

# **Groundwater Assessment Report: Highway 401 Planning Study East of Brockville, Township of Elizabethtown-Kitley (GWP 4111-22-00)**

Final Report

February 27, 2026

Prepared for:  
Ministry of Transportation Eastern Region

Prepared by:  
Stantec Consulting Ltd.

Project/File:  
165001328



## **Limitations and Sign-off**

The conclusions in the Report titled Groundwater Assessment Report: Highway 401 Planning Study East of Brockville, Township of Elizabethtown-Kitley (GWP 4111-22-00) are Stantec’s professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient’s own risk.

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Prepared by \_\_\_\_\_  
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**Acronyms / Abbreviations**

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## **Acronyms / Abbreviations**

AMSL	above mean sea level
BGS	below ground surface
CSPC	Cataraqui Source Protection Committee
EA	Environmental Assessment
EASR	Environmental Activity Sector Registry
GWP	Group Work Project
HVA	Highly Vulnerable Aquifers
IPZ	Intake Protection Zone
ICA	Issue Contributing Area
MECP	Ministry of the Environment, Conservation, and Parks
MNRF	Ministry of Natural Resources and Forestry
MTO	Ontario Ministry of Transportation
OGS	Ontario Geological Survey
PSW	Provincially Significant Wetland
Sites	MTO structures to be replaced and/or rehabilitated
SGRA	Significant Groundwater Recharge Area
SPA	Source Protection Area
SPP	Source Protection Plan
Stantec	Stantec Consulting Ltd.
Study Area	Area within 500 m of the project limits



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WHPA	Well Head Protection Area
WTP	Water Treatment Plant
WWR	Water Well Record



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## 1 Introduction

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# 1 Introduction

The Ontario Ministry of Transportation (MTO) has retained Stantec Consulting Ltd. to undertake a Preliminary Design, and Class Environmental Assessment (Class EA) Study on Highway 401 for the replacement and rehabilitation of one bridge and one culvert, and identifying the future Highway 401 footprint for an interim six lanes and ultimate eight lanes, from 0.75 km east of North Augusta Road to 3.3 km west of Maitland Road (approximately 2.6 km), in the Township of Elizabethtown-Kitley, east of Brockville, in the United Counties of Leeds and Grenville. The project was initiated in accordance with the Class EA for Provincial Transportation Facilities and Municipal Expressways (2024) (MTO Class EA).

The project study limits extend from 0.75 km east of the North Augusta Road Interchange to 3.3 km west of the Maitland Road Interchange for a total length of approximately 2.6 km. The existing MTO structural sites included within the project study limits are:

- Butlers Creek Culvert (16X-0238/C0)
- Sharpe's Lane Underpass (16X-0125/B0)

Figure 1 (Appendix A) presents the project limits and the location of these two structural sites (the Sites). For this report, the area within 500 m of the project limits is referred to as 'the Study Area' (Figure 1).

Proposed construction activities include replacement or rehabilitation and extension of Butlers Creek Culvert (16X-0238/C0), replacement of the Sharpe's Lane Underpass (16X-0125/B0), expansion and pavement reconstruction to accommodate interim widening of the existing four-lane divided highway to six-lanes and ultimate future highway widening to eight-lanes, and associated drainage improvements.



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## **1 Introduction**

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Stantec has completed the following groundwater review assessment for the Study Area. The assessment was completed based on review of the available groundwater resource information for the area. The objectives of the hydrogeologic assessment were:

- To provide background information pertaining to the project, proposed construction activities and hydrogeological settings
- To determine potential impacts to groundwater quality and/or quantity due to the proposed project work
- To provide design recommendations, if necessary, based on groundwater sources and vulnerable areas.

The results of the hydrogeological assessment are documented in this report, which is organized into five sections, including this introduction (Section 1.0). Section 2.0 presents the hydrogeological setting. Section 3.0 discusses potential groundwater constraints and recommendations for mitigation. References are provided in Section 4.0. Figures and tables referenced throughout the report are provided in Appendices A and B, respectively.



## **2 Site Setting**

The Study Area setting is described below including topography and drainage, physiography and geology, hydrogeology, private supply wells, and source protection.

### **2.1 Topography and Drainage**

Regional topography in the Study Area is relatively flat and ranges from approximately 185 m above mean sea level (AMSL) to 190 m AMSL (MNRF, 2024).

