each phase of construction. Location of drainage management facilities such as temporary sedimentation ponds, sediment detention basins, swales, and check dams, shall be determined prior to commencing the works within each drainage catchment area. Each DSMP was prepared in accordance with the "Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects" (MTO 2007). At a minimum, the DSMP included the following components as prescribed in the "Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects":

- Statement of objectives;
- Project description;
- Pre-development site conditions;
- Critical areas of concern;
- Responsibilities and accountability;
- Best Management Practice (BMP) selection and design
- Monitoring and maintenance;
- Contingency plan; and
- Detailed site drawings.

All stormwater management facilities are located outside of environmentally sensitive areas. The locations of the temporary sedimentation ponds during construction will be in the same locations as the ponds proposed in the original EA document (January 2010).

Impacts to the quality and quantity of individual private water wells are not anticipated, however if a well is impacted from dewatering or construction related activity then it will be LINK427's responsibility to mitigate the impact taking necessary measures which may include providing a new well to the impacted party. However, the complaint will be investigated to find out the cause of the impact and until the issue is resolved, LINK427 will need to provide water supply to the impacted property/ resident.

The removal of accumulated sediment is crucial in maintaining the efficiency of stormwater management ponds. A removal frequency of 30 years will be used for these ponds in order to ensure they are adequately maintained. The 30-year maintenance frequency is only an estimate and will be refined based on operational and maintenance experience in the field. Furthermore, it is a common practice to maintain ponds every 5 to 10 years. Annual inspections and inspections after any major storm will take place as required. Periodic outlet inspection to assure that orifice structures are not clogged will also be conducted. All ponds will be brought back to design conditions by the end of the maintenance cycle.

In addition to ensuring that all quantity and quality criteria are met for the project, the EA Notice of Approval included commitments to ensure that a surface water monitoring program be put in place so that all mitigation measures are functioning as intended. LINK427 will implement the surface water monitoring program as approved by MECP.

Finally, all outlets from stormwater management facilities will be designed with adequate erosion protection measures, as specified in the EA documents.

6.1.6 Erosion and Sediment Control

6.1.6.1 Existing Conditions

LINK427 has developed an Erosion and Sediment Control Plan (ESCP) for the project in order to document the environmental protection measures for preventing and controlling erosion and sedimentation during construction.

The ESCP provides the knowledge, awareness and methods necessary to complete the required work tasks in a manner that avoids or minimizes erosion and the potential impacts to the environment from sediment. The ESCP lays out the framework for ensuring that the design and construction activities are carried out in compliance with the terms and conditions of any project level permits, licenses, authorizations or agreements. As with all environmental management plans, the ESCP is a "living document" that will be reviewed and updated as the project progresses through the various stages of design and construction. In the formulation of the ESCP, the appropriate agencies are being consulted for their input. This keeps the information in the plan relevant to current site activities and operations.

The topography within the project area is generally flat, with a slightly downward slope from the northwest to the southeast. The dominant hydrologic features within the Lands include Rainbow Creek and Robinson Creek that are part of the Humber River Watershed. The valley land of local water courses (i.e. Rainbow Creek, Robinson Creek and Humber River) has cut through the glaciolacustrine deposits (silt and clay) into the underlying Halton Till. Areas within the watercourse valleys have alluvial coarse textured deposits, whereas the remaining surficial deposits consist primarily of glaciolacustrine silt and clay. The erodibility of the predominant surficial soils can generally be described as low to moderately erodible, with higher erodibility in the stream valleys.

For this work, the ESC measures employed will be industry-standard, proven techniques to prevent erosion of exposed soils and the transport of sediment from construction areas to watercourses, wetlands and protected retained natural areas.

The project has two approaches to erosion and sediment control based on qualitative risk:

1. General ESC for areas with moderate to low risk (the flat areas underlain by clay to silt till and glaciolacustrine deposits), and
2. Site specific ESC for areas of concern (i.e., near watercourses and watercourse valleys) that will be included in Drainage and Sediment Management Plans (DSMPs).

ESC measures will be monitored and maintained throughout the construction of the project.

6.1.6.2 Potential Impacts and Mitigation Measures

In general, sedimentation from construction activities has the potential to be a major contributor to increased fine sediment inputs, impacts on water quality and increased overland runoff inputs into watercourses. As a result, sedimentation has the potential to lead to increased flood events, reduced base flows, decreased habitat diversity and increased channel erosion that can negatively impact aquatic resources and other natural features. Therefore, the Highway 427 Expansion project will minimize the potential for erosion and downstream sediment transport with the application of ESC measures and procedures as identified in the ESCP and DSMPs. As such, stormwater runoff will be managed to prevent overland flow from entering the construction area.

Erosion control measures will be applied to reduce the generation of sediment, and include the following:

- Existing vegetation that is not identified to be removed is to be retained and protected.
- Exposed surfaces will be protected, as practical, to reduce erosion, including:
    - Removing only the vegetation above the ground during clearing
    - Minimizing the amount of area exposed at one time, including staging grubbing.

- Excavated materials requiring stockpiling will be separated at least 30 m from all identified watercourses, wetlands, and retained natural areas. The stockpiles will be placed in non-sensitive areas, protected with silt fence and sprayed with cover crop to mitigate any erosion and/or dust problems.
- Erosion measures will be in place prior to the start of construction and remain in place until restoration is complete and disturbed areas are stabilized against erosion.
- Standard erosion control measures will be installed and maintained following OPSS 805 or manufacturer's instructions.
- For most areas where work will not take place for a period of 45 days or more, exposed soils will be protected from erosion using the appropriate means, such as hydro-seeding or erosion control blankets. For locations near receiving watercourses, stabilization will take place where work will not take place for a period of 15 days or more.
- A qualified environmental inspector will be on-site daily throughout construction to check that ESC measures are installed, functioning, being maintained as per the standards and industry practice.
- The sediment control approach will include, but is not limited to:
    - Rock flow check dams (OPSD 219.210 and 219.211), silt fence flow check dams (OPSD 219.190) and/or other suitable measures will be provided in temporary construction ditches and swales, as required, to control flow rates and/or promote settling of sediments within swales prior to discharge.
    - On-site stormwater conveyance channels for temporary flow control purposes will have adequate capacity and protection to prevent erosion during storm and runoff events.
    - Stormwater outlets shall be stabilized prior to any upstream land disturbing activities.
    - Water velocity will be minimized with the use of constructed ditches, berms, and check dams.
    - Site entrances will be protected by gravel or other means so that sediment is not tracked off-site.
    - Storm sewer inlets which are made operable during construction or which drain stormwater runoff from a construction site are to be protected from sediment deposition by the use of filters.
    - Where sediment-laden standing water must be removed it will be disposed of by the appropriate means to contain sediment (e.g., sediment bags and sediment trap) (OPSD 219.240) and no direct discharge to watercourses will be allowed.
    - Standard sediment control measures will be installed and maintained following Ontario Standard Specifications or manufacturer's instructions.
    - Dewatering via pumping and isolating the construction zone from outside flows will be used to keep the work in the dry;
    - Water will be screened prior to dewatering pump intake;
    - Heavy duty silt fence will be installed at or above the regulatory flood line;
    - Temporary sedimentation ponds will be used for dewatering prior to discharge to watercourses;
    - Temporary diversion swales will be used to convey runoff;
    - Dewatering effluent discharge will be directed to sedimentation basins;

- Energy diffusers will be employed for dewatering effluent lines;
- Flow spreaders will be used downstream of ditches discharging to watercourses, they act as stilling basins. Flow spreaders will dissipate flow velocity downslope of the basins through the generation of sheet flow over vegetated surfaces. The basins will also help to infiltrate a portion of that flow.
- Check dams, sediment barriers, and/or filters will be used prior to discharge; and,

- All sediment control measures will be installed prior to construction.

6.2 Socio-Economic Environment

6.2.1 Air Quality

6.2.1.1 Existing Conditions

An assessment of potential air quality impacts from the project was documented in detail in the Individual EA (2010) and updated through an air quality assessment in 2015. The TESR (2013) noted that a regional air quality assessment was undertaken to consider effects of the proposed works on regional air quality. The TESR (2016) outlined and updated the main findings to reflect the proposed widening of two additional lanes. The purpose of the air quality assessment was to determine the potential air quality impacts of the Recommended Plan, utilizing the *Ministry of Transportation Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions of Provincial Transportation Projects (MTO Guide)*. The air quality assessment determined that significant regional air quality impacts are not anticipated as a result of the works. The study also provided recommendations for mitigation measures that can be implemented to reduce the potential for air quality effects from construction.

6.2.1.2 Potential Impacts

The air quality assessment examined local air quality impacts, regional air quality impacts, and climate change implications. The local air quality assessment was conducted using CAL3QHCR dispersion modelling software which was developed with all the necessary information for this project.

As part of the Individual EA (2010), regional impacts were determined by assessing the overall change in vehicle use. The analysis focused on pollutants such as oxides of nitrogen (NOX) and particulate matter (total suspended particulates [TSP]), which are important contributions to smog. The increase in Carbon Monoxide, and Coarse Particulate Matter and Carbon Dioxide is directly attributable to an increase in traffic. In addition, greenhouse gases (GHG) impacts were analyzed to assess the impact the project will have on climate change. Overall, project related emissions evaluated are significantly less than the Ontario GHG emissions target.

Some temporary effects could be expected from the construction activities associated with the project. These include operation of heavy equipment, topsoil removal and excavation or grading which could generate dust and result in short term decreases in air quality. The potential for these impacts will be controlled through best management practices and oversight by LINK427 to prevent unnecessary release of emissions and air contaminants.

6.2.1.3 Mitigation Measures

Based on the modelling results, specific local mitigation is not warranted. However, to minimize potential impacts to air quality during construction, the following best management practices for dust and other emissions shall be employed:

- Regular cleaning of construction sites to remove construction debris that may emit dust.
- Include provision of transportation modes with low emission rates.
- Non-chloride dust suppression measures, as identified in OPSS, will be used on unpaved haul roads within the Lands and other traffic areas susceptible to emitting dust whenever possible (the appropriate dust suppression techniques are subject to the area being free of sensitive plants, nearby watercourses or other ecosystems that may be affected). Other dust suppressants will be examined if safety or performance concerns warrant.
- Trucks will cover their loads when hauling fine-grained materials.

- Various methods will be used to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads.
- Where necessary, paved streets/roads where tracking of soil mud or dust has occurred will be cleaned.
- Posted speed limits will be complied with and, as appropriate, further reductions in speeds when travelling at sites with unpaved surfaces.
- Appropriate methods will be used to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads.
- Enclosures, wet sandblasting and / or other techniques will be used to minimize dust during any sandblasting operations.
- All motorized equipment/vehicles, including emission control devices where installed by the manufacturer, will be regularly maintained to ensure emissions from internal combustion engines is minimized.
- Excessive idling of equipment and idling of equipment that is not in immediate use will be prohibited.

6.2.2 Land Use

6.2.2.1 Existing Conditions

Existing land uses within and surrounding the project Lands are a mix of agriculture, residential, industrial/commercial and recreational uses. The Greenbelt exists to the north of the Lands and a major arterial network (including Highway 427) exists to the south, leading into the City of Toronto.

CP Rail track crosses the eastern portion of the Lands in a northwest-southeast orientation. Commercial / light industrial land uses are present within the Lands on the south side of Rutherford Road and east side of the CP Rail track. The subject area lies within York Region, and is subject to the York Region Official Plan (OP). LINK427 has maintained consultation with CP Rail and all considerations / agreements required for construction will be adhered with.

Future land uses within the Lands are governed by the Regional Municipality of York and the City of Vaughan Official Plans, which were both updated in 2010 after approval of the Individual EA (2010). Construction works related to this DCR do not preclude future municipal plans, particularly those pertaining to future trail plans. The updates to Official Plans were completed in response to population and employment forecasts for the area, and the City anticipates being able to meet those forecasts given the provincial policies of the Growth Plan for the Greater Golden Horseshoe.

The project Lands are bisected by Highway 427, natural heritage features, including tributaries to the Humber River, and a major hydro transmission corridor.

6.2.2.2 Potential Impacts

There are no impacts to the existing or future land uses within the Lands as a result of the proposed Highway 427 Expansion, as these works are contained with the ROW outlined in the previous EAs. No additional property is required for the construction works proposed in DCR #4, therefore no mitigation measures are required.

6.2.2.3 Mitigation Measures

The majority of the construction works are accommodated within the ROW outlined in the previous EAs. Therefore, no new private property is required. No mitigation measures are required.

6.2.3 Noise and Vibration

The DCR #4 construction works will be a temporary source of localized noise. The nature of the construction activities is such that the noise levels will vary temporally and spatially as different activities take place at different locations.

Some night work is anticipated in the City of Vaughan and the City of Toronto as the project construction schedule dictates. A Noise By-law exemption was obtained from City of Vaughan for the construction activities associated with DCR #4. The City of Toronto indicated that a noise bylaw exemption was not required for Provincial highway works. All works within the City of Vaughan and City of Toronto that are included in this DCR will be completed adhering to the applicable Noise Control By-laws as well as LINK427's Construction Noise and Vibration Plan.

6.2.3.1 Mitigation Measures

Implementation of the following measures is recommended to help mitigate any potential noise and vibration impacts:

- LINK427 will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities.
- Noise emissions from construction equipment will also be subjected to the limits set out in the MECP Publication NPC-115 and the *Noise Control Guideline for Class Environmental Assessment of Undertakings.*
- The MTO Environmental Guide for Noise (October 2006) will be followed.
- Heavily loaded trucks will be routed away from residential streets, where possible, in order to limit vibration impacts.
- The separation distance between the construction staging areas and nearby receptors will be maximized to the greatest extent possible to reduce noise and vibration impacts.
- Responses to noise and vibration complaints will be done in accordance with the project's Complaint Protocol.
- In the presence of persistent noise and vibration complaints, all construction equipment shall be verified to comply with MECP NPC-115, NPC-118 and Ontario Model Municipal Noise Control By-Law guidelines.
- As some construction activities are expected to be undertaken at night and/or on weekends, exemptions from any applicable municipalities (i.e. City of Vaughan) Noise Bylaws will be obtained.
- A Noise Exemption Permit was obtained by the City of Vaughan with the following conditions:
    - Communication notices be delivered to surrounding residents and businesses within a 60-metre radius at least two weeks prior to the start date.
    - The construction supervisor must monitor and investigate any complaints regarding construction noise.
    - The construction supervisor must take measures to minimize any unnecessary noise, including but not limited to idling of construction vehicles, unnecessary revving of engines, use of airbrakes, and to maintain equipment in good working order (including muffling devices) to minimize noise impacts.

While no significant adverse noise and vibration effects are anticipated due to the limited nature of the activities, a Construction Noise and Vibration Plan has been developed and will be implemented as per the EA Conditions of Approval throughout the construction period.

6.2.4 Waste Management/ Contaminated Property/ Excess Materials Management

6.2.4.1 Existing Conditions

A Contamination Overview Study (COS) of the Lands was completed as part of the Individual EA to determine the presence and significance of any actual or potential sources of contamination within the Lands. The COS identified areas of potential environmental concern and Phase I and Phase II Environmental Site Assessments were completed by MTO in 2016 for properties identified as having a high potential for environmental impacts (high potential to encounter contaminated material).

Based on the findings of the Phase I and II ESAs and subsequent environmental investigations and delineation programs completed by LINK427 in 2017 and 2018, the following was confirmed:

- Groundwater quality within the Lands meets the generic Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the *Environmental Protection Act*, Ministry of the Environment, April 15, 2011 (MECP Site Condition Standard (SCS)).

- Areas were identified within the Lands where soil quality does not meet the applicable MECP SCS and remedial activities will be completed prior to construction activities outlined in DCR #4. The sites with confirmed soil contamination and the status of the remedial work is summarized below:
    - 6400 Langstaff Road (PIN #: 033180168) (remediation ongoing);
    - 6350 Langstaff Road (PIN #:033180157) (remediation ongoing);
    - 10220 Huntington Road (PIN # 033210209) (remediation ongoing).
    - 9571 and 9667 Huntington Road (portions of PIN 033200244, PIN 033200246 and PIN 033200258) (site delineation completed – remediation ongoing).

6.2.4.2 Potential Impacts

Where possible, the areas of known contamination identified above will be remediated prior to construction activities within those areas; therefore, the potential for adverse impacts associated with construction activities in DCR #4 is low.

All remedial work will be completed in accordance with the Waste and Contamination Management Plan (WCMP), applicable regulations and best management practices, and will fulfil the requirements of the Individual EA (2010), TESRs (2013 and 2016) and MTO Best Management Practices.

In the event that unknown contamination is discovered during the course of construction activities, procedures and steps outlined in the WCMP will be implemented and procedures for working in contaminated areas will apply.

6.2.4.3 Mitigation Measures

Remedial excavations will be completed prior to the construction works outlined in DCR #4, in those areas with confirmed soil contamination. Mitigation measures will not be required during construction activities outlined in DCR #4.

The construction activities for DCR #4 will not involve the production of any excess soils that requires offsite management. Should there be any excess soils generated as part of construction activities associated with DCR #4, they will be managed in accordance with the project's WCMP, the project's Earth Management Plan (EMP) and with OPSS 180 (Management of Excess Materials).

6.2.4.4 Management of Designated Substances and Excess Materials

A designated substance survey (DSS) was previously completed for building structures within the Lands that will require demolition. The construction activities covered within DCR #4 does not include building demolition therefore, the management of designated substances is not required and the potential for impacts is low.

Excess materials generated during construction works will be managed in accordance with the WCMP, MECP regulations and OHSA requirements. Permits and approvals will be obtained (as required).

6.2.4.4.1 Mitigation Measures

Excess materials generated or encountered during construction activities will be managed in an environmentally acceptable manner, recycled and/or processed and disposed according to current legislation and practices in accordance with OPSS 180 and the LINK427 EMP. Specifically:

- Deposited waste and recyclable materials (such as metal, plastic etc.) will be removed and property managed off-site for reuse, recycling or disposal.
- Waste and recyclable materials will be segregated and separated where practicable, removed and/or managed off-site for reuse, recycling or disposal.
- In the event that suspect designated substances are identified during design and/or construction activities, additional testing and DSS reports will be completed (as required).

6.2.5 Traffic

The works outlined in DCR #4 require no traffic staging along Highway 427 overpass at the future extension of John Lawrie Street. The Highway 427 overpass at Rutherford Road will require some traffic staging, however no long-term traffic impacts to the travelling public are anticipated. There will be no long-term lane reductions at Rutherford Road, however some day and/or night lane closures for construction staging will occur during construction activities. All aforementioned temporary short duration traffic impacts will be in accordance with the Ontario Traffic Manual, Book 7 and with LINK's Traffic Management Plan, TMP, which outlines various procedures to be implemented to mitigate traffic impacts.

6.3 Cultural Environment

6.3.1 Archaeological Resources

An overview of the archaeological features found within the Lands were documented in the Individual EA (2010) and a Stage 1 through 3 Archaeological Assessment were completed as part of previous Environmental Assessments.

6.3.1.1 Potential Impacts

Archaeological assessments have been undertaken for all properties impacted by the proposed works. These lands are considered clear of archaeological potential.

6.3.1.2 Mitigation Measures

During construction there remains the low probability of encountering deeply buried archaeological resources. In the event that the following situations are encountered during construction, work must stop immediately and the actions undertaken as listed below:

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources will cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.
- In the event that human remains are encountered during construction, the proponent or person discovering human remains will immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Government Services at (416) 326-8393.
- The *Cemeteries Act*, R.S.O. 1990, c.C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services.
- During construction, the Coleraine Burying Grounds (Coleraine Cemetery) and the Coleraine Schoolhouse Site located on the south side of Major Mackenzie Drive will be protected to ensure protection from construction activities.

Should the boundaries of the project Lands change and extend outside of the proposed ROW, additional Stage 2 Archaeological Assessment work may be required.

6.3.2 Built Heritage and Cultural Landscapes

Cultural Heritage Evaluation and Documentation Reports were completed for the Highway 427 Expansion project during the Individual EA (2010) and subsequent studies. The construction activities covered in DCR #4 are within the vicinity of the Colerain Cemetery, Kellam House and barn and McKinnon Site which are protected sites however, construction will not impact any built or cultural heritage landscapes within the Lands. Though the Kellam House and Barn are slated for demolition.

6.3.2.1 Mitigation Measures

Mitigation measures include fencing and protection of the sites mentioned above, with heritage material to be removed by Black Creek Pioneer Village from Kellam House and Barn prior to demolition. No additional mitigation measures are required as the proposed construction activities result in no additional impacts to cultural or built heritage as identified in the Individual EA (2010).

7 Summary of Environmental Concerns, Mitigation Measures and Commitments

Table 5 below summarizes the environmental impacts associated with the Detail Design and outlines commitments for mitigation measures and future work. The table also references the commitments and mitigation measures identified as part of the Individual EA (2010), the TESR (2013) and TESR (2016). This table is provided only as a summary to show that the appropriate mitigation measures and design features are consistent with the commitments outlined in the Individual EA (2010), TESRs (2013 and 2016), as well as this DCR.