Figure 2 presents the natural features in the vicinity of the Study Area. The Study Area lies within the Cataraqui Source Protection Area (SPA) and extend across the Butlers Creek Subwatershed which is located within the jurisdiction of the Cataraqui Region Conservation Authority. Butlers Creek is located approximately 430 m east of Oxford Avenue/North Augusta Road (Figure 2) and is identified as a warm water stream, indicating a lack of groundwater contributions (CSPC 2008). The existing Butlers Creek Culvert (16X-0238/C0) conveys water from the creek beneath Highway 401 (Figure 2). Surface water drainage flows southerly and eventually drains into the St. Lawrence River. The St. Lawrence River is located approximately 2.2 km south of Highway 401 (Figure 2).

Review of available mapping (MNRF, 2024) indicates the Study Area does not intersect any Provincially Significant Wetlands (PSWs) or Areas of Natural and Scientific Interest. The nearest PSW is the South Augusta Wetland Complex PSW located approximately 1.5 km northeast of the Sharpe's Lane Underpass (16X-0125/B0) (Figure 2). There are some unevaluated wetlands mapped in proximity to the Highway 401 corridor and structural sites within the Study Area (Figure 2).



## **2.2 Physiography and Geology**

The Study Area is located within the physiographic region defined by Chapman and Putnam (2007) as the Smith Falls Limestone Plain, which is characterized by shallow soil overlying limestone or dolostone bedrock. Deeper soils are present in some areas as a result of old beach deposits, isolated drumlins, and clay deposits that have infilled depressions in the bedrock surface (CSPC 2008).

A review of the surficial geological mapping by the Ontario Geological Survey (OGS 2010), indicated the Butlers Creek Culvert (16X-0238/C0) lies within fine textured glaciolacustrine massive to well laminated deposits of silt and clay with minor sand and gravel (Unit 10a, Figure 3) while the Sharpe's Lane Underpass (16X-0125/B0) is mapped within stone-poor, carbonate-derived silty to sandy till (Unit 5b, Figure 3). Surficial deposits in the surrounding areas include exposed Paleozoic bedrock drift complex (Unit 4, Figure 3) and Precambrian bedrock drift complex (Unit 2, Figure 3), with pockets of coarse textured glaciomarine foreshore-basinal sand and gravel deposits (Unit 11c, Figure 3) mapped within the eastern extents of the Study Area.

Overburden in most of the Study Area, including the area of the Sharpe's Lane Underpass (16X-0125/B0), is interpreted to be underlain by Paleozoic bedrock of the March Formation consisting of interbedded sandstones and dolostones (Armstrong and Dodge 2007). Bedrock beneath in the western extents of the Study Area, including the area of Butlers Creek Culvert (16X-0238/C0), is interpreted as the Nepean Formation sandstone.

Available regional mapping presented in the Watershed Characterization Report for the Cataraqui SPA (CSPC 2008) indicated overburden thickness in the Study Area generally ranges from less than 1 m to 4 m in thickness, with an area of thicker overburden ranging between 10 m and 19 m in thickness present near the central Study Area. Overburden primarily consists of topsoil, clay, till and/or sand. Figure 4 presents Ministry of the Environment, Conservation and Parks (MECP) water well records



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(WWR) mapped as occurring within 500 m of the project limits and structural sites. Based on review of WWRs, the bedrock surface is encountered at depths ranging from 0 m to 17 m below ground surface (BGS) and is described as sandstone, limestone and/or granite with an occasional report of shale. A summary of the MECP WWR data is presented in Table 1 (Appendix B).

Further review of MECP WWRs and/or MTO foundation investigation reports available from the MTO foundation library (MTO 2024) provided the following information for the Sites:

- Butlers Creek Culvert (16X-0238/C0) – No MTO foundation reports related to this structure were identified. WWR data in the surrounding area reported thin overburden (topsoil) up the 1.2 m thick underlain by sandstone bedrock.
- Sharpe's Lane Underpass (16X-0125/B0) - A 1962 foundation investigation report for the Sharpe's Lane Underpass, indicated overburden consisted of 1.0 m to 2.3 m thick black loam (silt and sand) underlain by silty sand till with gravel and boulders to at least 9.8 m BGS. WWR data in the surrounding area reported overburden (clay, hardpan, and/or gravel) ranging from 3.7 m to 9.4 m in thickness underlain by limestone bedrock and sandstone.