7.1 Granted Approvals

The following approvals have been granted with the work under this DCR:

- Overall Benefit permit for SAR bats under the *Endangered Species Act*.
- Noise By-law exemption (City of Vaughan)
- Environmental Activity and Sector Registry (EASR) (for dewatering)
    - Construction Dewatering-Highway 427 Sections North of Highway 7 (Permit #: R-009-2110884923)
    - Construction Dewatering-Highway 427 Sections South of Highway 7 (Permit #: R-009-1110885173)
    - Langstaff Road Section WM (Permit #: R-009-1110890334)

Table 5 Summary of Environmental Concerns, Mitigation Measures and Commitments

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
Natural Environment		
Terrestrial Ecosystems	**MTO** **MNRF** **TRCA** **MECP**	***General Vegetation Protection Mitigation Measures*** ■ LINK427 has carefully reviewed construction impacts throughout the detail design process and has made extensive efforts to minimize vegetation removals during all phases of the project. ■ LINK 427 will protect and retain existing vegetation and trees, within identified protected vegetation areas. ■ Prior to heavy machinery working adjacent to identified natural areas and vegetation communities, tree protection barriers shall be installed outside the drip-line of the significant features to protect any vegetation that is to be retained and is in the vicinity of exposure to damage by machinery or other sources. This includes, but is not limited to, where vegetation removals will occur within forested communities. LINK427 shall ensure that all protection fencing conforms to the OPSS for the Protection of Trees (OPSS 801.07.02) and that the fencing is installed outside of the drip-line of the identified vegetation communities or natural heritage features. The boundaries of the Lands and protected vegetation will be clearly delineated on construction specifications and will be fenced prior to the start of works associated with DCR #1. The fencing will be retained in place throughout the duration of works associated with DCR #3. ■ Erosion and sediment control (ESC) measures will be installed according to the ESC Plan and as located on the design drawings, and will be maintained throughout construction. ■ In the event that adjacent vegetation communities or planted trees are accidently damaged during construction activities, LINK427 will implement appropriate contingency measures such as pruning tree limbs or roots that are accidently damaged using proper arboricultural techniques. ■ Exposed surfaces shall be stabilized and seeded with a temporary seed mix in areas where woody vegetation planting is not to occur within 45 days from completion of the works. Other exposed surfaces will be seeded as per the Landscape Plan discussed in a future DCR. ■ Temporary stockpiles will be seeded with a temporary seed mix consisting of Oats (*Avena sativa*) in spring/summer and winter wheat (*Triticum aestivum*) in fall as recommended by MNRF to quickly stabilize these areas.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work

		■ LINK427 will restrict earth movement immediately adjacent to woodlands during periods of high dust generation. Non-chloride dust suppression methods will be applied whenever possible during construction and processing activities. Other dust suppressants will be examined if safety or performance concerns warrant.
		■ Construction vehicle access will be limited to the existing roadways and construction paths, away from the protected vegetation.
		■ Vehicle re-fueling stations will be located within a centralized location on-site away from the protected vegetation.
		■ For areas immediately adjacent to the protected vegetation, supervision of the construction will occur.
		■ LINK427 shall undertake environmental inspection during construction to ensure that protection measures are implemented, maintained and repaired and remedial measures are initiated where warranted.
		■ There shall be no storage of materials within adjacent natural areas.
		■ LINK427 will ensure appropriate clearing and disposal of all construction-related debris following construction.
		■ A Vegetation Restoration Plan (VRP) has been developed in consultation with the MNRF and the TRCA. Once completed, the VRP will be used as the guiding document for future vegetation restoration activities. A final copy of the VRP will be provided to the MECP. The VRP will be integrated with the erosion control plan, the invasive species management plan and requirements of the ESA permit for SAR Bats. The VRP and Landscape Plan, which is to be implemented as part a future DCR, include the following elements:
		  ■ Planting at stormwater ponds will be designed to stabilize inlet and outflow areas and provide shading and bank stabilization. Additional planting around each pond will contribute to vegetative cover.
		  ■ Native species will be utilized where possible, particularly adjacent to sensitive areas and valleys.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		▪ Vegetation enhancement will be performed in areas where it is likely to be successful and will contribute ecological benefit. ▪ Areas of meadow marsh habitat will be created and integrated with the stormwater management system. ▪ Site-specific mitigation will be performed at key locations such as woodlands and valleys, to enhance existing vegetation and habitat. ■ Other locations along the highway such as interchanges and embankments will be vegetated with a combination of aesthetic and naturalized plantings.
Wildlife, Wildlife Habitat and Species at Risk (SAR)	**MTO MNRF TRCA MECP**	Mitigation measures to address potential impacts to Migratory Birds include: ■ All construction activities which may be disruptive to migratory birds will comply with the MBCA, 1994 and Migratory Bird Regulations (MBR 2012). ■ Measures to prevent nesting in structures identified for removal will be implemented as necessary (e.g., installing netting). ■ Should nesting migratory birds be encountered during construction, all activities in that area will cease and LINK427's Avian Biologist will be consulted for guidance. Mitigation measures to address potential impacts to wildlife include: ■ All construction workers will be trained in advance of starting work regarding potential to encounter wildlife while undertaking their activities, and the appropriate response if an encounter occurs. ■ Under no circumstances will any animal (e.g., bird, reptiles, mammals etc.) be knowingly harmed, harassed or otherwise disturbed. If an animal is encountered, it will be allowed to move away on its own. ■ If small wildlife (e.g. turtles, amphibians) are stranded within the construction zone, LINK427 will be contacted and the animals will be captured and released by a qualified individual (e.g., LINK427 SAR Biologist).

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ In the event that small wildlife encountered does not move away from the construction zone and construction activities are such that continuing construction in the area would result in harm to the animal, all activities will stop and LINK427 will be notified immediately. ***Wildlife Movement Opportunities*** Wildlife movement was a specific consideration in the structure design at the main valley crossings and a Wildlife Fence Plan has been developed for the project with the sole purpose of keeping wildlife off the highway ROW and funneling wildlife to the main valley crossings structures. The type of wildlife fence (e.g., height and size of openings) has been chosen based on the wildlife found in various areas along the length of the highway. The Wildlife Fence Plan will be incorporated into a future DCR. ***Species at Risk*** A SAR Awareness Training Manual has been prepared and is provided as an Appendix to the VRP and a protocol to follow in the event of an encounter is provided in that manual. All construction personnel have and will be trained in SAR awareness prior to initiating work. Specifically, the following measures will be followed in the event of an encounter with a SAR: ■ A SAR sighting is defined as an observation of a SAR where no action is required. ■ A SAR occurrence is defined as an observation of a SAR where capture and relocation is required. ■ In the event that SAR wildlife is encountered in the immediate work area, the protocol outlined below shall be followed: ■ Work in the immediate vicinity of the observation must come to a stop. ■ Should an Ecologist/Biologist not be on-site, one will be contacted immediately. ■ Ecologist/Biologist will notify the District MNRF Biologist within 48 hours of any observation of Endangered and Threatened species and/or immediately for any species going to a wildlife custodian. ■ It is not necessary to notify the District MNRF Biologist with observations of Special Concern species or general wildlife sightings (deer, raccoon etc.).

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		▪ A 30-m setback from the area of the species location will be applied to allow the species to vacate the area naturally within a 24-hour period and then exclusionary fence is to be installed if appropriate. ▪ Should a SAR be encountered during construction activities completed during the winter months (e.g. dislodged from hibernation), the species will immediately be placed in appropriate containers and stored in a dark, warm, quiet place and be transported to an appropriate wildlife sanctuary/rehabilitation facility as soon as possible. Onsite Ecologists/Biologist will advise of the transportation arrangements and consult with MNRF to notify them of the transportation. ▪ Work is to not commence again in the immediate area of the observation until further instructed by onsite Ecologist/Biologist.
Fish and Fish Habitat	**MTO** **MNRF** **TRCA** **DFO**	▪ Sediment and erosion control measures will be implemented during all phases of construction, clean-up and restoration to prevent sediment laden runoff from entering any of the watercourses directly from the construction zone. At a minimum, the project ESCP and site-specific DSMPs will address the following aspects: ▪ Perimeter silt fence will be installed between the work areas and all reaches of those watercourses where works are required, including ditch and drainage works that drain to watercourses that support fish habitat. ▪ The fencing will be properly installed and regularly inspected and maintained. It will be left in place and maintained until all surfaces contributing drainage to these watercourses are stabilized. ▪ All exposed and newly constructed surfaces will be stabilized using appropriate means in accordance with the characteristics of the soil material and slope conditions. ▪ These surfaces will be fully stabilized and re-vegetated as quickly as possible (and at a maximum within 15 days) following completion of the works. ▪ All near-water construction zones will be isolated using standard perimeter silt fencing of the general construction zone up and downstream. The silt fencing will be heavy duty/reinforced fencing for all

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		disturbed areas of the embankments that drain to the streams. Silt fencing will be regularly inspected and maintained as required. ■ Temporary dewatering of the construction zones will be required for the outfall installations. All temporary dewatering will be done using appropriate energy dissipation and settling / filtration measures for discharge to ensure no erosion or sediment release occurs in the watercourses. No dewatering discharge will be released directly to the watercourses. If temporary dewatering of the near stream construction zone is required, dewatering will be discharged through a filter bag / splash pad located at least 30 m from the watercourses. ■ All dredged, salvaged or stockpiled materials will be located a safe distance from the watercourses edges, stabilized and a physical barrier placed between the stockpile and the watercourse to prevent the migration of any sediment or other material to the watercourse. ■ All work areas or other disturbed surfaces draining to the watercourses and/or in the floodplain will either be temporarily or permanently stabilized and re-vegetated with appropriate native, non-invasive species a maximum of 15 days following construction. ■ The erosion and sediment control measures will be left in place, monitored and maintained in proper working order until all disturbed areas draining to the watercourses are fully stabilized, including establishment of vegetative cover. ■ All activity will be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants / deleterious substances, in addition to sediment as outlined above, to the watercourses. Storage, maintenance or refueling or maintenance of equipment will be conducted at least 30 m away from the watercourses. LINK427 will implement the project Spills Prevention and Emergency Response Plan throughout construction. ■ All on-site crew members operating construction vehicles will be appropriately trained in handling a potential spill and have WHMIS Training. ■ Every effort will be made to retain as much of the natural vegetation as reasonably possible to help ensure bank stability and control erosion, and to expedite the recolonization of the disturbed areas with native plant species.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ All riparian vegetation removed to construct the outfall structures will be replaced with a mix of appropriate native species. Additional riparian plantings may be incorporated to enhance existing conditions along the ROW. Only native shrub and tree species, compatible with the site conditions will be used. ■ A CISEC certified inspector will be on-site regularly throughout construction, responsible for ensuring the sediment and erosion control measures are functioning and all mitigation measures are being implemented.
Groundwater and Hydrogeology	**MTO MECP TRCA Property Owner**	■ Dewatering activities shall be conducted in accordance with control procedures as specified in OPSS 518 Control of Water from Dewatering Operations. Appropriate dewatering measures shall be implemented to manage any groundwater encountered during grading activities, and dewatering discharge water will be filtered as necessary to prevent transport of sediment to natural surface water receptors; ■ A Spill Prevention and Emergency Response Plan has been prepared; ■ Surface runoff will be directed to roadside ditches and ditch conditions shall be improved to minimize groundwater recharge impacts; ■ Groundwater monitoring wells (screened in the shallow overburden) will be installed, if not already present, near the groundwater dewatering locations to closely monitor groundwater quantity and quality during the dewatering activities; ■ The environmental quality of pumped water discharged to the natural environment must meet the requirements provided in O. Reg. 387/04 and O. Reg. 63/16; and ■ Salt usage and runoff will be minimized during road de-icing applications by following best practices consistent with those used across North America and employ the latest winter maintenance technologies (alternative to and environmentally friendlier than using road salt). The following preliminary design commitments shall be implemented by LINK427: ■ Monitoring of private wells will be completed prior to construction to establish background conditions, subject to obtaining permission to access the property and the well(s) by the land owner. Monitoring of private wells located outside of the ZOI of the potential dewatering areas for the Highway 427 extension between Zenway Boulevard and Major Mackenzie Drive are not required. Deep wells located within the ZOI will not need monitoring because the depth of the wells are more than 15 m, significantly deeper

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		than any level of groundwater lowering in a potential dewatering area. Shallow wells, if present within the ZOI, may require monitoring for water quality and quantity. ■ The quality of pumping discharge from the excavated areas are to meet the applicable quality objectives for discharge as per O. Reg. 387/04, O., Reg. 64/16 and O.Reg. 63/16 conditions and also shall conform to OPSS 518; ■ All groundwater monitoring/observation wells and water wells encountered during construction located within the construction alignment (**Figures 5A** to **5D**) shall be decommissioned as per the requirements made under O. Reg. 903 as amended. Any water wells identified by LINK427 within the construction lands will be decommissioned in accordance with the requirements made under O. Reg. 903 as amended; and ■ LINK427 will prepare and submit annual monitoring reports by August 31 of each year until construction is completed and for one year after construction completion.
Drainage and Stormwater Management	**MTO MECP MNRF TRCA DFO**	■ LINK427 will develop individual Construction Period Drainage and Sediment Management Plan(s) (DSMP) that incorporate each watercourse crossing prior to construction. ■ Location of drainage management facilities such as temporary sedimentation ponds, sediment detention basins, swales, and check dams, shall be determined prior to commencing the works within each drainage catchment area. Each DSMP shall be prepared in accordance with the "Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects" (MTO 2007). At a minimum, the DSMP shall include the following components as prescribed in the "Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects": ■ Statement of objectives; ■ Project description; ■ Pre-development site conditions; ■ Critical areas of concern; ■ Responsibilities and accountability; ■ Best Management Practice (BMP) selection and design ■ Monitoring and maintenance; ■ Contingency plan; and ■ Detailed site drawings.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ All stormwater management facilities are located outside of environmentally sensitive areas. The locations of the temporary sedimentation ponds during construction will be in the same locations as the ponds proposed in the original EA document (January 2010). ■ Impacts to the quality and quantity of individual private water wells are not anticipated, however if a well is impacted from dewatering or construction related activity then it will be MTO's responsibility to mitigate the impact taking necessary measures which may include providing a new well to the impacted party. However, the complaint will be investigated to find out the cause of the impact and until the issue is resolved the MTO will need to provide water supply to the impacted property/ resident. ■ In addition to ensuring that all quantity and quality criteria are met for the project, the EA Notice of Approval included commitments to ensure that a surface water monitoring program be put in place so that all mitigation measures are functioning as intended. LINK427 will implement the surface water monitoring program as approved by MECP. ■ The removal of accumulated sediment is crucial in maintaining the efficiency of stormwater management ponds. A removal frequency of 30 years will be used for these ponds in order to ensure they are adequately maintained. The 30-year maintenance frequency is only an estimate and will be refined based on operational and maintenance experience in the field. Furthermore, it is a common practice to maintain ponds every 5 to 10 years. Annual inspections and inspections after any major storm will take place as required. Periodic outlet inspection to assure that orifice structures are not clogged will also be conducted. All ponds will be brought back to design conditions by the end of the maintenance cycle. ■ Regular inspections will be undertaken during installation, prior to forecasted major storm events, during snowmelt and following significant storm events. Environmental inspections for routine maintenance of erosion and sedimentation controls shall occur daily in areas where work is occurring, where maintenance/ repairs have been undertaken, and after significant storm events. ■ Finally, all outlets from stormwater management facilities will be designed with adequate erosion protection measures, as specified in the EA documents.
Erosion and Sediment Control	**MTO MNRF TRCA MECP**	Erosion control measures will be applied to reduce the generation of sediment, and include the following: ■ Existing vegetation that is not identified to be removed is to be retained and protected. ■ Exposed surfaces will be protected, as practical, to reduce erosion, including: ■ Removing only the vegetation above the ground during clearing

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		▪ Minimizing the amount of area exposed at one time, including staging grubbing. ■ Excavated materials requiring stockpiling will be separated at least 30 m from all identified watercourses, wetlands, and retained natural areas. The stockpiles will be placed in non-sensitive areas, protected with silt fence and sprayed with cover crop to mitigate any erosion and/or dust problems. ■ Erosion measures will be in place prior to the start of construction and remain in place until restoration is complete and disturbed areas are stabilized against erosion. ■ Standard erosion control measures will be installed and maintained following OPSS 805 or manufacturer's instructions. ■ For most areas where work will not take place for a period of 45 days or more, exposed soils will be protected from erosion using the appropriate means, such as hydro-seeding or erosion control blankets. For locations near receiving watercourses, stabilization will take place where work will not take place for a period of 15 days or more. ■ A CISEC certified inspector will be on-site regularly throughout construction to check that ESC measures are installed, functioning, being maintained as per the standards and industry practice. ■ The sediment control approach will include: ▪ Rock flow check dams (OPSD 219.210 and 219.211), silt fence flow check dams (OPSD 219.190) and/or other suitable measures will be provided in temporary construction ditches and swales, as required, to control flow rates and/or promote settling of sediments within swales prior to discharge. ▪ On-site stormwater conveyance channels for temporary flow control purposes will have adequate capacity and protection to prevent erosion during storm and runoff events. ▪ Stormwater outlets shall be stabilized prior to any upstream land disturbing activities. ▪ Water velocity will be minimized with the use of constructed ditches, berms, and check dams. ▪ Site entrances will be protected by gravel or other means so that sediment is not tracked off-site.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ Storm sewer inlets which are made operable during construction or which drain stormwater runoff from a construction site are to be protected from sediment deposition by the use of filters. ■ Where sediment-laden standing water must be removed it will be disposed of by the appropriate means to contain sediment (e.g., sediment bags and sediment trap) (OPSD 219.240) and no direct discharge to watercourses will be allowed. ■ Standard sediment control measures will be installed and maintained following Ontario Standard Specifications or manufacturer's instructions. ■ Dewatering via pumping and isolating the construction zone from outside flows will be used to keep the work in the dry; ■ Water will be screened prior to dewatering pump intake; ■ Heavy duty silt fence will be installed at or above the regulatory flood line; ■ Temporary sedimentation ponds will be used for dewatering prior to discharge to watercourses; ■ Temporary diversion swales will be used to convey runoff; ■ Dewatering effluent discharge will be directed to sedimentation basins; ■ Energy diffusers will be employed for dewatering effluent lines; ■ Flow spreaders will be used downstream of ditches discharging to watercourses, they act as stilling basins. Flow spreaders will dissipate flow velocity downslope of the basins through the generation of sheet flow over vegetated surfaces. The basins will also help to infiltrate a portion of that flow. ■ Check dams, sediment barriers, and/or filters will be used prior to discharge; and, ■ All sediment control measures will be installed prior to construction.
Socio-Economic Environment		
Air Quality	**MTO** **MECP** **MNRF**	■ Regular cleaning of construction sites to remove construction debris that may emit dust. ■ Include provision of transportation modes with low emission rates.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ Non-chloride dust suppression measures, as identified in OPSS, will be used on unpaved haul roads within the Lands and other traffic areas susceptible to emitting dust whenever possible (the appropriate dust suppression techniques are subject to the area being free of sensitive plants, nearby watercourses or other ecosystems that may be affected). ■ Trucks will cover their loads when hauling fine-grained materials. ■ Various methods will be used to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads. ■ Where necessary, paved streets/roads where tracking of soil mud or dust has occurred will be cleaned. ■ Posted speed limits will be complied with and, as appropriate, further reductions in speeds when travelling at sites with unpaved surfaces. ■ Appropriate methods will be used to prevent trucks and other vehicles from tracking soil, mud or dust onto paved streets or roads. ■ Enclosures, wet sandblasting and / or other techniques will be used to minimize dust during any sandblasting operations. ■ All motorized equipment/vehicles, including emission control devices where installed by the manufacturer, will be regularly maintained to ensure emissions from internal combustion engines is minimized. ■ Excessive idling of equipment and idling of equipment that is not in immediate use will be prohibited.
Land Use	**MTO**	The majority of the construction works are accommodated within the ROW outlined in the previous EAs. Therefore, no new private property is required. No mitigation measures are required.
Noise and Vibration	**MTO** **MECP**	■ LINK427 will be required to keep idling of construction equipment to a minimum and to maintain equipment in good working order to reduce noise from construction activities. ■ Noise emissions from construction equipment will also be subjected to the limits set out in the MECP Publication NPC-115 and the *Noise Control Guideline for Class Environmental Assessment of Undertakings.* ■ The MTO Environmental Guide for Noise (October 2006) will be followed. ■ Heavily loaded trucks will be routed away from residential streets, where possible, in order to limit vibration impacts.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
		■ The separation distance between the construction staging areas and nearby receptors will be maximized to the greatest extent possible to reduce noise and vibration impacts. ■ Responses to noise and vibration complaints will be done in accordance with the project's Complaint Protocol. ■ In the presence of persistent noise and vibration complaints, all construction equipment shall be verified to comply with MECP NPC-115, NPC-118 and Ontario Model Municipal Noise Control By-Law guidelines. ■ As some construction activities are expected to be undertaken at night and/or on weekends, exemptions from any applicable municipalities (i.e. City of Vaughan) Noise Bylaws will be obtained.
Waste Management / Contaminated Property / Excess Materials Management	**MTO MNRF TRCA DFO**	■ Deposited waste and recyclable materials (such as metal, plastic etc.) will be removed and property managed off-site for reuse, recycling or disposal. ■ Waste and recyclable materials will be segregated and separated where practicable, removed and/or managed off-site for reuse, recycling or disposal. ■ Concrete materials from off-site sources will be assessed (as required) to determine suitability prior to crushing and/or processing activities. ■ Permits and approvals associated with the management and processing of excess materials will be obtained as required. ■ Designated substances will be managed by persons qualified and trained for the specific substances in accordance with applicable regulations. All materials resulting from demolition will be identified and classified under O. Reg. 347 and managed in an environmentally responsible manner. ■ In the event that suspect designated substances are identified during design and/or construction activities, additional testing and DSS reports will be completed (as required).
Traffic	**MTO General Public**	■ No long-term traffic impacts to the travelling public are anticipated. There will be no long-term lane reductions at Rutherford Road, however some day and/or night lane closures for construction staging will occur during construction activities. All aforementioned temporary short duration traffic impacts will be in accordance with the Ontario Traffic Manual, Book 7 and with LINK's Traffic Management Plan, TMP, which outlines various procedures to be implemented to mitigate traffic impacts.

Environmental Issues / Concern	Agencies	Proposed Mitigation / Commitments to Future Work
Cultural Environment		
Archaeological Resources	**MTO MTCS**	In the event that the following situations are encountered during construction, work must stop immediately and the actions undertaken as listed below: ■ Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources will cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*. ■ In the event that human remains are encountered during construction, the proponent or person discovering human remains will immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Government Services at (416) 326-8393. ■ The *Cemeteries Act*, R.S.O. 1990, c.C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 (when proclaimed in force) require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the Ministry of Consumer Services. ■ During construction, the Coleraine Burying Grounds (Coleraine Cemetery) and the Coleraine Schoolhouse Site located on the south side of Major Mackenzie Drive will be protected to ensure protection from construction activities.
Built Heritage and Cultural Landscapes	**MTO MTCS**	Mitigation measures include fencing and protection of the sites mentioned above, with heritage material to be removed by Black Creek Pioneer Village from Kellam House and Barn prior to demolition. No additional mitigation measures are required as the proposed construction activities result in no additional impacts to cultural or built heritage as identified in the Individual EA (2010).

8 Project Monitoring

During constructionLINK427 will oversee the mitigation measures and key design features to confirm that they are not only implemented as required, but that they are consistent with the previous EA commitments, including external notifications and consultation. In addition, LINK427 will assess the effectiveness of the environmental mitigation measures to confirm the following:

- Mitigation measures are providing the intended control and/or protection;
- The control and/or protection provided by mitigation measures is adequate;
- Additional mitigation measures are provided, as required, for any unanticipated environmental problems that may develop during construction;
- Information is available regarding required mitigation measures; and
- Environmental monitoring, after a project is completed, may involve follow-up monitoring of significant measures and/or significant concerns.

Condition 8 of the MECP Notice of Approval (November 2010) outlines the requirements for a Complaint Protocol. The Complaint Protocol, established for the Highway 427 Expansion project addresses how LINK427 will respond to complaints made during the construction and operation of the project. During construction and operation of the Highway 427 Expansion project, this Protocol will act as a tool to ensure that all complaints are addressed, recorded, tracked and handled in an expeditious and efficient manner.

Per Condition 4 and 5 of the MECP Notice of Approval (November 2010), a Compliance Monitoring Program (CMP) was developed and an Annual Compliance Report is submitted to MECP on September 30 of each year since 2015. The purpose of the CMP is to enable the monitoring of the fulfillment of the provisions of the EA. The CMP identifies the parties responsible for project compliance monitoring and provides the program scope and actions required during the project's detail design, construction, operation and maintenance stages. The Annual Compliance Report describes its compliance with the conditions of approval set out and describes the results of the CMP. Per Condition 5 of the MECP Notice of Approval and Individual EA (2010), Annual Compliance reporting which describes compliance with the conditions in the Notice of Approval is being submitted to MECP annually on or before September 30th of each year.

LINK427 has also developed an Environmental Management System (EMS) that intends to administer environmental management processes within the Highway 427 Expansion Project that complies with the ISO 14001:2004 Standard, and will be applied throughout the Project Term. The EMS will manage significant environmental aspects so as to limit the impacts on the environment and demonstrates the processes to be used to comply with all LINK427's environmental obligations. LINK427 will comply with the requirements of the Environmental Approvals as per Schedule 17(2)(C) and complete the ESA monitoring and has obtained the Overall permit for SAR bats.

Construction is subject to daily general on-site inspection to ensure the execution of the environmental component of the work and to deal with environmental problems that develop during construction. This is the primary method for compliance monitoring.

8.1 Groundwater Monitoring

A groundwater monitoring program is being implemented to confirm that there are no adverse impacts to groundwater resources with regards to the construction activities of the Highway 427 Expansion and to identify construction related impacts early in order to carry mitigation measures, if necessary. The program includes:

- Pre-construction monitoring: weekly, 1 month before start of construction;
- Construction monitoring: dependent upon the length of construction; with a minimum frequency of once a month; and

- Post-construction monitoring: weekly, for 2 weeks after the end of construction.

8.2 Surface Water Monitoring

Section 6 of the MECP Notice of Approval (November 2010) deals with Surface Water Monitoring and Mitigation of the extension portion (from Highway 7 to Major Mackenzie Drive) of the Highway 427 Expansion project for the baseline condition, as well as construction and post-construction. For this program, four surface water monitoring stations were established to determine baseline water quality conditions for Robinson Creek and Rainbow Creek, which are the receiving water courses for the area surrounding the construction zone. Monitoring was undertaken by the MTO between 2015 and 2016, prior to the start of construction. LINK427 has continued this monitoring during construction. The purpose of construction monitoring is to compare surface water quality during the construction period to the established baseline conditions, and to upstream characteristics, to quantify changes in water quality that may be attributed to construction activities for the highway extension. The scope of the program includes: i) continuous water level, temperature and conductivity monitoring using data loggers; ii) water quality sampling every two weeks and after wet weather events; and iii) stream gauging (monthly). Post-construction monitoring will also be undertaken after the end of construction.

Appendix A: Study Notification Materials

August 23, 2017

RE: NOTICE OF COMMENCEMENT
HIGHWAY 427 EXPANSION, DETAIL DESIGN AND CONSTRUCTION

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion project within the City of Vaughan and the City of Toronto.

Please see the attached Notice of Commencement for additional information and a key plan.

The purpose of this letter is to notify you of this project and provide you with an opportunity to identify any interests you may have.

This project is being carried out in accordance with the approved environmental planning process for projects under the MTO *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000) and has now progressed to Detail Design. Design and Construction Reports (DCRs) will be prepared to document the Detail Design process, including environmental investigations, potential environmental effects, proposed mitigation measures, commitments to future work and monitoring. The DCRs will each be made available for a 30-day public and agency review period. Notices will be published in local newspapers, on the Project website (www.427expansion.ca) and distributed by mail to those on the project contact list to clearly identify the start and end dates of the review period, list locations where the DCR may be reviewed, and describe the process for submitting comments, including Project Team contact information.

Public Information Centres (PICs) will be held during the detail design process to allow the public an opportunity to review and comment on the project.

We encourage you to actively participate in the study by visiting our project website (www.427expansion.ca), or by contacting the staff identified on the attached “Notice of Commencement” with your comments or information requests.

Under the *Freedom of Information and Protection of Privacy Act* (FOIPPA) and the *Access to Information Act*, comments and information regarding this project, with the exception of personal information, will become part of the public record. If you have accessibility requirements in order to participate in this project, please contact the undersigned.

Yours truly,

Aitor Arbesu Iglesias
Project Director

Encl. Notice of Commencement

cc: Chris Tschirhart, Environmental Director – LINK427

23 Août 2017

RE: AVIS DE LANCEMENT
PROLONGEMENT DE L'AUTOROUTE 427, DÉTAILS CONCERNANT LA CONCEPTION ET LA CONSTRUCTION

Le Ministère des transports (MTO) et Infrastructure Ontario ont choisi **LINK427** pour entreprendre la conception, la construction, le financement et l'entretien du projet de prolongement de l'autoroute 427 dans la Ville de Vaughan et de Toronto.

Veuillez trouver ci-joint l'Avis de lancement pour des renseignements complémentaires et le plan d'ensemble.

L'objectif de cette lettre est de vous faire part de ce projet et de vous donner la chance d'identifier des intérêts que vous pourriez avoir à ce sujet.

Ce projet est effectué conformément au processus de planification environnementale autorisé pour les projets en vertu des normes d'évaluation environnementale du Ministère des transports (MTO) pour les routes provinciales (2000), devenu maintenant une conception détaillée. Les Rapports de conception et de construction (RCC) seront préparés pour élaborer le processus de conception détaillée, comprenant des enquêtes environnementales, la prise en compte d'effets environnementaux potentiels, les mesures d'atténuation proposées, les engagements envers les futurs travaux et la surveillance. Tous les RCC seront mis à la disposition du grand public et aux agences lors d'une période d'examen de 30 jours. Des avis seront publiés dans les journaux locaux, sur le site Web du projet (www.427expansion.ca) et distribués par courrier à celles et ceux qui sont sur la liste de distribution du projet, pour leur signaler du début de la période d'examen et des emplacements où chaque RCC sera mis à disposition, ainsi qu'une description du processus pour soumettre des commentaires, y compris les coordonnées de l'équipe de projet.

Des Centres d'information publique (CIP) se tiendront pendant toute la durée du processus de conception détaillée pour permettre au grand public d'évaluer et de commenter sur les détails du projet.

Nous vous encourageons à participer activement à l'étude en visitant le site web du projet (www.427expansion.ca) ou en contactant le personnel indiqué dans « l'Avis de lancement » avec vos commentaires et vos demandes d'information.

En vertu de la Loi sur l'accès à l'information et la protection de la vie privée, les commentaires et les informations associés à ce projet, avec l'exception des renseignements personnels, seront divulgués au public. Avec l'exception des renseignements personnels, tous les commentaires seront divulgués au public. Si vous avez des exigences en termes d'accessibilité pour participer à ce projet, veuillez contacter la personne ci-dessous.

Cordialement,

Aitor Arbesu Iglesias
Directeur de projet

P.J. Avis de lancement
cc: Chris Tschirhart, Directeur en charge de l'environnement – LINK427

NOTICE OF COMMENCEMENT FOR DETAIL DESIGN AND CONSTRUCTION

Highway 427 Expansion

THE PROJECT

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion project within the City of Vaughan and the City of Toronto. The *Highway 427 Transportation Corridor Environmental Assessment (EA)* received approval from the Ministry of Environment and Climate Change (MOECC) in November 2010. The project was updated through completion of a Transportation Environmental Study Report (TESR) in 2016 to add additional lanes to the proposed Highway 427 extension. A separate TESR was completed in 2013 for the widening of existing Highway 427 between Albion Road to Highway 7.

The Highway 427 Expansion project includes the design and construction of the following:

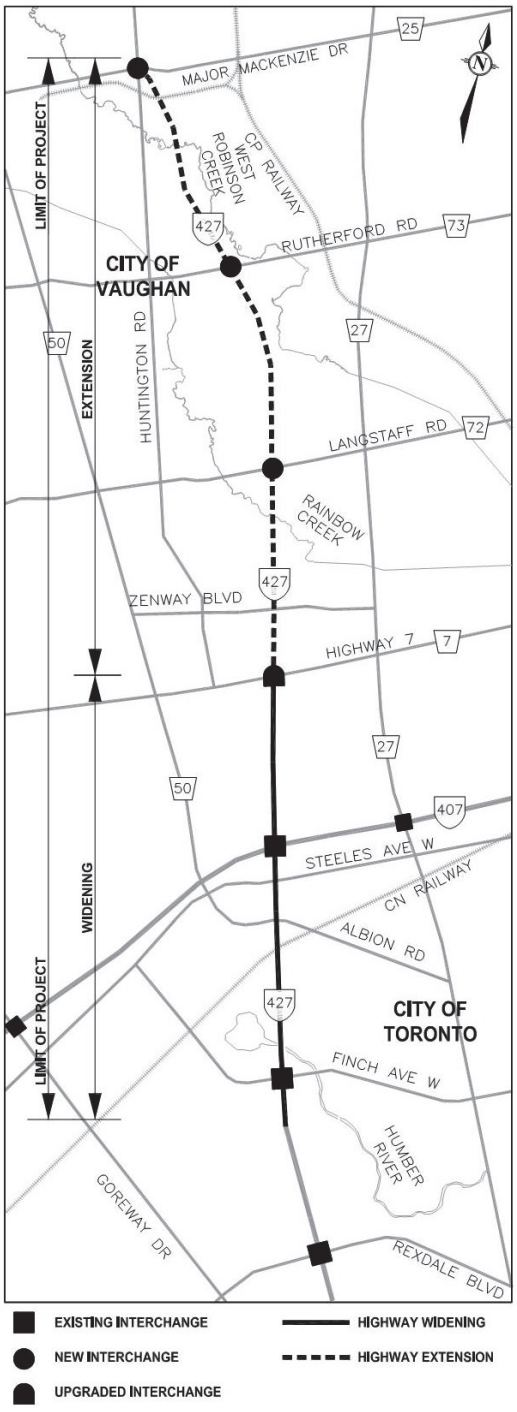
- A new 6.6 km extension from Highway 7 to Major Mackenzie Drive with:
  - eight lanes from Highway 7 to Rutherford Road;
  - six lanes from Rutherford Road to Major Mackenzie Drive;
  - three new interchanges (Langstaff Road, Rutherford Road and Major Mackenzie Drive);
  - new median High Occupancy Toll (HOT) lanes.
- A 4.0 km road widening from Finch Avenue to Highway 7:
  - from six to eight lanes between Finch Avenue to south of Steeles Avenue;
  - from four to eight lanes, from south of Steeles Avenue to Highway 7;
  - new median High Occupancy Toll (HOT) lanes.

THE PROCESS

This project is being carried out in accordance with the approved environmental planning process for projects under the MTO *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000) and has now progressed to Detail Design.

Public Information Centres (PICs) will be held throughout the detailed design process to allow the public an opportunity to review and comment on project details.

Design and Construction Reports (DCRs) will be prepared to document the Detail Design process, including environmental investigations, potential environmental effects, proposed mitigation measures, commitments to future work and monitoring. The DCRs will each be made available for a 30-day public and agency review period and notices will be published in local newspapers, on the Project website www.427expansion.ca and



distributed by mail to those on the project contact list advising of the start of each review period and locations where each DCR will be available for review.

COMMENTS

We are interested in hearing any comments that you may have regarding this project. If you wish to obtain additional information, provide comments or sign up for the project mailing list please contact those listed below, or visit the project website at www.427expansion.ca.

If you have any accessibility requirements in order to participate in this project please contact one of the Project Team members listed below.

Mr. Chris Tschirhart
LINK427
Environmental Director
1 Royal Gate Blvd.
Woodbridge, ON. L4L 8Z7
Ph: 1-888-352-8085
Email: ask@427Expansion.ca

Mr. Aitor Arbesu Iglesias
LINK427
Project Director
1 Royal Gate Blvd.
Woodbridge, ON. L4L 8Z7
Ph: 1-888-352-8085
Email: ask@427Expansion.ca

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*. With the exception of personal information, all comments will be part of the public record.

Des renseignements sont disponibles en français en composant 1-888-595-3152.

AVIS DE LANCEMENT DES DÉTAILS DE CONCEPTION ET DE CONSTRUCTION

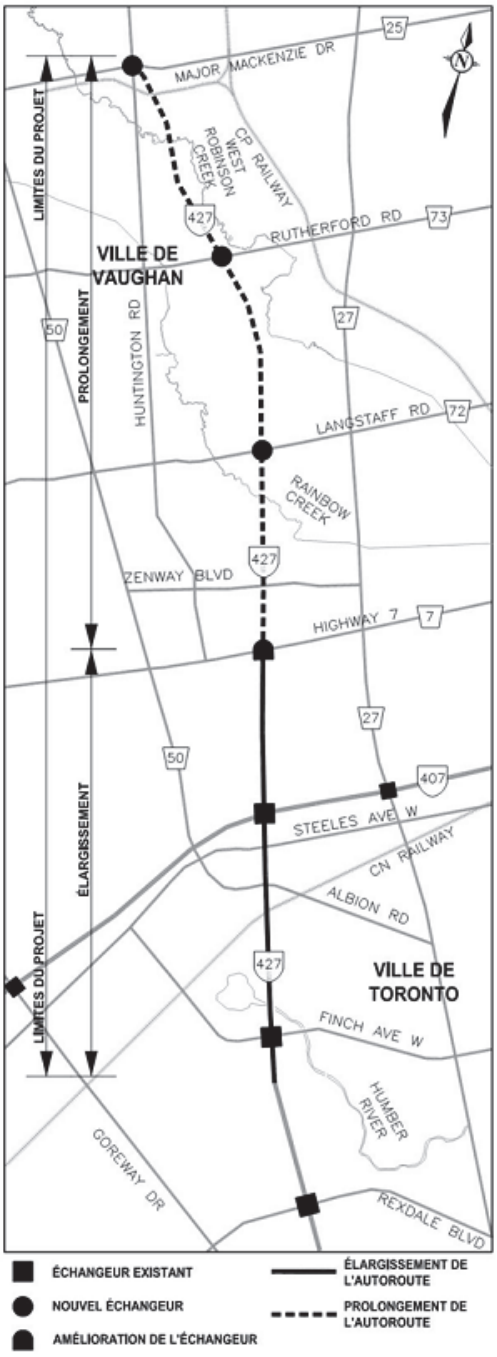
Prolongement de l'autoroute 427

LE PROJET

Le Ministère des transports (MTO) et Infrastructure Ontario ont choisi **LINK427** pour entreprendre la conception, la construction, le financement et l'entretien du projet de prolongement de l'autoroute 427 dans la Ville de Vaughan et de Toronto. *L'évaluation environnementale du corridor de transport de l'autoroute 427* a été approuvée par le Ministère de l'environnement et du changement climatique en novembre 2010. Le projet a été mis à jour par l'achèvement du Rapport d'étude environnementale sur les transports (REET) en 2016 dans le but d'ajouter de nouvelles voies au prolongement suggéré de l'autoroute 427. Un autre REET avait été achevé en 2013 pour l'élargissement de l'autoroute 427, entre Albion Road et la route 7.

Le projet de prolongement de l'autoroute 427 comprend la conception et la construction de ce qui suit :

- Un nouveau tronçon de 6,6 kilomètres de la route 7 à Major Mackenzie Drive comportant
  - huit voies de la route 7 à Rutherford Road;
  - six voies de Rutherford Road à Major Mackenzie Drive;
  - trois échangeurs à Langstaff Road, Rutherford Road et Major Mackenzie Drive;
  - nouvelles voies médianes réservées aux véhicules multioccupants à accès spécial tarifé (VMOT)".
- Une route de 4 kilomètres qui s'élargit au de l'avenue Finch à la route 7
  - passant de six à huit voies, de l'avenue Finch au sud de l'avenue Steeles;
  - passant de quatre à huit voies, de l'avenue Steeles à la route 7;
  - nouvelles voies médianes réservées aux véhicules multioccupants à accès spécial tarifé (VMOT)".



LE PROCESSUS

Ce projet est effectué conformément au processus de planification environnementale autorisé pour les projets en vertu des normes d'évaluation environnementale du Ministère des transports (MTO) pour les routes provinciales (2000), devenu maintenant une conception détaillée.

Des Centres d'information publique (CIP) se tiendront pendant toute la durée du processus de conception détaillée pour permettre au grand public d'évaluer et de commenter sur les détails du projet.

Les Rapports de conception et de construction (RCC) seront préparés pour élaborer le processus de conception détaillée, comprenant des enquêtes environnementales, la prise en compte d'effets environnementaux potentiels, les mesures d'atténuation proposées, les engagements envers les futurs travaux et la surveillance. Tous les RCC seront mis à disposition au grand public et aux agences lors d'une période d'examen de 30 jours. Des avis seront publiés dans les journaux locaux, sur le site Web du projet (www.427expansion.ca) et distribués par courrier à celles et ceux qui sont sur la liste de distribution du projet, pour leur signaler du début de la période d'examen et des emplacements où chaque RCC sera mis à disposition.

COMMENTAIRES

Nous aimerions recevoir vos commentaires à l'égard de ce projet. Si vous désirez obtenir des renseignements supplémentaires, fournir des commentaires ou faire partie de la liste de distribution du projet, veuillez contacter les

personnes ci-dessous ou visiter le site Web du projet à www.427expansion.ca.

Si vous avez des exigences en termes d'accessibilité pour participer à ce projet, veuillez contacter un des membres de l'équipe de projet ci-dessous.

M. Chris Tschirhart
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Courriel : ask@427Expansion.ca

Les informations seront recueillies conformément à la *Loi sur l'accès à l'information et la protection de la vie privée*. Avec l'exception des renseignements personnels, tous les commentaires seront divulgués au public.

Des renseignements sont disponibles en français en composant 1-888-595-3152.

Ministry of Transportation
Major Projects Office
Central Region

159 Sir William Hearst Avenue
Building D, 7th Floor
Toronto, ON M3M 0B7
Tel.: 416-235-3749
Fax: 416-235-3576

Ministère des Transports
Bureau grands projets
Région du Centre

7e étage, édifice D
159, avenue Sir William Hearst
Toronto, ON M3M 0B7
Tél.: 416-235-3749
Téléc. 416-235-3576

Ontario

August 23, 2017

«Name»
«Organization»
«Address»

Dear «Greeting»:

Re: Notice of Commencement, Highway 427 Expansion Project
Detail Design and Construction
Ministry of Transportation

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion project within the City of Vaughan and the City of Toronto.

The purpose of this letter is to notify you of project start-up and inquire if your community has an interest in this study. We also welcome the opportunity to meet with you to discuss this project.

This project is being carried out in accordance with the approved environmental planning process for projects under the MTO *Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000) and has now progressed to Detail Design. Design and Construction Reports (DCRs) will be prepared to document the Detail Design process, including environmental investigations, potential environmental effects, proposed mitigation measures, commitments to future work and monitoring. The DCRs will each be made available for a 30-day public and agency review period. Notices will be published in local newspapers, on the Project website (www.427expansion.ca) and distributed by mail to those on the project contact list to clearly identify the start and end dates of the review period, list locations where the DCR may be reviewed, and describe the process for submitting comments. Public Information Centres (PICs) will be held during the detail design process to allow an opportunity to review and comment on the project.

As part of the Environmental Assessments for the Highway 427 Expansion, a complete Archaeological Assessment was undertaken. LINK427 will follow all protocols as outlined in the Environmental Assessments regarding informing and contacting Indigenous communities regarding any archaeological artefacts that may be found as a result of construction activities.

Under the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*, comments and information regarding this project, with the exception of personal information, will become part of the public record. If you have accessibility requirements in order to participate in this project, please contact the undersigned.

If you would like to provide comments, or if you require further information regarding this project, please feel free to contact me by phone at 416-235-4188 or by e-mail at Pauline.VanRoon@ontario.ca. In addition, if you are interested in meeting as a result of receiving this letter, please contact me to arrange a meeting at your earliest convenience.

Sincerely,
Ministry of Transportation

Pauline Van Roon
Head, Planning & Engineering

cc: C. Copeland - MTO Environmental Planner
A. Arbesu - LINK427

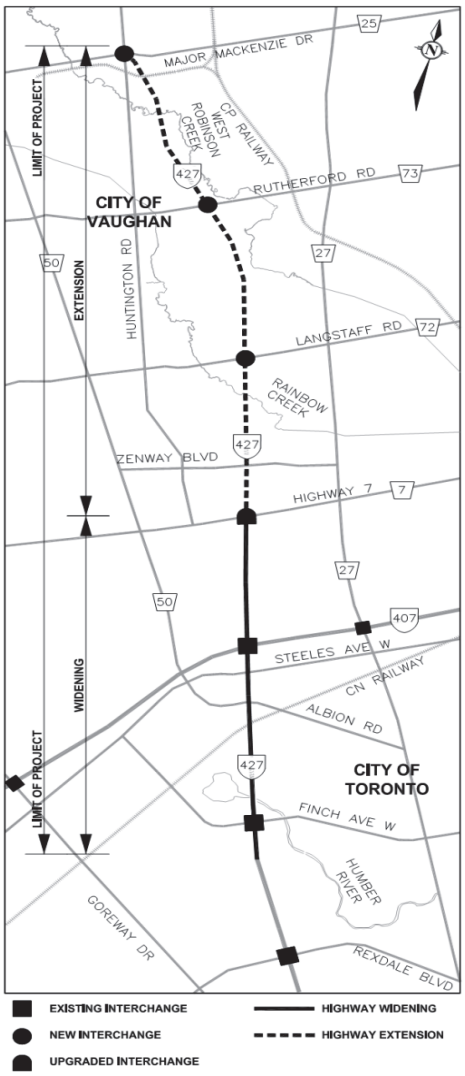
Encl.: Notice of Commencement

NOTICE OF PUBLIC INFORMATION CENTRE
HIGHWAY 427 EXPANSION PROJECT
DETAIL DESIGN AND CONSTRUCTION REPORTS

THE PROJECT

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion project from Finch Avenue to Major Mackenzie Drive within the City of Vaughan and the City of Toronto.

The Highway 427 Transportation Corridor Environmental Assessment (EA) received approval from the Ministry of Environment and Climate Change (MOECC) in November 2010. The project was updated through completion of a Transportation Environmental Study Report (TESR) in 2016 to add additional lanes to the proposed Highway 427 extension. A separate TESR was completed in 2013 for the widening of the existing Highway 427 between Albion Road to Highway 7. This meeting is to introduce the construction works contained in the Design and Construction Reports (DCR #2 and DCR #3), and to provide agencies, interested groups, business representatives and members of the general public with an opportunity to review and comment on the design details, results of the consultation process, construction staging and environmental impacts and mitigation measures.



PUBLIC CONSULTATION

This first Public Information Centres (PIC) has been arranged for members of the project team to be available to discuss the project and answer any questions.

The first PIC is scheduled as follows:

Date:	**January 25, 2018**
Location:	**Element Hotel - Vaughan Southwest** **6170 Hwy 7, Vaughan** **Vaughan, Ontario**
Time:	**4:00 pm to 8:00 pm**

THE PROCESS

This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the *MTO Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000). In accordance with MTO's Class EA, DCR #2 and #3 have been prepared and made available for public review.

COMMENTS

We are interested in hearing any comments that you may have regarding this study. If you wish to obtain additional information or provide comments, please consult the project website at: **www.427expansion.ca**. With the exception of personal information, all comments will become part of the public record. Comments on these DCR's can be provided by mail, e-mail, or online to:

Mr. Christopher Tschirhart
Environmental Director
LINK427
1 Royal Gate Blvd., Suite G
Woodbridge, ON L4L 8Z7
Phone: 1-888-352-8085

E-mail: ask@427Expansion.ca

Mr. Aitor Arbesu Iglesias
Project Director
LINK427
1 Royal Gate Blvd., Suite G
Woodbridge, ON L4L 8Z7
Phone: 1-888-352-8085

E-mail: ask@427Expansion.ca

If you have any accessibility requirements in order to participate in this project please contact one of the Project Team members listed above.

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*. With the exception of personal information, all comments will be part of the public record.

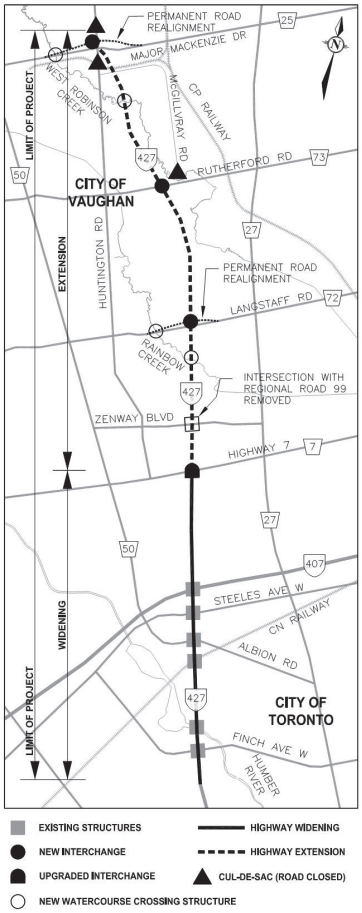
Des renseignements sont disponibles en français en composant 1-888-595-3152.

NOTICE OF PUBLIC INFORMATION CENTRE
HIGHWAY 427 EXPANSION PROJECT

THE PROJECT

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion Project from Finch Avenue to Major Mackenzie Drive within the City of Vaughan and the City of Toronto.

The Highway 427 Transportation Corridor Environmental Assessment (EA) received approval from the Ministry of Environment and Climate Change (MOECC) in November 2010. The project was updated through completion of a Transportation Environmental Study Report (TESR) in 2016 to add additional lanes to the proposed Highway 427 extension. A separate TESR was completed in 2013 for the widening of the existing Highway 427 between Albion Road to Highway 7.



PUBLIC CONSULTATION

The first Public Information Centre (PIC) for this project was held in January 2018. **The second PIC is planned for May 22, 2018.** This second PIC will provide agencies, interested groups, business representatives and members of the general public with an opportunity to review and comment on the following elements of construction:

- Detours and staging at Langstaff Road and Major Mackenzie Drive;
- Finish grading and construction of interchange ramps at Langstaff Road and Major Mackenzie Drive;
- Construction of a new underpass at Langstaff Road;
- Construction of two new Highway 427 overpasses (one for northbound lanes and one for southbound lanes) at Canadian Pacific Railway Intermodal Terminal & McGillivray Road;
- Construction of a new overpass at Major Mackenzie Drive;
- Construction of two new Highway 427 overpasses (one for northbound lanes and one for southbound lanes) at West Robinson Creek;
- Replacement of the existing Major Mackenzie Drive culvert with a new overpass structure at West Robinson Creek;
- Replacement of the existing Langstaff Road culvert with an overpass at Rainbow Creek; and
- Construction of two new Highway 427 overpasses (one for northbound lanes and one for southbound lanes) at Rainbow Creek.

Members of the project team will be available to discuss the project and answer any questions. The construction elements will be documented in a DCR to be tabled for public review after this PIC.

The PIC is scheduled as follows:

Date:	**May 22, 2018**
Location:	**Element Hotel - Vaughan Southwest** **6170 Highway 7, Vaughan, Ontario**
Time:	**4:00 pm to 8:00 pm**

THE PROCESS

This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the *MTO Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000). In accordance with MTO's Class EA, DCRs will be prepared with input from this PIC and will be made available for public review.

COMMENTS

We are interested in hearing any comments that you may have regarding this project. If you wish to obtain additional information or provide comments, please consult the project website at: **www.427expansion.ca**. Comments can be provided by mail, e-mail, or online to:

Mr. Aitor Arbesu Iglesias

Project Director
LINK427
1 Royal Gate Blvd., Suite G
Woodbridge, ON L4L 8Z7
Phone: 1-888-352-8085
E-mail: ask@427Expansion.ca

If you have any accessibility requirements in order to participate in this Public Information Centre please contact us at the coordinates above.

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*. With the exception of personal information, all comments will be part of the public record.

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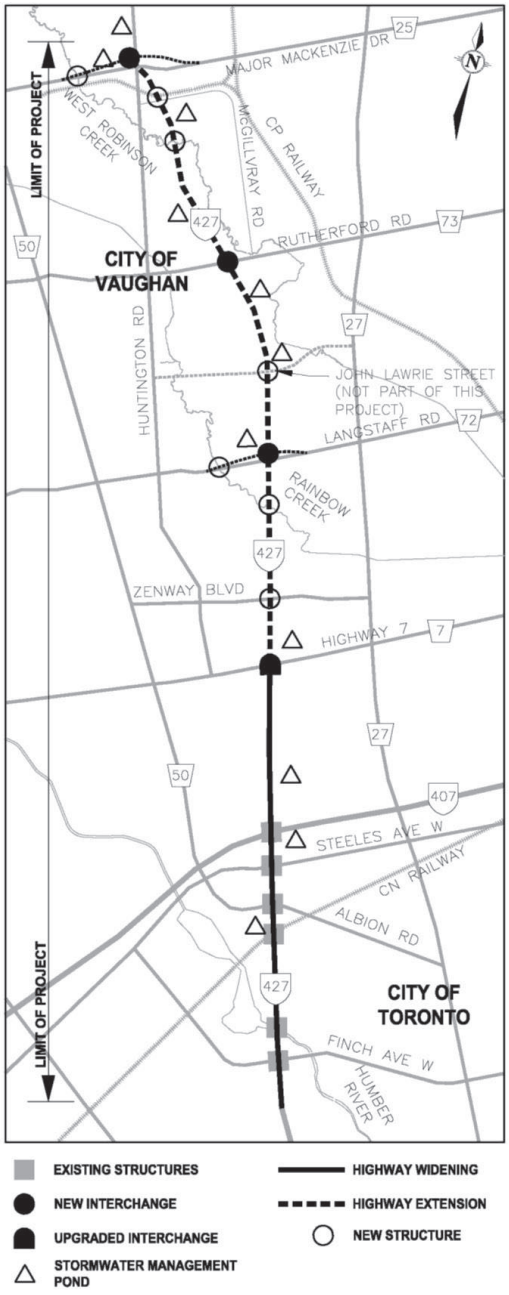
NOTICE OF PUBLIC INFORMATION CENTRE
HIGHWAY 427 EXPANSION PROJECT

THE PROJECT

LINK427 has been selected by the Ministry of Transportation (MTO) and Infrastructure Ontario (IO) to undertake the design, build, finance and maintenance of the Highway 427 Expansion Project from Finch Avenue to Major Mackenzie Drive within the City of Vaughan and the City of Toronto.

The Highway 427 Transportation Corridor Environmental Assessment (EA) received approval from the Ministry of Environment, Conservation, and Parks (MECP) in November 2010. The project was updated through completion of a Transportation Environmental Study Report (TESR) in 2016 to add additional lanes to the proposed Highway 427 extension. A separate TESR was completed in 2013 for the widening of the existing Highway 427 between Albion Road to Highway 7.



PUBLIC CONSULTATION

The first Public Information Centre (PIC) for this project was held in January 2018, the second PIC was held in May 2018 and the third PIC is planned for **September 27, 2018**. This PIC will provide agencies, interested groups, business representatives and members of the general public with an opportunity to review and comment on the following elements of construction:

- Detail Design Refinements to Stormwater Management Ponds;
- Construction of new Overpasses at Rutherford Road and Street A (future John Lawrie Street);
- Electrical (street lighting, traffic lights etc.);
- Guiderail, barriers, and pavement markings;
- Intelligent Transport Systems (ITS); and
- Traffic Signage

Members of the project team will be available to discuss the project and answer any questions. The construction elements will be documented in a Design and Construction Report (DCR) to be tabled for public review after this PIC.

The PIC is scheduled as follows:

Date:	**September 27, 2018**
Location:	**Element Hotel - Vaughan Southwest** **6170 Highway 7, Vaughan, Ontario**
Time:	**4:00 pm to 8:00 pm**

THE PROCESS

This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the *MTO Class Environmental Assessment (Class EA) for Provincial Transportation Facilities* (2000). In accordance with MTO's Class EA, DCRs will be prepared with input from this PIC and will be made available for public review.

COMMENTS

We are interested in hearing any comments that you may have regarding this project. If you wish to obtain additional information or provide comments, please consult the project website at: **www.427expansion.ca**. Comments can be provided by mail, e-mail, or online to:

Mr. Paul Neals

Environmental Director
LINK427
1 Royal Gate Blvd., Suite G
Woodbridge, ON L4L 8Z7
Phone: 1-888-352-8085
E-mail: ask@427Expansion.ca

Mr. Aitor Arbesu Iglesias

Project Director
LINK427
1 Royal Gate Blvd., Suite G
Woodbridge, ON L4L 8Z7
Phone: 1-888-352-8085
E-mail: ask@427Expansion.ca

If you have any accessibility requirements in order to participate in this Public Information Centre please contact us at the coordinates above.

Information will be collected in accordance with the *Freedom of Information and Protection of Privacy Act* and the *Access to Information Act*. With the exception of personal information, all comments will be part of the public record.

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Highway 427 Expansion Project
Public Information Centre (PIC)
Thursday, September 27, 2018

Comment Sheet

Name (optional):_____
Email (optional):_____
Phone number (optional):_____

Do you have any concerns or comments regarding the Highway 427 Expansion Detail Design and Class Environmental Assessment Study? Please respond in the box below.

- What is the plan for maintenance of dry ponds eg how excess sedimentation will be removed and where to.

Information will be collected in accordance with the Freedom of Information and Protection of Privacy Act and the Access to Information Act. With the exception of personal information, all comments will be part of the public record. If you have any accessibility requirements in order to provide comments, please notify one of the Project Team members at this event or email ask@427expansion.ca or call 1-888-352-8085.

Highway 427 Expansion Project
Public Information Centre (PIC)
Thursday, September 27, 2018

Comment Sheet

Name (optional):
Email (optional):
Phone number (optional):

Do you have any concerns or comments regarding the Highway 427 Expansion Detail Design and Class Environmental Assessment Study? Please respond in the box below.

I AM HAPPY THAT THE PROJECT APPEARS TO BE ON SCHEDULE.

2 COMMENTS:

1) CONSIDER A PROGRESSIVE OPENING GOING NORTH.

2) PLEASE CONSIDER PROVIDING 3 LANES NORTHBOUND TO HWY 407 - THE MERGE AT FINCH TO 2 LANES RESULTS IN HUGE JAMS IN THE AFTERNOON. A LARGE VOLUME EXITS ONTO THE 407, SO THE 2 LANES NORTH OF THAT WOULD NOT BE AS BIG A BOTTLENECK.

THANKS!

Appendix B: Agency Correspondence Table

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
Municipalities	
DCR #4 Overview Meeting – November 20, 2018 and November 29, 2018	
■ Representatives from: ▪ York Region City of Vaughan A representative from City of Vaughan noted that City of Vaughan will provide detailed comments in response to consultation with the LINK427 Design team directly to the Design team. From Highway 7 to Vaughan Valley there is a double left into one lane. LINK427 and York Region (via conference call) discussed the design optimizations implemented at the Rutherford Overpass bridge structure. LINK's optimized design allows for the ultimate configuration (6 lanes) of the future Rutherford widening. LINK427's design provides the grading platform for this future expansion, to be potentially be performed by the Region.	The lines are marked as a 4-lane cross section.
City of Vaughan review of 50% Design Packages (6,7,8 & 10, Rev A) – Street A Design	
■ City of Vaughan met with LINK427 to discuss the design of Street A on October 24, 2018. City of Vaughan was anticipating that Street A bridge structures would resemble what was shown in the General Arrangement provided in Annex N of the municipal EA. The seven landowner/developers will need to be consulted.	

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
■ Vaughan questioned if this alternate bridge design would have an effect on where the 26m ROW would be fully available. (i.e. would the ROW have a significant taper zone from the full 26m ROW to a smaller ROW under the bridge). City of Vaughan circulated the memo to the 7 landowners and stakeholders.	LINK427 will provide plan view showing where grading limits would be in both bridge designs. LINK427 confirms that the proposed structure is a stand-alone structure and no additional work (other than aesthetical) would be required once Street A is excavated to the entire 26 m width. LINK427 is providing the same Street A elevations as indicated in the EA. LINK427 acknowledges that the profile of H427 was changed at bid stage, but maintained Street A elevation. Recently, it has come to the attention of LINK427, that regardless of the change of profile effected during design, this would have been required due to HONI lines overhead. The vertical alignment of H427 needs to be maintained. LINK427 provided a memo that outlines: changes between EA and LINK427 structure, reasoning for changes and impacts (if any) to Vaughan as a result.
York Region (YR) review of 50% Design Packages (6, 7, 8, & 10, Rev A)	
The Regional Municipality of York consultants provided comments with respect to the West Vaughan Sewage Servicing (WVSS) Project.	LINK427 responses in progress.
YR notes that the WVSS 60% tunnel profile drawings in this area show the tunnel crown at approximate elevation 161.5 below the extension.	LINK proposing a meeting to discuss.
YR notes that LINK427 should be aware that the north abutment piles for the Rutherford Rd crossing are slightly north of the tunnel	LINK proposing a meeting to discuss.

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
outside face but the piles would not be far from the tunnel in plain view. LINK 427 should be aware of this and verify the piles will not be affected by the tunnel construction.	
■ YR notes that drawing 802 indicates the estimated pile tip elevation at 178.000. At the location of the piles, the tunnel crown is indicated on the (WVSS) 60% drawings to be approximately at elevation 161.5. Therefore the tunnel would pass below the depth of the piles by approximately 16+m. The tunnel is to be constructed in bedrock.	LINK proposing a meeting to discuss.
YR notes that 3 storm water ponds are to be constructed near Rutherford Road. However, they are north and south of the crossing and should not be a concern.	No action.
YR indicates that Drawings 033, 034, and 035 show the future WVSS tunnel along the north side of Rutherford Road consistent with the (WVSS) 60% design drawings. YR should provide the (WVSS) 90% design drawings to MTO after we submit them so the latest tunnel location can be indicated on the Link427 drawings for their next submission.	LINK proposing a meeting to discuss.
YR notes that the MTO's engineer should be aware that there will be vibration anticipated during the construction which may impact the piles depending on the piles basis of design (whether friction or bearing piles) which we do not know. YR is providing them with information and they are responsible to check their design accordingly.	LINK proposing a meeting to discuss.
It is expected that the Electrical and Signals belong to MTO. Since the Region will likely maintain those signals, it is expected that	Above ground per York Region standards and underground per MTO.

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
MTO will build the underground as per MTO spec, and the aboveground as per the Region spec.	
■ What about pedestrian crossing? There is a crosswalk at Major Mackenzie, but not at Langstaff (3 signals) or Rutherford (2 signals).	■ Crossings will be provided at Langstaff Rd and MMD only. There is no proposed pedestrian crossing at Rutherford Rd.
■ At two ramp signals of Langstaff, why not install those EB and WB secondary poles on the proposed medians?	■ Median island added. Secondary poles will be placed in the median in the next submission.
■ Please make sure Primary and Secondary heads with enough longitudinal and lateral distance.	■ Primary and secondary heads are with 10m laterally and between 5m-15m longitudinally.
■ In Drawing #1028, the ducts between MH32 and MH33 and for those poles, either having dedicated ducts for each pole or adding one MH or handwell for Pole TS23.	■ Please see wiring diagram for further clarification
■ While the limits of the project do not appear to encroach onto York Region's jurisdiction, if there are any utility relocation works, Link427 will need to work with the respective utility companies as well as York Region-Corridor Control through the Municipal Consent process.	■ Agreed.
■ Please provide additional pavement markings for on street bike lanes crossing the intersection of Hwy 427 off ramp and Langstaff Rd and any other driveway and intersection crossing, including Carpool parking lot, as per York Region Design Guidelines for Pedestrian and Cycling Facilities.	■ LINK will review further with MTO.
■ Existing bike lanes on Langstaff Rd must be incorporated in the staging works as this connection is the only existing east – west dedicated facility through the Hwy 427 corridor in York Region.	■ Bike lanes are maintained during staging (refer to previously submitted Package 4)

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
■ The Region's Major Mackenzie Drive road widening project from Pine Valley to Barons St is proposed to commence in Spring 2019. The sidewalk and active transportation facility should be 2.0m and 3.6m wide consistent with the Region's other proposed structures along Major Mackenzie Drive.	■ Sidewalk dimensions are specified in the Project Agreement and reflected as such in design drawings.
■ Region is currently coordinating with developers to configure North Bound left turn (LT) lane at Barons Street. The current design of LT does not encroach into MTO construction. However, based on the traffic study conducted by the developer if the LT lane encroaches within the MTO construction, Region will contact MTO.	■ Understood.
■ Drainage design within the Region's construction limit has been submitted to MTO and requires more coordination between MTO and the Region.	■ LINK will continue to coordinate with the Region.
Agencies	
Ministry of the Environment, Conservation and Parks (MECP) Reviewed the Drainage and Stormwater Management Report Revision 4A (October 2018)	
■ Ministry of the Environment, Conservation and Parks reviewed the Stormwater Management Report Revision 4A.	■ LINK427 responses in progress.
■ MECP noted that Table 7 (section 2.0) is not satisfactory. MECP adds that the table should provide a comprehensive and accurate discussion for each environmental commitment outlined in the 2010 EA and 2016 TESR. These commitments include: the consistencies in the SWM approach between the EA stage and detailed design stage or the changes that have been made in detailed design (i.e. description of what is staying the same vs what is changing, in relation to the commitment), how the commitment is being met and/or not being met fully due to	

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
the changes required during the detailed design, the rationale to support these changes and explanation on how the change does not result In increased potential effects not previously identified in the EA stages. MECP has requested that Table 7 be revised to provide more detail and clear discussion. ■ Each commitment should reference whether it is from the 2010 EA or the 2016 TESR, or both. The table should include all commitments from the 2010 EA and 2016 TESR. ■ The 2010 EA and 2016 TESR only apply to the extension section of the project so Table 7 should only discuss the extension section. A second table in section 2.0 should discuss commitments related to stormwater management made within the 2013 Highway 427 from Albion Road to Highway 7 Preliminary Design and Class Environmental Assessment Study Transportation Environmental Study Report for the widening section. ■ Referencing an email from LINK427 on September 25, 2018, where 30.9 ha of ROW impervious area being controlled, 26.39 ha are being controlled using dry ponds and 4.57 ha are being controlled using linear ponds. As linear ponds are designed to fit into the road right of ways as a method of providing quantity controls and some level of quality controls, MECP notes that it is not clear whether enhanced level of quality treatment can be met in the areas controlled with linear ponds. This increases the loss amount of ROW impervious area being controlled to the enhanced quality level. Are there any additional measures for these areas, beyond what is already currently being proposed in	

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
the treatment train, which could be or are being incorporated to improve quality control? ■ MECP requests the report more clearly describe where the proposed OGS units will be placed and what area they are treating. ■ MECP notes that paragraph 3 of section 2.2. requires revisions. ■ MECP notes that paragraph 2 and 3 of section 7.2 requires revisions. ■ MECP states that improvements should be made in the next design stage. These improvements include the increase of freeboard of Pond 1W to 0.3m or more. Provide an average side slope of 4:1 or flatter for Pond 3W (currently 2:1). Increase the length-to-width ratio for Dry Pond 9, preferably to 3:1 or more. Complete the detailed design of the linear ponds and maximize their ability for quantity and quality control. Provide quality control to the greatest extent for the uncontrolled catchment areas by utilizing decentralized LIDs and OGSs. ■ MECP notes that not all the Proposed Catchment Area IDs and corresponding areas in Table 32 are consistent with those in Section 7.5. ■ MECP states that the recommended improvements should be taken into account in the next design stage, therefore can be implemented through a detailed design process. All of the recommendations are based on the Ministry's SWM design manual and/or best engineering practices and they should be implemented to the greatest extent possible.	

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
Toronto and Region Conservation Authority Meetings from May – June 2018	
■ Toronto and Region Conservation Authority is one of the review agencies of the SWM and drainage approach.	■ TRCA stated that in general there are no concerns from their part for the approach modifications discussed (treatment train as opposed to wet ponds). It was agreed LINK427 would supply them with a report for review. That was submitted in March. It was agreed that the approach to Stormwater Management by LINK427 is consistent with the Original Environmental Assessment.
■ TRCA requested a comparison table that would highlight the changes proposed from SWM from the EA.	■ LINK427 expanded the comparison table to include a column that explicitly identified how each commitment is being achieved in the proposed SWM approach.
■ TRCA states that the Stormwater Management Criteria of the report should be revised to state that erosion control requirement is 48-hour detention and not the 24 hours as listed.	■ LINK427 has revised the Storm Water Management Criteria of the report to state that erosion control requirement is 48 detention instead of 24 hours.
■ TRCA noted that quantity control requirement should be noted that pre-development flow rates are determined by the Humber unit flow relationships.	■ LINK427 responded that unit flow rates were not considered as part of the EA.
■ TRCA states that consideration should be given to adding a water balance (and erosion control for areas not directed to a pond) section indicating 5 mm on-site retention.	
■ TRCA request clarification on how the target flow rates were determined. They requested that clarification on how the required released rates were derived.	■ Target release rates from the SWM facilities were determined based on the pre-development flow rates. All reference EA documents use the post- to pre-development approach for target release rates.
■ TRCA notes that the project is located within an area of the Humber watershed and requires post-development flows be limited to unit flow rate changes.	■ The 5mm on-site detention was not considered as part of the EA. ■ LINK427 responded that target release rates were determined based on the pre-development flow rates. All reference EA

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
■ TRCA notes that it is not been noted how water quality will be achieved in the proposed dry ponds. TRCA recommends providing further detail for each outlet in order to determine if enhanced controls can be provided.	documents use the post- to pre-development approach for target release rates. ■ LINK427 responded that a combination of grassed highway embankments (vegetated filter strips), flat bottomed grassed swales (enhanced swales), and dry ponds with 48 hour detention time will be utilized in the extension section (where grading permits – from Highway 7 to Major Mackenzie Drive) to achieve a treatment train process. ■ In areas of the extension section where runoff cannot be conveyed to SWM facilities, flat bottomed grassed swales and grassed embankments will be provided as per the EA. In areas where sheet flow on the embankments and grassed swales cannot be sufficiently be provided, such as the widen section (from Finch Avenue to Highway 7), water quality controls will be provided as per the EA with one (1) linear pond and two (2) wet ponds.
■ TRCA requests that LINK427 explores all possible alternatives to reduce the large amount of uncontrolled area in order to reduce impacts of this project on the receiving water courses.	■ LINK427 responds that all possible alternatives to reduce the large amount of uncontrolled area to reduce impacts of this project on the receiving water courses is being explored. ■ In regards to quantity, each outfall location will consist of controlled and uncontrolled catchment areas, target release rates for the controlled catchment areas will ensure the total flow to the outfall location does not exceed existing conditions for the 2 to 100 year storm events. ■ In regards to quality, highway embankments (vegetated filter strips) and flat-bottomed grassed swales (enhanced swales) will provided

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
	a measure of quality control in areas where SWM ponds are not feasible.
■ TRCA notes that LINK427 should consider incorporating runoff reduction LIDs to the SWM plan because typically TRCA would require efforts to be made to retain runoff from the 5 mm storm event (at minimum) to reduce erosion and help mimic pre-development water balance conditions.	■ LINK427 commented that the 5mm on-site detention was not considered as part of the EA. However, LID measures such as vegetated filter strips and enhanced grassed swales are being implemented throughout the project.
■ TRCA states that an IA of 1 mm is typically accepted for impervious areas in hydrologic modelling but LINK427 used an IA of 2mm. TRCA notes that the parameter should be revised so SWM facilities can be sized conservatively.	■ LINK427 will consider changing the IA in the hydrologic model from 2mm to 1mm provided the impact be minimal.
■ TRCA notes that due to the fact some SWM measures are at 50% design, they cannot confirm whether their criteria have been achieved on some linear ponds.	■ LINK427 responded that linear ponds will be proposed for uncontrolled areas discharging directly to Rainbow Creek. Details of all the structures that are at 50% design stage including the mentioned linear ponds, can/will be provided at the next design stage level of 90%.
■ TRCA notes that they typically request detention time calculations to demonstrate the erosion control requirements can be achieved within the proposed SWM pond.	■ LINK427 noted that detention time calculations are included in the report as part of the stage-storage-discharge calculations.
■ TRCA notes that Pond 05 encroaches into a wetland. They would like LINK427 to confirm if the pond can be reoriented so that it, and its associated grading, no longer encroaches into this feature.	■ LINK427 responds that pond-05 cannot be reoriented, and it cannot be reduced in size. The Vegetation Restoration Plan Framework notes that there is impact to this wetland and requires the project team to create areas of meadow marsh to provide additional wildlife habitat to mitigate the impact.
■ TRCA suggests considering relocating the outfall for pond 04 to the south side of the pond, to avoid having the headwall halfway down the slope. This will avoid direct impacts to the wetland.	

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
	■ LINK427 is reviewing redirecting the outlet to the south side of the pond. LINK427 will provide details in the 90% design stage if it is feasible. ■ LINK427 adds that pond 3-w has been designed and is completely located on the south side of Albion Road. LINK427 notes that the functionality has not changed and is located in the same area as it was proposed during the EA stage.
Potentially Interested Stakeholders	
Vaughan Bicycle User Group (BUG)	
The proposed 427 Expansion will be crossing several existing vital links within the industrial and commercial areas of West Vaughan. Several nature trails also exist in the area and will be affected by the proposed path of the 427. These links and trails are well used by cyclists at the present time and measures need to be taken to facilitate the continued safety of the users or to enhance it. The BUG would like to request that space for dedicated bicycle lanes be included for each of the crossings over or under the proposed 427 path. Provisions must be implemented now, even where no cycling facilities currently exist to avoid creating bottlenecks or obstacles for cyclists in the future. We know the Vaughan Active Transportation Plan updated in 2012 includes cycling infrastructure at these crossings. We heard they will be completed before 2031. Cyclists prefer separate cycling facilities such as cycle tracks. We need a minimum of 3.5m boulevard space to accommodate a 1.5m sidewalk and 1.5m cycle track plus buffer on each side of the boulevard.	Thank you for your interest in the Highway 427 Expansion project and for sharing your concerns. Please see the responses below to your questions & comments: 1. *The proposed 427 Expansion will be crossing several existing vital links within the industrial and commercial areas of West Vaughan. Several nature trails also exist in the area and will be affected by the proposed path of the 427. These links and trails are well used by cyclists at the present time and measures need to be taken to facilitate the continued safety of the users or to enhance it.* We can confirm that existing paved trails, such as the Humber River Trail, will remain intact. 2. *The BUG would like to request that space for dedicated bicycle lanes be included for each of the crossings over or under the*

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
Sidewalks should be a minimum 2m on the structure if we have road bike lanes. Again, we need the crossing platform to include these spaces now to prevent future restrictions. The Vaughan Active Transportation Plan shows several trails crossing the proposed path of the Highway 427 Expansion. Therefore, we request the 427 crossing structures are built to include future trail crossings at locations noted below. Typically, these crossings trails are 3m wide plus a minimum of 1.5m side clearance on both sides. Minimum clear height is 3m. Specifically we need the following: • Please allow for an underpass crossing north of Rainbow Creek; • A trail is proposed to connect to the south side of Langstaff Road at approximately Sta. 9+400. Ensure that works at Langstaff include a trail connection. Please allow for a trail connection beneath the proposed Langstaff ramps at Sta. 9+520. • A trail is proposed in the hydro corridor which will require the following modifications: ➢ Sta. 10+400. Please ensure that works at Langstaff include ➢ provisions for a trail connection; ➢ Between Sta.12+600 and 13+300 A trail crossing is desired across highway 427; ➢ West of Sta. 9+760 A crossing will be required at Rutherford Road; • A trail is proposed adjacent to the south side McGillvary Road. Please ensure that the proposed overpass width at Sta. 16+050 allows for a trail crossing underneath.	*proposed 427 path. Provisions must be implemented now, even where no cycling facilities currently exist to avoid creating bottlenecks or obstacles for cyclists in the future. We know the Vaughan Active Transportation Plan updated in 2012 includes cycling infrastructure at these crossings. We heard they will be completed before 2031.* Consideration for cyclist at each of the major crossings are as such: **Langstaff** There are bike lanes on both sides of Langstaff. Bicycle crossing locations are designed at the on and off ramps to the 427. **Major Mackenzie Drive** - There will be a sidewalk on the north side and a multi-use path on the south side. **Rutherford** - The structure allows for future expansion to a 6-lane road with a multi-use path and sidewalk on the boulevard. **Zenway** - The structure will have a sidewalk on both sides but not a dedicated bike lane. **Highway 7 Bridge structure** - There are no dedicated bike lanes, however the structure has incorporated a new parapet wall with bicycle rail on top.

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
Vaughan BUG would appreciate being kept informed of this EA progress directly and would welcome any further correspondence on this project. Since 2014, the Vaughan BUG's main mission is to promote cycling as an effective and a sustainable transportation option, encourage safe cycling, increase driver's awareness and seek improved cycling facilities and infrastructure in Vaughan. Thank you for your time and consideration.	3. *Cyclists prefer separate cycling facilities such as cycle tracks. We need a minimum of 3.5m boulevard space to accommodate a 1.5m sidewalk and 1.5m cycle track plus buffer on each side of the boulevard. Sidewalks should be a minimum 2m on the structure if we have road bike lanes. Again, we need the crossing platform to include these spaces now to prevent future restrictions.* Sidewalk, boulevard and multi-use path dimensions are designed according to municipal codes and/or standards. 4. *Please allow for an underpass crossing north of Rainbow Creek;* An underpass crossing at Rainbow Creek is not part of LINK427's scope of work, however the design does not preclude a crossing in the future. 5. *A trail is proposed to connect to the south side of Langstaff Road at approximately Sta. 9+400. Ensure that works at Langstaff include a trail connection. Please allow for a trail connection beneath the proposed Langstaff ramps at Sta. 9+520.* The LINK427 design does not preclude a future trail on the south side of Langstaff Road. However a trail connection under the Langstaff Ramp at station 9+520 is not a part of LINK427's scope of work.

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
	6. A trail is proposed in the hydro corridor which will require the following modifications • *Sta. 10+400. Please ensure that works at Langstaff include provisions for a trail connection;* o The LINK427 design does not preclude a future trail connection at station 10+400 • Between Sta.12+600 and 13+300 A trail crossing is desired across highway 427; o No allowances have been made for a trail crossing at this location in this phase of the project. However the future Street A may be a suitable location for a crossing o West of Sta. 9+760 A crossing will be required at Rutherford Road; o The LINK427 design does not preclude a future crossing at station 9+760 *7. A trail is proposed adjacent to the south side McGillivray Road. Please ensure that the proposed overpass width at Sta. 16+050 allows for a trail crossing underneath.* • The LINK427 design does not preclude a future crossing at station 16+050 – however this is an active railine.

Highway 427 Expansion Project Agency Comments received as a result of consultation requests and resulting meetings between the Organizations and LINK427 Staff	Highway 427 Expansion Project LINK427 Responses
	8. *Vaughan BUG would appreciate being kept informed of this EA progress directly and would welcome any further correspondence on this project.* Thank you again for sharing your concerns and we look forward to continued correspondence with Vaughan BUG.

Lopez, Juan

From: Lopez, Juan
Sent: June-20-18 9:37 AM
To: Lopez, Juan
Subject: RE: CFN 51838 - Highway 427 Expansion

From: Suzanne Bevan [_____]
Sent: June-19-18 4:30 PM
To: van Kessel, Karl <_____>; Hemmings, Isabelle <_____>
Subject: CFN 51838 - Highway 427 Expansion

Hi Isabelle and Karl,

Thank you so much for the consultation thus far and hope the following is of assistance to the project team.

It is staff's understanding that LINK427 has been retained by the Ministry of Transportation and Infrastructure Ontario to undertake design, construction, finance and maintenance of the Highway 427 Expansion project.

Staff also understands that on behalf of LINK427, WSP has provided TRCA with the Drainage and Stormwater Management Report, original dated July 6, 2017 (Report) for review for the purposes of commenting on proposed changes to the stormwater management scheme presented in the approved Highway 427 Transportation Corridor IEA (approved 2010) to the current scheme presented in the above referenced Report received March 1, 2018.

Based on the TRCA staff (staff) review of the Report, various conversations about the approach LINK427 is taking to meeting the EA requirements and the response to our May 4, 2018 email, staff agrees in principle to the following statements:

The overall stormwater management approach proposed by LINK427 is acceptable because it should achieve level 1 quality treatment control. As such, the revised LINK427 stormwater management approach is expected to achieve the same level of environmental protection as the proposed preliminary design EA approach to stormwater management.

Staff agrees in principle that the changes made by the proposed LINK427 approach to stormwater management should be able to achieve the same EA commitments for stormwater management quality, quantity and thermal controls as the preliminary design EA approach. As such, with the level of details available, the TRCA has no further comments at this time with the stormwater approach proposed by LINK427.

Suzanne Bevan, B.Sc (Hons)
Senior Planner
Environmental Assessment Planning | Planning and Development

E: _____
A: 101 Exchange Avenue, Vaughan ON L4K 5R6

Toronto and Region Conservation Authority (TRCA) | trca.ca

Lopez, Juan

From: Heaton, Mark (MNRF)
Sent: August-13-18 3:36 PM
To: Lopez, Juan
Cc: Hemmings, Isabelle; van Kessel, Karl; Bamforth, Peter; McMillan, Sean; O'Callaghan, Tom; Copeland, Christopher J. (MTO)
Subject: RE: Hwy 427 Dry Pond Configuration with Outlets

Hello Juan

Confirmed. No other SWM related concerns.

Karl – is there a need to meet next week? I would prefer not – defer matters to September meeting. Possibly site progress tour then?

Regards

Mark Heaton
OMNRF Aurora

From: Lopez, Juan
Sent: August 9, 2018 6:25 PM
To: Heaton, Mark (MNRF)
Cc: Hemmings, Isabelle van Kessel, Karl Bamforth, Peter McMillan, Sean O'Callaghan, Tom Copeland, Christopher J. (MTO)
Subject: RE: Hwy 427 Dry Pond Configuration with Outlets

Hello Mark,

This would be the outlet for Pond 3. The invert of the outlet at the discharge location is propose at 185.54 and the 100-year water level at the receiving creek is 179.53. This represents a drop of more than 6m to the creek base flow. The figure below illustrates the proposed outlet.

Our geomorphologist is assessing the existing channel stability for the proposed flows. We should get his recommendation within the next couple of weeks and we will provide you then with a formal response to your question.

In the meantime, could you confirm that this is the only outstanding issue for you to be comfortable with the overall LINK427 stormwater management approach and Detail Design and that once it is addressed no additional comments will be expected?

Lopez, Juan

From: Lopez, Juan
Sent: December-07-18 4:14 PM
To: Lopez, Juan
Subject: FW: Hwy 427 SWM Report Submission to MECP for Review and Discussion

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From: Sanzo, Adam (MECP) [_____]
Sent: October-23-18 2:23 PM
To: Copeland, Christopher J. (MTO) <_____>; Hemmings, Isabelle <_____>
Cc: van Kessel, Karl <_____>; Cembalisty, Jack <_____>; O'Leary, Emilee (MECP) <_____>; Sanzo, Adam (MECP) <_____>; Desautels, Solange (MECP) <_____>
Subject: RE: Hwy 427 SWM Report Submission to MECP for Review and Discussion

Dear Christopher and Company,

As you know, we asked for some assistance from our Approvals staff to determine if the changes to the stormwater management strategy would need to be considered as a formal amendment to the Individual Environmental Assessment or if it can be undertaken through the detailed design phase as proposed by the 427 Project Team.

Upon review, we concur that the proposed drainage and stormwater management strategy updates may continue through the appropriate detailed design stage processes. Any further changes to the project will need to be considered once again and would not be exempt from a possible amendment in the future.

Further, staff have reviewed the updated Drainage and Stormwater Management Report (September 2018) and provide the following comments:

· I do not have concerns with the principle of using the treatment train approach to achieve Enhanced level of treatment for this site.
· Improvements should be made in the next design stage to:
    - increase the freeboard of Pond 1W, preferably to 0.3 m or more (currently 0.16 m);
    - provide an average side slope of 4:1 or flatter for Pond 3W (currently 2:1);
    - increase the length-to-width ratio for Dry Pond 9, preferably to 3:1 or more (may be accomplished by berms, currently 1.73:1);
    - complete the detailed design of the linear ponds and maximize their ability for quantity and quality control; and
    - provide quality control to the greatest extent for the uncontrolled catchment areas by utilizing decentralized LIDs and OGSs.
· Please ensure the Proposed Catchment Area IDs and corresponding areas in Table 32 are consistent with those in Section 7.5. For example, the 5 catchment areas (3002, 3003, 3004, 3005 and 2020) for Rainbow Creek outlet location described in Section 7.5.4 are not accurately reflected in the corresponding section in Table 32.

The recommended improvements should be taken into account in the next design stage, therefore they can be implemented through a detailed design process. Please also note all of the recommendations are based on the ministry's SWM design manual and/or best engineering practices and they should be implemented to the greatest extent possible.

Additionally please note that the ministry's Central Region Technical Support Section (TSS) has also conducted a review of the Updated Drainage and Stormwater Management Report. Comments from TSS on the report are forthcoming from the Regional EA Coordinator, Emilee O'Leary.

Regards,

Adam Sanzo | Project Officer
Environmental Assessment and Permissions Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West | Toronto, Ontario M4V 1P5
Tel: | Fax:

Email: _____ | Website: http://www.ene.gov.on.ca/

If you have any accommodation needs or require communication supports or alternate formats, please let me know.

Si vous avez des besoins en matière d'adaptation, ou si vous nécessitez des aides à la communication ou des médias substituts, veuillez me le faire savoir.

Appendix C: Public Information Centre Display Materials

WELCOME TO PUBLIC INFORMATION CENTRE #3

Detail Design and Class Environmental Assessment Study for the Highway 427 Expansion Project

At this PIC, you will have a chance to review:

- An overview of the Project
- The steps in the Environmental Assessment (EA) process
- The Detail Design and Construction Activities
- The Existing Conditions in the Project Lands
- Potential Environmental Impacts and Proposed Mitigation

This information will be documented in a Design and Construction Report (DCR), which will be made available for public review as part of the Environmental Assessment process.

HIGHWAY 427 EXPANSION

Project Description

The overall detail design scope of the Highway 427 Expansion Project includes the following:

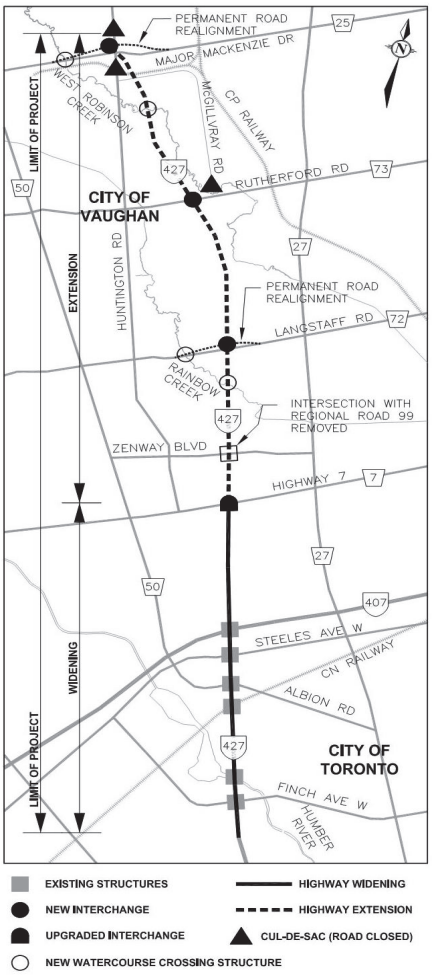
4.0 km Highway Widening from Finch Avenue to Highway 7:

- from six to eight lanes between Finch Avenue to south of Steeles Avenue;
- from four to eight lanes, from south of Steeles Avenue to Highway 7; and
- new median managed lanes.

New 6.6 km Highway Extension from Highway 7 to Major Mackenzie Drive with:

- eight lanes from Highway 7 to Rutherford Road;
- six lanes from Rutherford Road to Major Mackenzie Drive;
- three new interchanges (Langstaff Road, Rutherford Road and Major Mackenzie Drive); and
- new median managed lanes.

Project Limits



HIGHWAY 427 EXPANSION

Environmental Assessment Process – Preliminary Design

This project is based on the following previous Preliminary Design and Environmental Assessment (EA) studies that together document the key elements of the Project:

- **427 Transportation Corridor Environmental Assessment Report (January 2010)**, for the extension of Highway 427 from its existing terminus at Highway 7 to Major Mackenzie Drive.
- **Highway 427 from Albion Road to Highway 7 Preliminary Design and Class EA Study Transportation Environmental Study Report (November 2013)**, Group 'B' Class EA for the widening of the existing Highway 427 from 1.5 km south of Albion Road to Highway 7.
- **Transportation Environmental Assessment Report, Highway 427 Extension Widening From Highway 7 to Major Mackenzie Drive (January 2016)**, Group 'B' Class EA to widen the planned extension of Highway 427 from Highway 7 to Major Mackenzie Drive.

Individual EA Highway 427 Extension (Highway 7 to Major Mackenzie Drive) January 2010

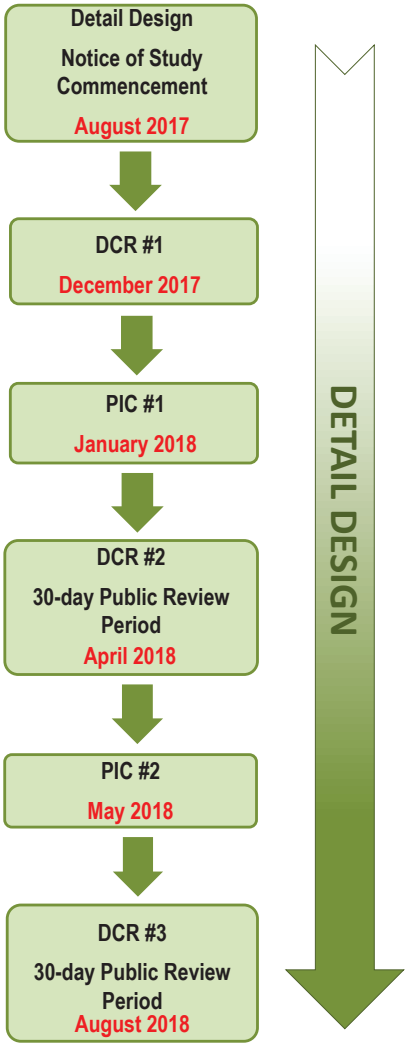
TESR Widening of Existing Highway 427 (Albion Road to Highway 7) November 2013

TESR (Update to 2010 EA) Widening of Highway 427 Extension (Hwy 7 to Major Mackenzie Drive) January 2016

PRELIMINARY DESIGN

Environmental Assessment Process – Detail Design

- This project is being carried out in accordance with the approved environmental planning process for Group 'A' projects under the *MTO Class Environmental Assessment for Provincial Transportation Facilities* (Class EA).
- Based on the Design-Build / AFP Approach to this project, Detail Design will progress in a staged manner making it necessary to document the process in more than one Design and Construction Report (DCR).
- A series of DCRs are being prepared to document the Detail Design process for the various project components:
  - DCR #1 was prepared for advanced clearing and filed for public review in December, 2017.
  - PIC #1 was held in January, 2018 and documented the works in DCR #2.
  - DCR #2 was filed for public review from April 10, 2018 to May 11, 2018.
  - PIC #2 was held in May, 2018 and documented the works included in DCR #3.
  - DCR #3 was filed for public review from August 2, 2018 to August 31, 2018.
  - The works associated with DCR #4 are being presented at this PIC.

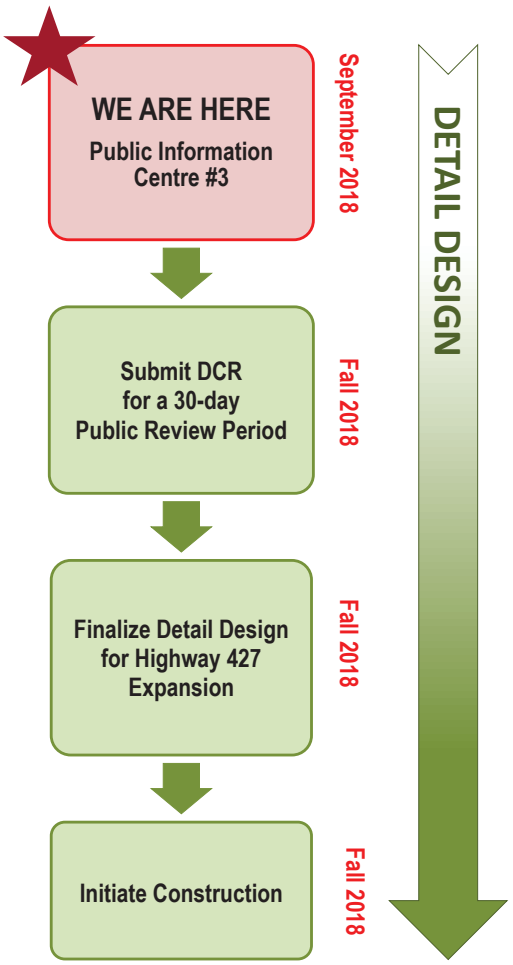


Environmental Assessment Process – Detail Design

This PIC presents the Detail Design process that will be documented in the upcoming Design and Construction Report (DCR) which will include the following:

- An overview of the project and the EA process;
- A summary of consultation activities undertaken;
- A detailed description of the undertakings;
- A description of potential effects on the environment, as well as proposed mitigation measures; and
- Commitments to future work and monitoring.

- In accordance with the MTO Class EA, the next DCR will be submitted for a 30-day public review period in Fall 2018.
- The detail designs for the construction works addressed by the next DCR will be finalized taking into consideration comments received.
- Construction will commence on the works contained in the next DCR in 2019.

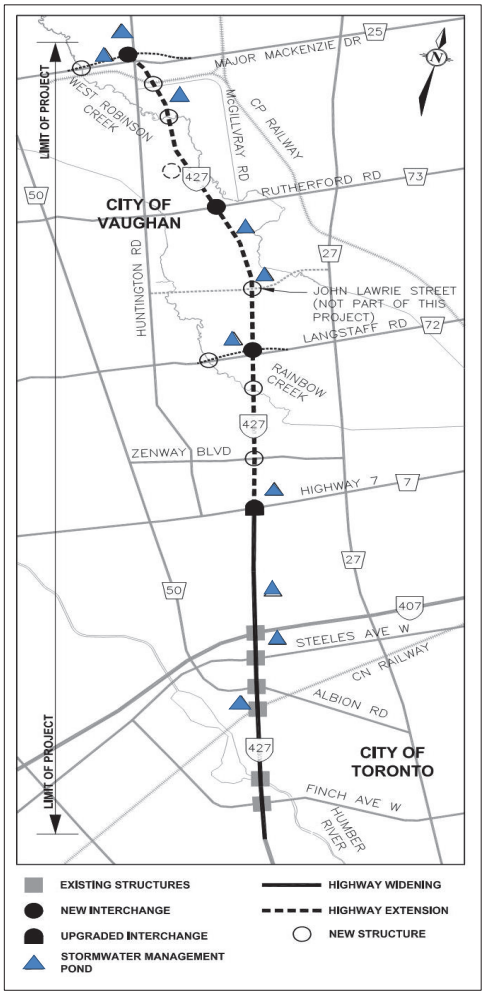


HIGHWAY 427 EXPANSION

Overview of the Proposed Construction Works

The following is an overview of the proposed construction works presented as part of this PIC and DCR #4:

- The construction of new Overpasses at the future extension of John Lawrie Street and Rutherford Road.
- Electrical (street lighting, traffic lights etc.) for the Widening and Extension of Highway 427
- Intelligent Transport Systems (ITS) for the Widening and Extension of Highway 427
- Guiderail and barriers for the Extension of Highway 427
- Pavement Markings & Traffic Signage for the Extension of Highway 427
- Water Resources / Stormwater Ponds for the Extension of Highway 427



HIGHWAY 427 EXPANSION

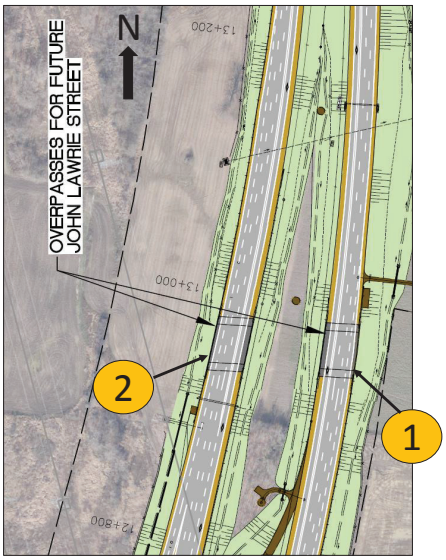
Highway 427 Overpass at Future John Lawrie Street

1 New Structure (Northbound Lanes)

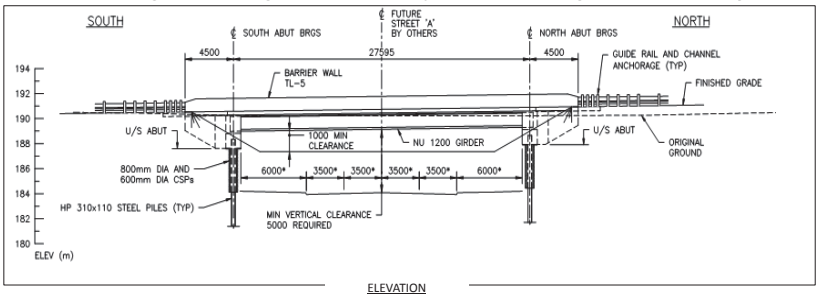
- Single-span bridge with a total length of 27.6 m.
- 1 Ramp Lane, 3 General Purpose Lanes, and 1 Managed Lane in the northbound direction towards Rutherford Road.
- 1.0 m minimum height will be provided to ground level, designed to provide a 5.0 m minimum height to John Lawrie St. (access to future development).
- The detail design process has resulted in a reduction of the bridge span from 42 m to 27.6 m. This does not result in any change to the future John Lawrie Street road surface dimensions.

2 New Structure (Southbound Lanes)

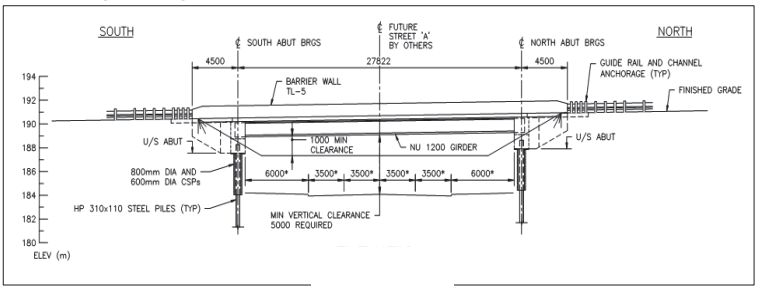
- Single-span bridge with a total length of 27.8 m.
- 1 Ramp Lane, 3 General Purpose Lanes, and 1 Managed Lane in the southbound direction towards Langstaff Road.
- 1.0 m minimum height will be provided to ground level, designed to provide a 5.0 m minimum height to John Lawrie St. (access to future development).
- The detail design process has resulted in a reduction of the bridge span from 42 m to 27.8 m. This does not result in any change to the future John Lawrie Street road surface dimensions.



These 50% designs are being reviewed in conjunction with Regional Municipality of York and the City of Vaughan



ELEVATION
NTS



HIGHWAY 427 EXPANSION

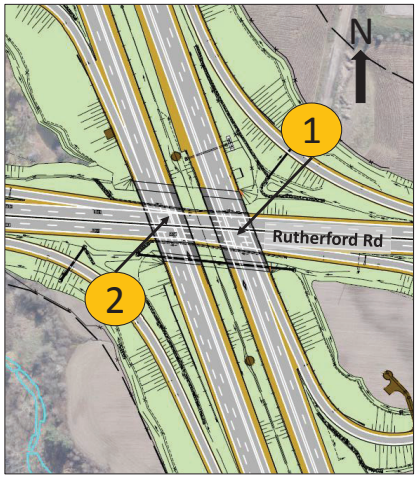
Highway 427 Overpass at Rutherford Road

1 New Structure (Northbound Lanes)

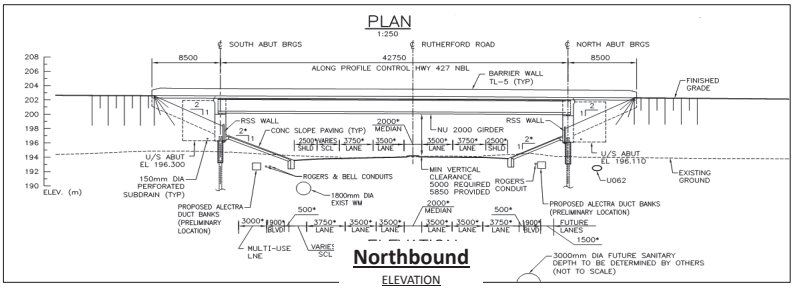
- The detail design process has resulted in a reduction from a 68 m two span bridge to a single-span bridge with a total length of 42.8 m and a minimum height of 5.85 m.
- Structure carries 1 Ramp Lane, 2 General Purpose Lanes, and 1 Managed Lane in the northbound direction towards Major Mackenzie Drive.
- No short-term traffic impacts to the travelling public as there will be no lane reductions at Rutherford Road. However, some nightwork for construction staging will occur.
- No long-term traffic impacts to the travelling public are expected as a part of these works.
- The Design accounts for future expansion of Rutherford road, which accommodates 6 lanes of traffic and future 1.9 m boulevards on both sides of the road, a sidewalk on the north side and a multi-use path on the south.

2 New Structure (Southbound Lanes)

- The detail design process has resulted in a reduction from a 68 m two span bridge to a single-span bridge with a total length of 42.8 m and a minimum height of 5.49 m
- Structure carries 1 Ramp Lane, 2 General Purpose Lanes, and 1 Managed Lane in the northbound direction towards Langstaff Road.
- No short-term traffic impacts to the travelling public as there will be no lane reductions at Rutherford Road. However, some nightwork for construction staging will occur.
- No long-term traffic impacts to the travelling public are expected as a part of these works.
- The Design accounts for future expansion of Rutherford road, which accommodates 6 lanes of traffic and future 1.9 m boulevards on both sides of the road, a sidewalk on the north side and a multi-use path on the south.



These 50% designs are being reviewed in conjunction with Regional Municipality of York and the City of Vaughan



Northbound

ELEVATION

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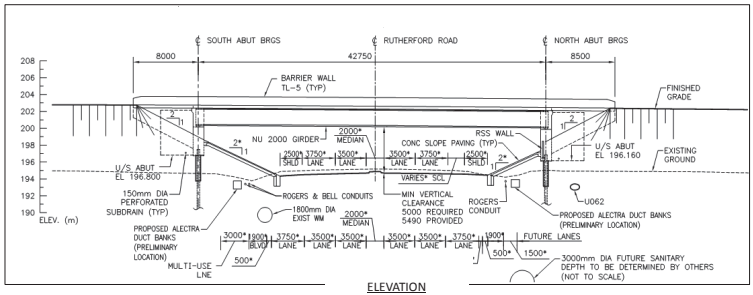


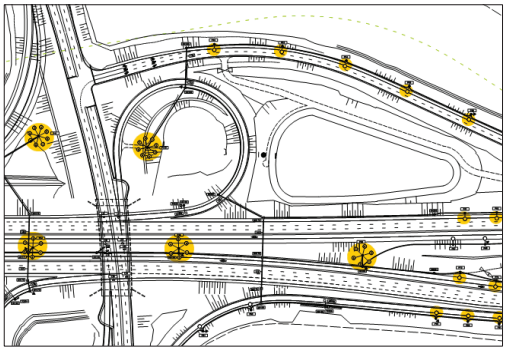
ELEVATION

NTS

HIGHWAY 427 EXPANSION

Electrical (street lighting, traffic lights etc.)

- The Highway 427 Expansion project will be fully illuminated with a combination of High Mast Lighting poles as well as typical street light poles and luminaires.
- Lighting throughout will be Light Emitting Diode (LED) with the exception of Zenway Boulevard where municipal standards will be used.
- As part of the new interchanges at Langstaff Road, Rutherford Road, and Major Mackenzie Drive, upgrades will also include new signalized intersections at highway ramps to manage movements of traffic exiting the highway.



Intelligent Transport Systems (ITS)

- LINK427 will provide ITS for the entire project limits of the Highway 427 Expansion.
- ITS elements will include the following Subsystems: electrical power supply, variable message signs, vehicle detection, queue warning, closed circuit television and video/data communication.
- Elements of the ITS will provide rapid detection, response and dissemination of incidents, roadway condition and travel time information to all users including local communities, emergency service providers, commercial fleets, and broadcast media.
- LINK will also provide civil provisions for a future Managed Lane system.

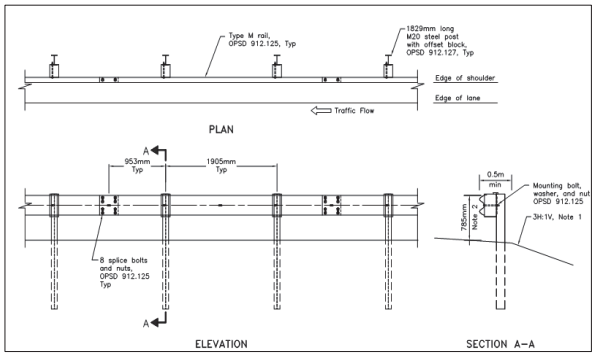
MTO Traffic Operations Centre (CRCTMC)

http://futurebnd.com/project/ministry-of-transportation-ontario-its/

HIGHWAY 427 EXPANSION

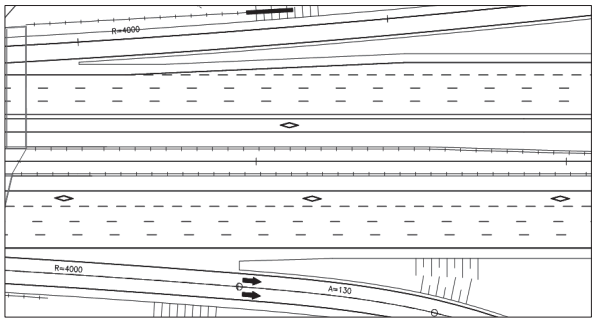
Guiderail and Barriers

- The design of the new extension of Highway 427 includes guiderails and barriers where necessary.
- North of Highway 7, Steel Beam Guiderail is primarily utilized to ensure user safety.
- All barriers, guiderails and crash systems/attenuators will comply with MTO guidelines.



Pavement Markings & Signage

- Pavement markings combined with road signs provide important information about the direction of traffic, regulations, and driving conditions. This work will be taking place during the night to minimize traffic impacts with existing traffic and during the day for the segments of the highway expansion that currently have no existing traffic.
- LINK427 will provide signage (overhead, ground mounted) at all approaches to and from the highway at each interchange.
- LINK427 will provide signage and line markings to delineate and identify Managed Lanes along the entire project limits of the Highway 427 Expansion.
- Line markings will assist in vehicle guidance, and will comply with MTO and CSA standards.



PRELIMINARY DESIGN STORMWATER MANAGEMENT (SWM)

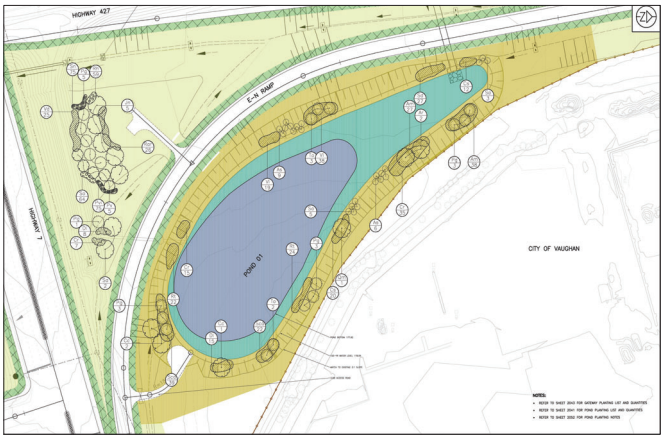
- The Preliminary Design Stormwater Management (SWM) strategy consists of utilizing flat-bottomed grassed swales and stormwater management ponds to provide quality and quantity control to runoff.
- The SWM ponds were sized to meet the pre-development peak stormwater release rates.
- The SWM strategy provides enhanced level quality control.
- The following ponds were proposed (2016 TESR):
    - North of Highway 7: 7 wet ponds and 2 enhanced grassed swales

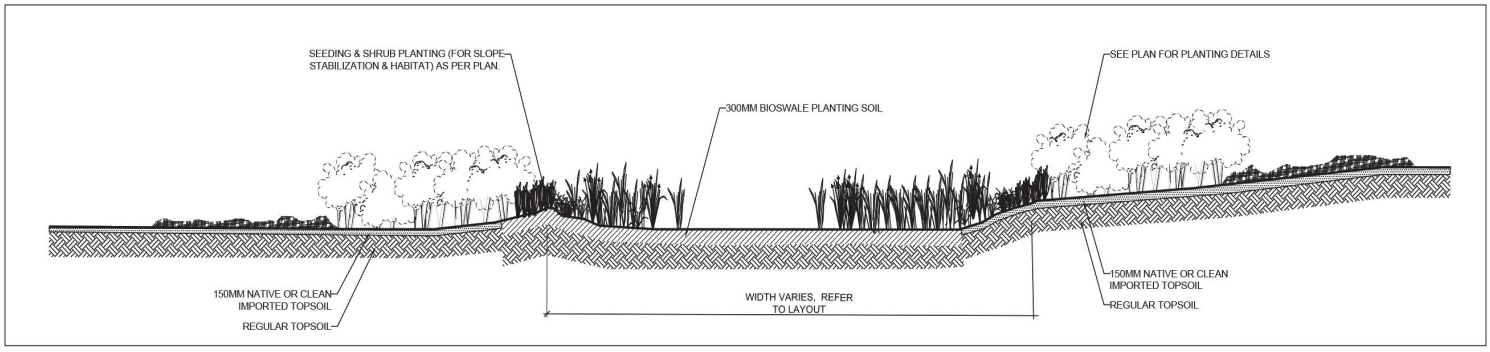
DETAIL DESIGN STORMWATER MANAGEMENT

- The Detail Design stormwater management strategy consists of utilizing a multiple step approach by means of flat-bottomed grassed swales, grassed embankments, oil grit separators (OGSs), enhanced grassed swales and stormwater management ponds to provide quality and quantity control to runoff.
- The SWM ponds were sized to meet pre-development peak stormwater release rates.
- The SWM strategy provides enhanced level quality control consistent with the preliminary design.
- The following ponds are now proposed:
    - North of Highway 7: 8 dry ponds and 6 enhanced grassed swales
    - The additional dry pond is located at the north east quadrant of Highway 7 and Highway 427.
    - The 2 preliminary enhanced swales have been reconfigured into 5 swales and there is 1 additional swale located at the south east quadrant of West Robinson Creek and Highway 427.
    - Meadow marsh planting has been incorporated into the dry pond design.

Water Resources / Stormwater Ponds

- Similar to the existing Highway 427 corridor, the proposed stormwater management strategy for the new extension consists of using flat-bottomed grassed swales in all locations and implementation of stormwater management ponds to provide quality and quantity control to runoff.
- Quality controls will provide enhanced level quality protection.
- The dry ponds being proposed control peak flows of runoff and are lined with vegetation on the bottom as they only hold water temporarily after rain events to allow settlement of pollutants.



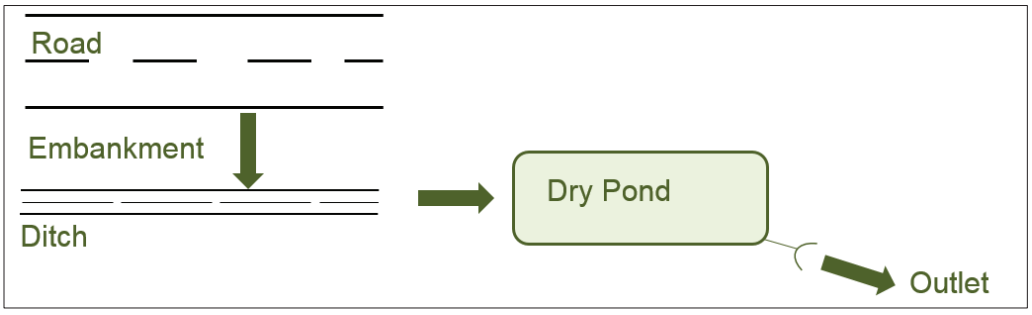


5 MEADOW MARSH/SHALLOW MARSH CROSS SECTION, TYP.
2047

NTS

REASON FOR CHANGES FROM PRELIMINARY DESIGN TO DETAIL DESIGN

- In every project there is an advancement in the design as the undertaking transitions from Preliminary Design to Detail Design. This is based on the greater level of detail and additional information available in Detail Design.
- According to the greater level of information available in Detail Design, such as updated geotechnical considerations; a more refined grading plan; an updated understanding of the spatial limitations and interactions with the groundwater table; a better understanding of utility conflicts; etc.
- As part of the Detail Design analysis, it was decided that the use of dry ponds was more desirable.
- Dry ponds mitigate thermal effects of stormwater runoff. Wet ponds introduce inherent thermal impacts to receiving waterbodies due to warming of the permanent pool between rainfall events, whereas a dry pond has no permanent pool.
- The same level of quality treatment and quantity control provided by wet ponds will be afforded by the proposed stormwater management strategy, which takes a multiple-step approach to address water quality treatment involving: vegetated embankments, grassed swales, enhanced grassed swales and dry ponds. According to the MECP guidelines, the multiple step approach meets the criteria for water balance, water quantity, erosion control and water quality. Quality control measures of the proposed multiple step approach meet the MECP Enhanced Level Treatment for 80% total suspended solids (TSS) removal.



REASON FOR CHANGES FROM PRELIMINARY DESIGN TO DETAIL DESIGN

- The dry ponds will discharge into existing watercourses and the appropriate erosion control measures/protection will be applied to mitigate potential erosion impacts, as per the Toronto and Region Conservation Authority (TRCA) stormwater management criteria.
- There will be no change in impact to the environment with the proposed changes.

Consultation with MNRF, TRCA and MECP

- As a result of consultation with MNRF and TRCA, the following modifications in the detail design stormwater management strategy have occurred:
  - Meadow marsh areas at the bottom of the dry ponds have been included to enhanced quality control of stormwater runoff.
  - The outlet of Pond-4 has been relocated from discharging directly into Robinson Creek to discharging into a tributary of Robinson Creek, which addressed potential erosion concerns related to the steep embankment.
  - Pond-5 has been moved southwards to avoid encroachment with an existing wetland.
  - Pond-3 outlet channel has been designed with stabilization measures to avoid potential erosion concerns due to increase in discharge rates from the pond.
  - Consultation with MECP is ongoing.

Existing Environmental Conditions

VEGETATION

- Within the Extension section of the project, vegetation is concentrated within the main valley crossings, as well as three small, isolated farm woodlots. There is a high proportion of non-native plant species, which is likely due to the high level of disturbance in the surrounding area.
- Vegetation that will be affected between Highway 7 and Major Mackenzie Drive is dominated by cultural meadow, hedgerows and agricultural fields, with more natural vegetation limited to the main valley crossings and three isolated farm woodlots.

WILDLIFE AND SPECIES AT RISK (SAR)

- Wildlife recorded are generally common, generalist species tolerant of urban or semi-urban conditions.
- No significant wildlife habitat has been identified.
- No SAR amphibians (i.e., Western Chorus Frog) have been confirmed.
- Barn Swallow SAR have been found to be nesting in two barns.
- Four SAR bat species (i.e., Little Brown Myotis, Northern Myotis, Eastern Small-footed Myotis and Tricoloured Bat) have been found in two barns and woodland habitat.

FISH AND FISH HABITAT

- The two main watercourses are Rainbow Creek and West Robinson Creek which are tributaries of the Humber River. There is also the East Robinson Creek and several smaller tributaries of Rainbow and West Robinson Creek.
- No aquatic SAR have been observed within the watercourses or identified by the MNRF or DFO.

Existing Environmental Conditions

GROUNDWATER AND HYDROGEOLOGY

- The project is within the Humber River Watershed
- The regional groundwater flow direction is to the southwest, south and southeast.
- Potable water supply in the area is comprised of municipal water supply and private well water supplies. A municipal water supply well (the Kleinberg Well) is located to the north. The limits of the Wellhead Protection Zone for this well are located approximately 800 m north of the intersection of Major Mackenzie Drive and Huntington Road to the north.

LAND USE

- Existing land uses are a mix of agriculture, residential, industrial/commercial and recreational. Commercial/light industrial land uses are on the south side of Rutherford Road and east side of the CP Rail track.

ARCHAEOLOGICAL RESOURCES

- A Stage 1 Archaeological Assessment of the entire Highway 427 Transportation Corridor was completed as part of the Individual EA (2010).
- Stage 2 Archaeological Assessments were completed in 2015 in areas determined to have archaeological potential. The results of the Stage 2 indicated that the project is clear of archaeological potential and no further archaeological assessments are required.
- A Stage 3 Mechanical Top Soil Removal was completed at the Coleraine Cemetery in July 2016. No further assessment is recommended for the site.

CULTURAL LANDSCAPES

- Cultural Heritage Evaluation and Documentation Reports were completed for the Highway 427 Expansion project during the Individual EA (2010) and subsequent TESRs (2013 and 2016). The construction activities to be covered in this DCR do not impact any built or cultural heritage landscapes.

Proposed Environmental Mitigation Measures

VEGETATION

- The limits of the construction zone have been delineated and fenced to protect the vegetation that is not identified for removal.
- Tree/shrub debris will be stored outside identified protected vegetation.
- In the event that adjacent vegetation communities or planted trees are accidently damaged during construction activities, LINK427 will implement appropriate contingency measures such as pruning tree limbs or roots that are accidently damaged using proper arboricultural techniques.
- A Vegetation Restoration and Landscape Plan (VRP) is being prepared to revegetate disturbed areas following construction and to provide compensation for loss of vegetation within the new alignment.
- A Landscape Plan is also being prepared and will include the planting at stormwater ponds which are designed to stabilize inlet and outflow areas and provide shading and bank stabilization.

WILDLIFE AND SAR

- Construction works will be conducted outside of the migratory bird nesting window (April 15 to August 15). If work is scheduled during this window, it will be preceded by a survey by a qualified avian biologist to identify active nests. Active nests will not be disturbed.
- All construction workers are required to be trained in advance of starting work regarding potential to encounter wildlife and SAR while undertaking their activities, and the appropriate response if an encounter occurs.
- Any wildlife encountered will not be knowingly harmed.
- Vegetation debris will be removed or mulched as soon as possible, especially prior to the breeding bird season (April 15 to August 15) in order to prevent birds from nesting in debris piles.
- An Overall Benefit Permit has been obtained under the Endangered Species Act (2007) for SAR bat habitat removal.
- Registration under the Endangered Species Act (2007) was completed for the removal of breeding habitat for Barn Swallow

Proposed Environmental Mitigation Measures

FISH AND FISH HABITAT

- The warmwater permissible in-water timing window of July 1st to March 31st will be implemented. All in-water works will be done in isolation of flowing water with a fish rescue undertaken from within the isolated area in all fish baring watercourses.
- Any temporarily stockpiled soil, debris or other excess materials, and any construction-related materials, will be properly contained in areas separated at least 30 m from all watercourses.
- All construction-related activities will be controlled to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances.
- The construction access, work areas and associated requirements for removal of riparian vegetation will be minimized to the extent required for the construction activities, and these areas will be delineated in the field using properly installed protective silt fencing. All temporarily disturbed areas will be re-stabilized following construction using appropriate means.

GROUNDWATER AND HYDROGEOLOGY

- A Groundwater Monitoring Program is being implemented, in accordance with the EA commitments.
- The selection of construction machinery, choice of construction methods and phasing of construction will be used in order to reduce water taking requirements.
- An Environmental Activity and Sector Registry (EASR) for the entire project will be required.
- Potential to impact nearby environmental features is very low due to anticipated low volume pumping.

EROSION AND SEDIMENT CONTROL

- The construction period Drainage and Sediment Management Plan(s) (DSMP) incorporate each watercourse crossing. The purpose of the DSMPs is to provide water quality treatment of the runoff generated within all drainage catchment areas before water is discharged to any watercourse.
- The Erosion and Sediment Control Plan (ESCP) for the project documents the environmental protection measures for preventing and controlling erosion and sedimentation during construction works. The Erosion and Sediment Control (ESC) measures required for the works are industry standard proven techniques.
- A Surface Water Monitoring Program will verify that ESC measures are functioning as intended.
- Disturbed floodplain areas to be covered with topsoil, seeded with a native mix, and stabilized with a biodegradable erosion control blanket.

Proposed Environmental Mitigation Measures

NOISE

- LINK427 will keep idling of construction equipment to a minimum and will maintain equipment in good working order to reduce the noise emitted from construction activities.
- As some construction activities are expected to be undertaken during nighttime and/or weekends, exemptions from local Noise Bylaws have been obtained from the City of Toronto and City of Vaughan.
- While no significant adverse noise and vibration effects are anticipated, the Construction Noise and Vibration Plan will be implemented as per the EA Conditions of Approval throughout the construction period.

ARCHAEOLOGY & CULTURAL HERITAGE

- Archaeological Assessments have been completed and it is unlikely that archaeological resources are present.
- In the event that deeply buried archaeological deposits are discovered, the Ministry of Tourism, Culture and Sport will be notified immediately. In the event that human remains are encountered, LINK427 will immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Government Services.
- The Coleraine Burying Grounds (Coleraine Cemetery) and the Coleraine Schoolhouse Site located on the south side of Major Mackenzie Drive will be protected during construction activities.

Proposed Environmental Mitigation Measures

WASTE MANAGEMENT AND CONTAMINATION

- Based on the findings of the Contamination Overview Study (COS), Phase I and II Environmental Site Assessments (ESAs) and subsequent environmental investigations and delineation programs it was confirmed that ground water quality meets the applicable Ministry of the Environment, Conservation and Parks (MECP) Site Condition Standards (SCS).
- In the event that unknown contamination is discovered during the course of construction activities, procedures and steps outlined in the Waste and Contamination Management Plan (WCMP) will be implemented and procedures for working in contaminated areas will apply.
- While the construction works are not anticipated to result in the production of any excess soils that require offsite management, should there be excess materials generated during construction, they will be managed in accordance with the project's Earth Management Plan, the WCMP and OPSS 180 (Management of Excess Materials).
- Identified designated substances within the building structures will be removed and disposed of in accordance with the WCMP, MECP regulations and OSHA requirements. Additional Designated Substance Surveys (DSS) and/or sampling programs will be completed (as required) if suspected designated substances or hazardous materials are suspected to be present.
- Excess materials generated during construction activities will be managed in an environmentally acceptable manner, recycled and/or processed and disposed according to current legislation and practices in accordance with Ontario Provincial Standard Specification (OPSS) 180 and the project's Earth Management Plan.

Communication Opportunities

Highway 427 Expansion Project Website

- The Highway 427 Expansion project website (www.427expansion.ca) will be the central portal for communication providing updates and information on traffic disruptions, construction activities and progress.

One-Window Communication

- LINK427 has established a one-window communication system for public enquiries, complaints and comments. Members of the public may contact LINK by telephone: 1-888-352-8085 (French Language line: 1-888-595-3152) or by email at ask@427expansion.ca.

- Ce document hautement spécialisé n'est disponible qu'en anglais en vertu du règlement 411/97, qui en exempte l'application de la Loi sur les services en français. Pour de l'aide en français, Appelez le Bureau des services en français au: 1-888-595-3152.

Variable Message Panels

- Portable variable messaging signs (PVMS) will be used at key locations and updated as needed to communicate, in real time, key information related to traffic management.

Notices & Bulletins

- Notices of upcoming consultations or other project activities will be delivered via the Project Mailing List, E-mail List, Project website, and local newspapers. Notices will also be mailed to residents and businesses that reside in a 2km radius of the project boundary.

- Project Bulletins will be prepared monthly, or more frequently if required and may include information on PICs, construction activities, traffic detours and other relevant information. These bulletins will be sent via email and available on the Project website.

Next Steps

Following this Public Information Centre (PIC), we will:

- Review and respond to comments received.
- Refine the Detail Design and mitigation measures based on comments received.
- Prepare the Design and Construction Report for public review.

Thank you for attending this Public information Centre. We welcome your comments. Please fill out the Comment Sheet you were provided when you entered and submit it before you leave, or e-mail / mail it to the address below by **October 25, 2018**. If you have questions about the Project or wish to be added to the mailing list, please contact:

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Comments and information regarding the project are being collected to assist LINK427 in meeting the requirements of the Environmental Assessment Act. *This material will be maintained on file for use during the study and may be included in study documentation. LINK427 will adhere to the privacy protection rules established in the* Freedom of Information and Protection of Privacy Act (FIPPA). *With the exception of personal information, all comments will become part of the public record.*

www.427expansion.ca

Appendix D: Geometric Constraints (SWM)

Table 4.6: Wet Ponds – Summary of Design Guidance (cont'd)

Length-to-Width Ratio	Maximize flow path and minimize short-circuiting potential	Overall: minimum 3:1 (may be accomplished by berms, etc.) Forebay: minimum 2:1	From 4:1 to 5:1

$$\frac{188.37}{(\ 77.11 + \ 17.47\ )\ /\ 2} = 3.98$$

CURRENT LENGTH TO WIDTH RATIO 3.98 : 1

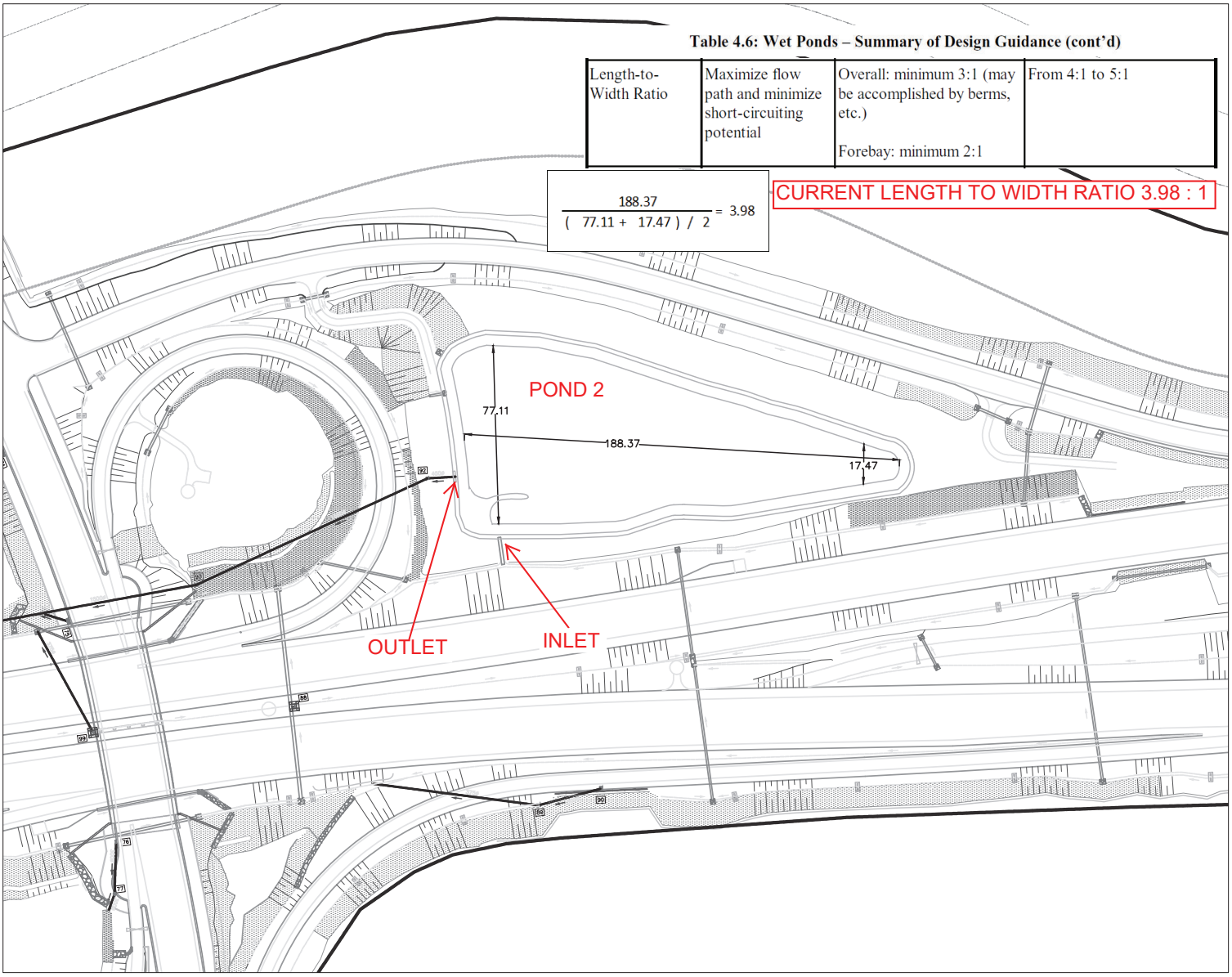
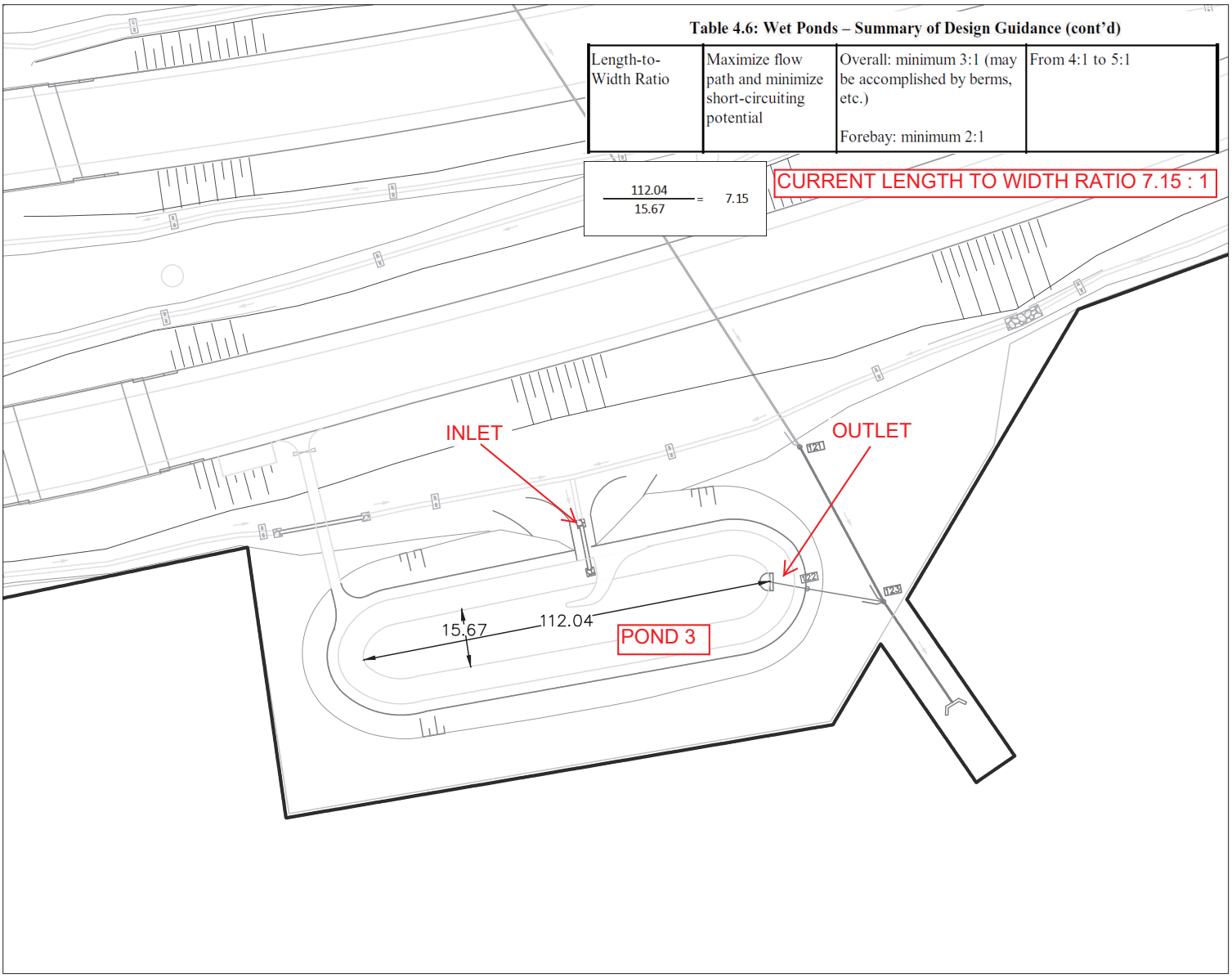


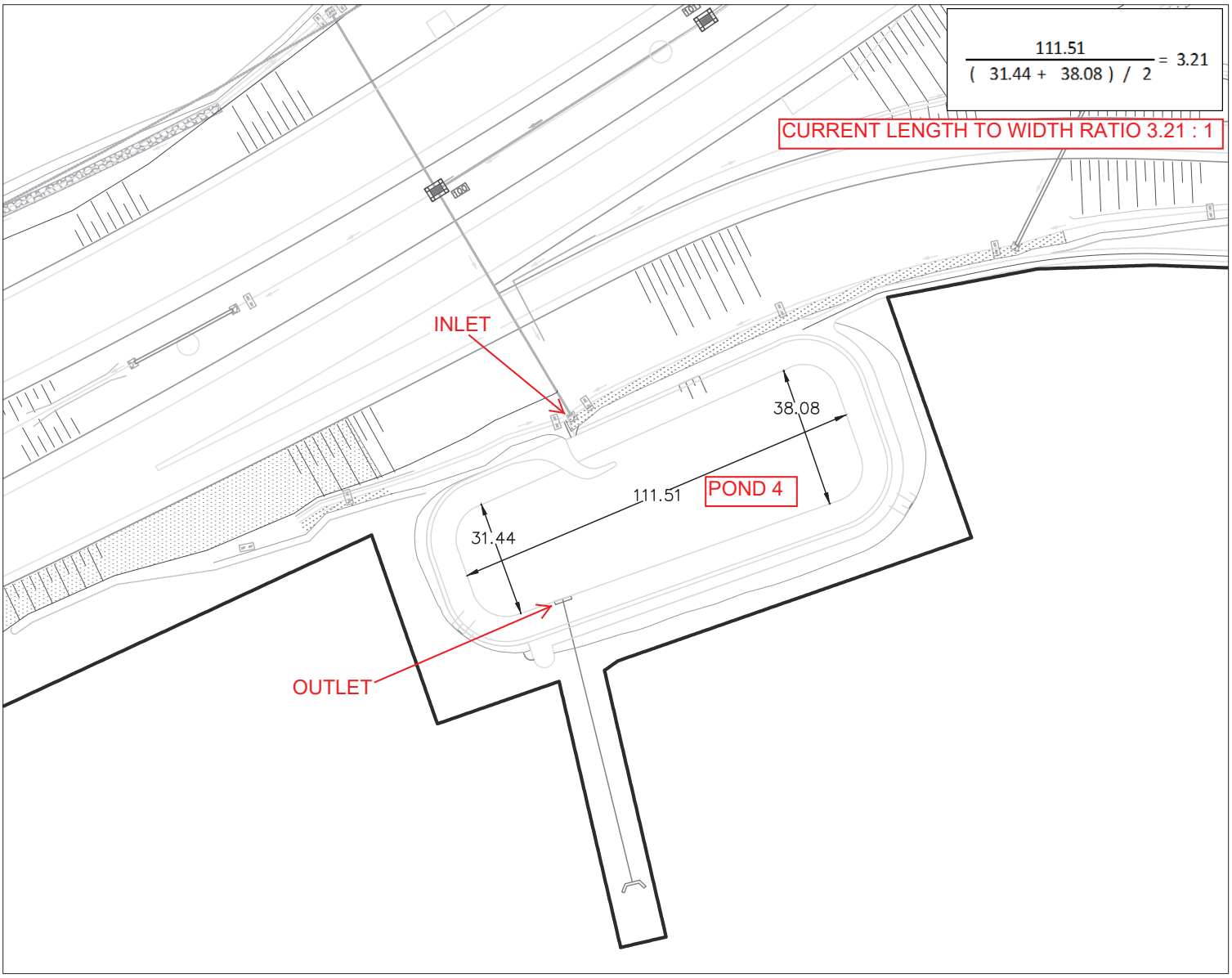
Table 4.6: Wet Ponds – Summary of Design Guidance (cont'd)

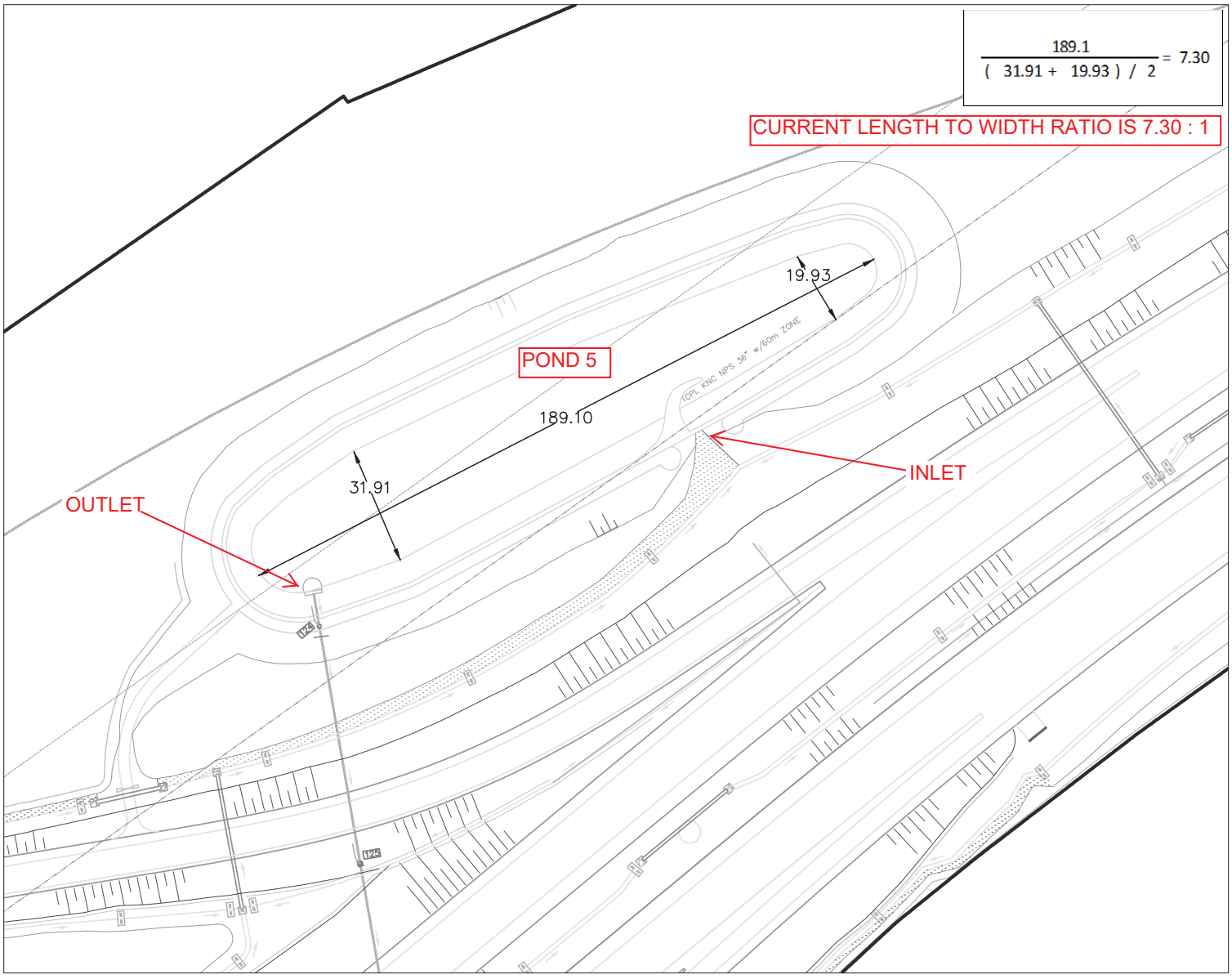
Length-to-Width Ratio	Maximize flow path and minimize short-circuiting potential	Overall: minimum 3:1 (may be accomplished by berms, etc.) Forebay: minimum 2:1	From 4:1 to 5:1

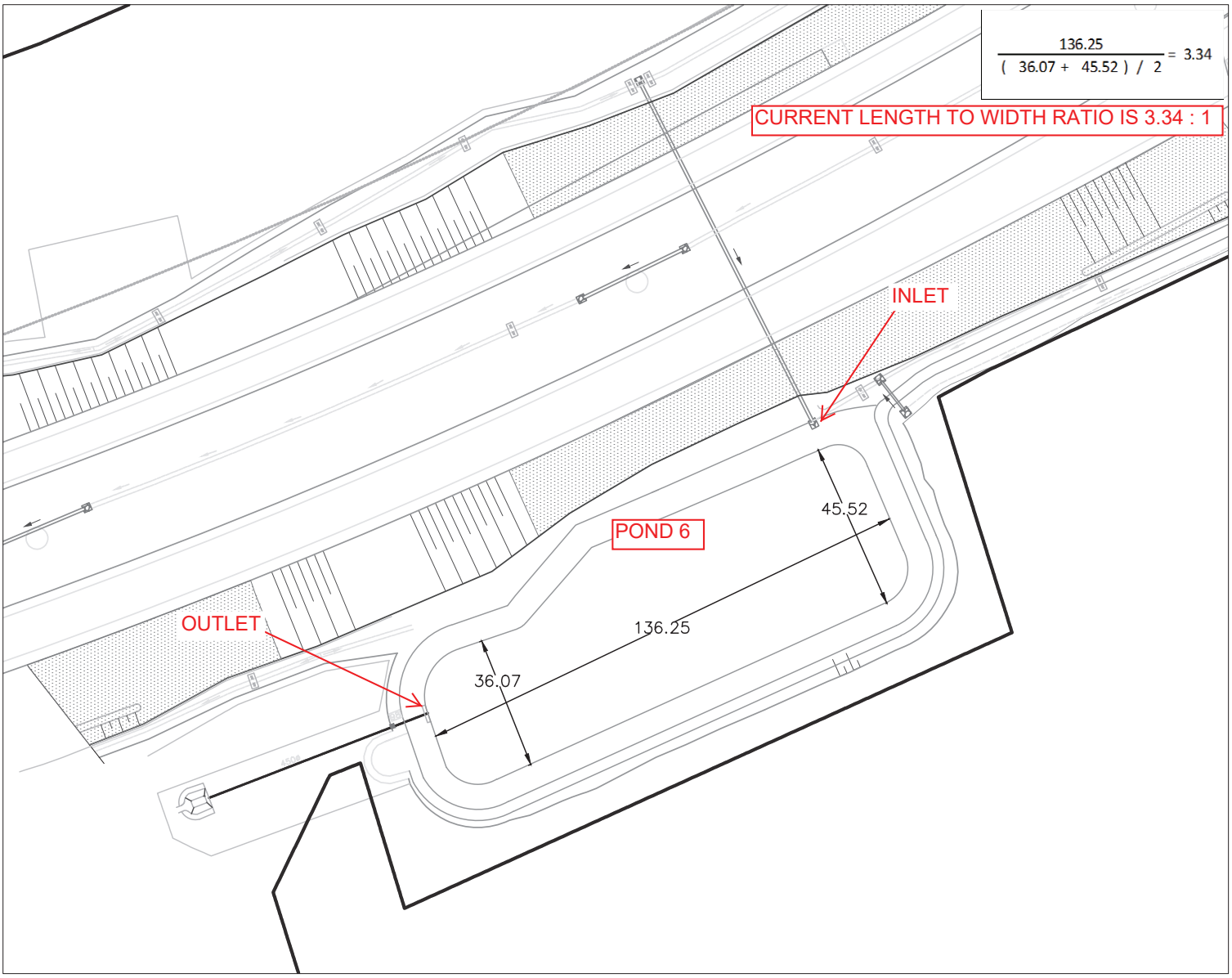
$$\frac{112.04}{15.67} = 7.15$$

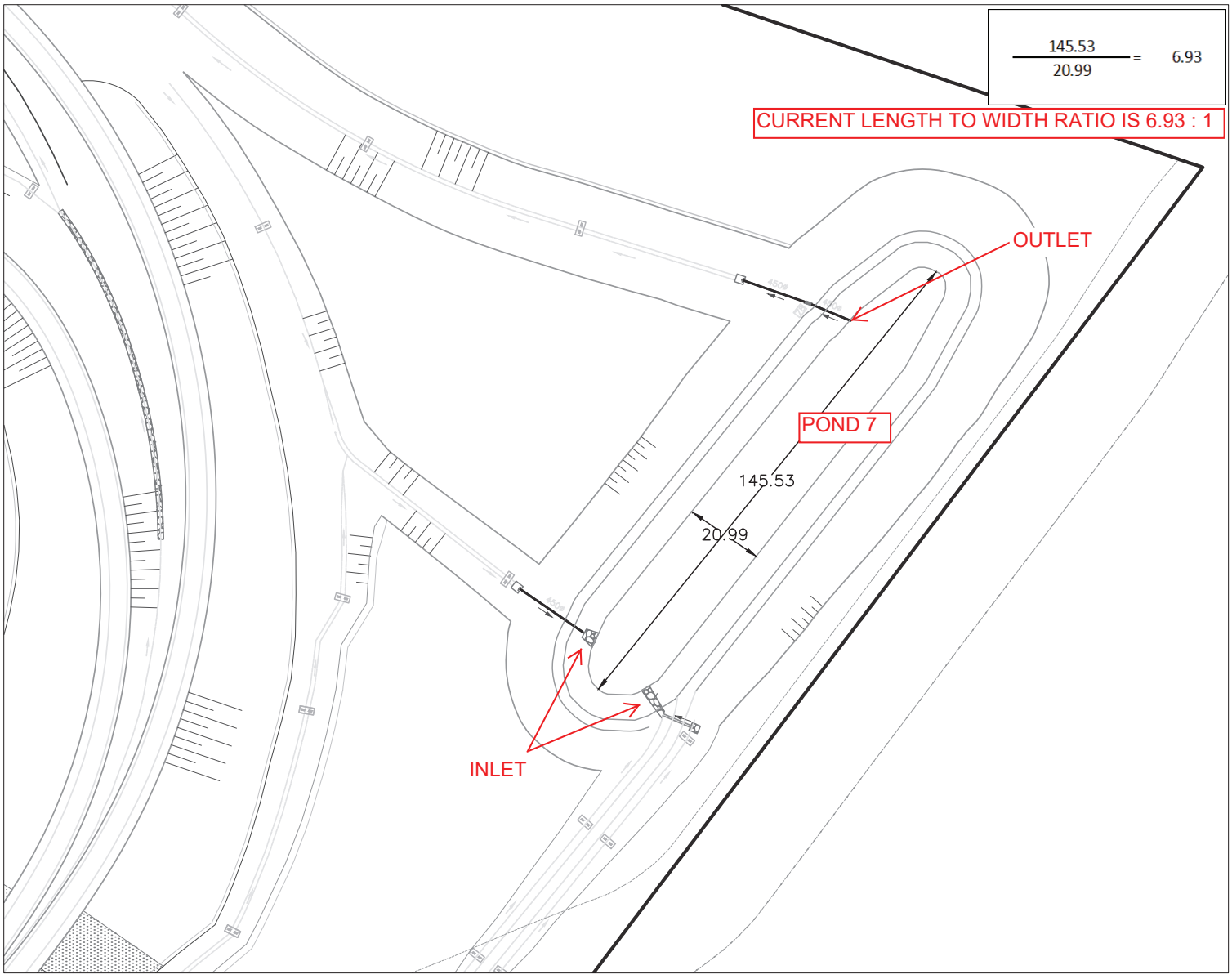
CURRENT LENGTH TO WIDTH RATIO 7.15 : 1

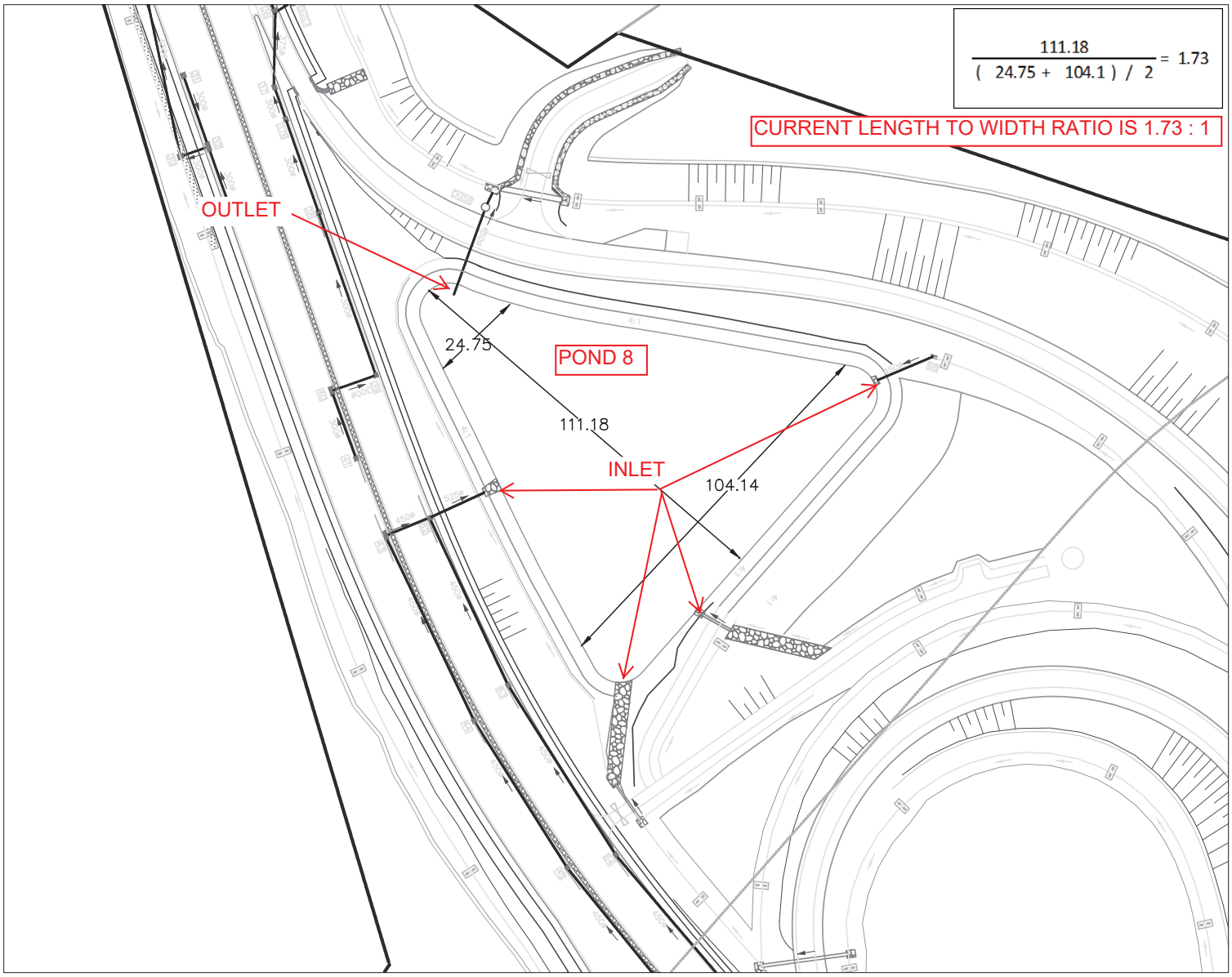



111.51 / (31.44 + 38.08) / 2 = 3.21
CURRENT LENGTH TO WIDTH RATIO 3.21 : 1
INLET
38.08
111.51
POND 4
31.44
OUTLET


189.1 / (31.91 + 19.93) / 2 = 7.30
CURRENT LENGTH TO WIDTH RATIO IS 7.30 : 1
19.93
POND 5
189.10
31.91
OUTLET
INLET
124
125


136.25 / (36.07 + 45.52) / 2 = 3.34
CURRENT LENGTH TO WIDTH RATIO IS 3.34 : 1
INLET
POND 6
OUTLET
45.52
136.25
36.07


145.53 / 20.99 = 6.93
CURRENT LENGTH TO WIDTH RATIO IS 6.93 : 1
OUTLET
POND 7
145.53
20.99
INLET


111.18
(24.75 + 104.1) / 2 = 1.73
CURRENT LENGTH TO WIDTH RATIO IS 1.73 : 1
OUTLET
24.75
POND 8
111.18
INLET
104.14

Appendix F: Groundwater Dewatering Assessment Summary Table

Groundwater Dewatering Assessment Summary Table

Updated: Septmeber 26, 2018

Reference Drawings: January 12, 2018 (90% complete)

Site Name, ID and Drawing (DWG) Number	Station (STA) IDs	Field Status	Engineering Drawing	Hydrogeological Assessment Conditions	Dewatering Evaluation (LPD-Litres per day)	Final Comments	Structure ID	Package ID
Highway 7 to Major Mackenzie Drive				Chainage starts at 10+000 from Highway 7 for northern portion of Highway 427				
Street A Overpass (DWG-138, 139) B14A/14B	STA. 12+950	Static water level data collected.	90% available and reviewed.	Foundation abutments will be on H piles and the lowest elevation of pile cap is 185.7 masl in till. The GW level in the vicinity is 188.8 found in till.	Less than 50,000 LPD	The pile cap will be founded in till which is not very conducive to groundwater flow. However, there is potential for gravity flow from shallow sand seams and as a result some amount of water may accumulate in the excavated trench. Sump pumping would be adequate to address this issue.	B14A/14B	Package 7
Highway 427 Overpass at Rutherford Road (DWG-140, 141) B15A/15B	STA. 14+175	Static water level and single well response test completed.	90% available and reviewed.	The overpass structure will be constructed as designed above ground on driven piles. GW will not be an issue at this site.	No dewatering.	The overpass structure will be built above ground and on piles as designed. No dewatering will be necessary.	B15A/15B	Package 7
Dry Pond-1 at STA. 9+600, Northeast corner of Future Highway 427 and Highway 7 (DWG--H427-D, F, Package 6, 2200/2201)	STA. 9+600	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 178.3 masl founded in till. Groundwater in adjacent monitoring well was 180.1 masl also screened in till.	Less than 50,000 LPD	Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (230 m) and wide (60 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps.		Package 6
Dry Pond-2 at STA. 12+300, Northwest corner of Future highway 427 and Langstaff Road Interchange (DWG-H427-D, F, Package 6, 2202/2203)	STA. 12+300	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 178.5 masl founded in till. Groundwater in adjacent monitoring well was 188.1 masl also screened in till having almost 10 m of hydraulic head. Short term sump pumping and long term permanent pressure relief system may be required.	Anticipated pumping rate is 99,000 LPD both in the short and long term stage.	Since the pond bottom will be at the elevation of 178.5 masl and the groundwater level at the site is at 188.1 masl in till, over time the groundwater will accumulate underneath the pond and will create buoyant condition that may affect the integrity fo the clay liner. So if the pond bottom elevation remains as designed, pressure relief wells will be needed to release pore pressure developed over time. The permanent relief well system may require long term PTTW if the long term pumping rate is more than 50,000 LPD.		Package 6
Linear Ponds A, B, C, D and E (dated 2018/06/18, H427-D, Package 6, No. 2204 (A), 2205 (B and C), 2206 (C), 2007 (D and E)			50% complete drawings available and reviewed	The bottoms of these drainage diteches are above groundwater levels. So dewatering during construction of these drainage ditches are not anticipated.	Dewatering not anticipated.	Dry linear drainage ditches that will route storm water.		
Dry Pond-3 At Sta. 13+100, North Of Street-A Crossing of proposed Highway 427 (H-427-D, F, Package 7, No. 2202, dated 2018/04/25)	STA. 13+100	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 186.18 masl founded in till. Groundwater in adjacent monitoring well was 186.6 masl also screened in till. So very minor groundwater accumulation in the excavated area may be anticipated.	Less than 50,000 LPD	Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (140 m) and wide (45 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps.		Package 7
Dry Pond-4 At Sta. 13+700, on the Southwest Corner of proposed Highway 427 and Rutherford Road Interchange (H-427-D, F Package 7, DWG No. 2204/2205, dated 2018/04/25)	13+700	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 189.2 masl founded in till. Groundwater in adjacent monitoring well was 191.8 masl also screened in till. So minor groundwater accumulation due to gravity drainage may be anticipated in the excavated area.	Less than 50,000 LPD	Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (120 m) and wide (40 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps.		Package 7
Dry Pond-5 At Sta. 14+600, Northwest Corner of proposed Highway 427 And Rutherford Road Interchange (H-427-D, F, Package 7, DWG No. 2207/2206, dated 2018/04/25)	STA. 14+600	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 192 masl founded in till. Groundwater in adjacent monitoring well was 195.8 masl also screened in till. So minor groundwater accumulation due to gravity drainage may be anticipated in the excavated area. Adequate thickness of clay liner at the bottom should be used to counterbalance the hydraulic head to reduce potential adverse impacts to the clay liner.	Less than 50,000 LPD	The groundwater in till is at 195.8 masl and the pond bottom is at 192 m masl which will cause approximately 3.8 m of hydraulic head at this pond location. Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (200 m) and wide (30 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps. If the clay liner is designed to adequate thickness to counterbalance the hydraulic head provision for permanent pressure relief system may not be required.		Package 7
Dry Pond-6 At Sta. 15+800, South of McGillivray Road and on the East side of proposed Highway 427 (H-427-D, F, Package 8, DWG No. 2200/2201, dated 2018/06/08)	STA. 15+800	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 196.05 masl founded in till. Groundwater in adjacent monitoring well was 197.8 masl slightly above the pond bottom. So minor groundwater accumulation due to gravity drainage may be anticipated in the excavated area.	Less than 50,000 LPD	Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (160 m) and wide (50 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps.		Package 8
Dry Pond-7 At Sta.16+600, North of Major Mackenzie Drive and proposed Highway 427 (H-427-D, F, Package 8, DWG No. 2202/2203, dated 2018/06/08)	STA. 16+600	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 200.85 masl founded in till. Groundwater at adjacent monitoring well was 203.8 masl. So minor groundwater accumulation due to gravity drainage may be anticipated in the excavated area. Adequate thickness of clay liner at the bottom should be used to counterbalance the hydraulic head to reduce potential adverse impacts to the clay liner.	Less than 50,000 LPD	The groundwater in till is at 203.8 masl and the pond bottom is at 200.85 m masl which will cause approximately 3 m of hydraulic head at this pond location. Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (150 m) and wide (30 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps. If the clay liner is designed to adequate thickness to counterbalance the hydraulic head, provision for permanent pressure relief system may not be required.		Package 8
Dry Pond-8 At Sta. 9+700, West Side of proposed Highway 427 North of Major Mackenzie Drive (H-427-D, F, Package 8, DWG No. 2204/2205, dated 2018/06/08)	STA. 9+700	Static water level collected from adjacent monitoring well.	50% complete drawings available and reviewed	Pond bottom is at 199.54 masl founded in till. Groundwater at adjacent monitoring well was 202.5 masl. So minor groundwater accumulation due to gravity drainage may be anticipated in the excavated area. Adequate thickness of clay liner at the bottom should be used to counterbalance the hydraulic head to reduce potential adverse impacts to the clay liner.	Less than 50,000 LPD	The groundwater in till is at 202.5 masl and the pond bottom is at 199.54 m masl which will cause approximately 3 m of hydraulic head at this pond location. Till is not conductive to transport and flow of groundwater. Since the size of the excavated area will be relatively long (130 m) and wide (60 m), groundwater may accumulate in the excavated area which will need to be removed using sump pumps. If the clay liner is designed to an adequate thickness to counterbalance the hydraulic head, provision for permanent pressure relief system may not be required.		Package 8

PWQO = Provincial Water Quality Objective, masl = metres above sea level, mgs = metres below ground surface