## 2.3 Hydrogeology

Due to the generally thin overburden within the Cataraqui SPA, aquifers have primarily been identified in the bedrock (CSPC 2017). Most people in the area draw their water from wells completed in bedrock aquifers predominantly consisting of Paleozoic limestones, dolostones, sandstones, and Precambrian rock. The most permeable bedrock material in the Cataraqui SPA is the Nepean Formation coarse conglomerates and sandstone, which is known to be a high yielding aquifer (CSPC 2017). The March formation is also reported to be relatively permeable due to the sandstone interbeds (CSPC 2017). Groundwater flow within the bedrock aquifers is mainly through a network of fractures. These bedrock aquifers are generally covered with a thin layer of sand and/or clay deposits. CSPC (2017) indicated that some areas with thicker soil cover can act as a protective barrier to the bedrock aquifers, especially where mainly clay overburden is present and that areas with less soil cover tend to be highly susceptible to



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surface contamination as fractures in bedrock can act as a pathway for contaminants to reach groundwater. In general, groundwater flow within the Cataraqui SPA follows the topography, flowing south towards the St. Lawrence River (CSPC 2008).

A review of available foundation investigation reports (MTO 2024) and MECP WWRs (Figure 4 and Table 1) within 500 m of the Sites provided the following water level data:

- Butlers Creek Culvert (16X-0238/C0) – No MTO foundation reports related to this structure were identified. WWR data in the surrounding area indicated static water levels at about 7 m BGS in nearby bedrock wells. Groundwater conditions adjacent to the creek are not known but are likely shallow given the vegetation in the area.
- Sharpe's Lane Underpass (16X-0125/B0) – The 1962 foundation investigation report for the Sharpe's Lane Underpass identified groundwater levels near ground surface in boreholes completed within overburden.

## 2.4 Municipal and Private Water Supply

Most of the developed areas within the City of Brockville are serviced with municipal water obtained from the St. Lawrence River. The nearest surface water intake to the Sites is for the City of Brockville's Water Treatment Plant (WTP), located greater than 5 km southwest of the Butlers Creek Culvert (16X-0238/C0). No full municipal water services are available in the Township of Elizabethtown-Kitley (Official Plan 2018), and most of the residents in the rural portions of the Cataraqui SPA obtain their drinking water from private wells (CSPA, 2008).

Given the project location within the rural Township of Elizabethtown-Kitley, it is anticipated that the water supply for nearby rural residences and businesses is obtained from private groundwater supply wells. To be conservative, the potential for private wells was reviewed for the Study Area as a whole. The review of the MECP WWR (Figure 4) identified a total of 157 WWRs within 500 m of the Study Area, with 120 water supply wells reported for domestic/livestock use, nine (9) for commercial use, one (1) for public use, and two (2) for irrigation use. Details of these water supply wells are summarized in Table 1 (Attachment B). As shown in Table 1, local private water wells



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were installed between 1949 and 2020 and are completed within bedrock. The remaining WWRs were reported as monitoring, observation, or test wells, abandoned, not used, or provided no information on use.

There are potential private wells located in proximity to the Sites as summarized below:

- Butler's Creek Culvert (16X-0238/C0) – >20 properties with potential wells along 2<sup>nd</sup> Concession Road, North Augusta Road and Oxford Avenue (Figure 4-1). It is noted that the Oxford Acres trailer park located at Oxford Crescent is serviced with municipal water.
- Culvert (16X-0226/C0) – >20 properties with potential wells along 2<sup>nd</sup> Concession Road, Sharps Lane and Kelly Road (Figure 4-2)

Based on the WWR review, the mapped private water supply wells in the Study Area are predominantly bedrock wells. As part of detailed design, the location of below ground excavation and potential groundwater construction dewatering should be reviewed with respect to the potential private supply wells to determine the need for and extent of private well monitoring in select areas.

## 2.5 Source Water Protection

In accordance with the Clean Water Act (2006), the Cataraqui Source Protection Committee (CSPC) completed source water protection assessments for the CSPA (CSPC 2017). As part of the assessment process, vulnerable areas within the source water area were defined. Vulnerable areas include Wellhead Protection Areas (WHPAs), Highly Vulnerable Aquifers (HVAs), and Significant Groundwater Recharge Areas (SGRAs) for groundwater supply sources, and Intake Protection Zones (IPZs) for surface water supply sources.

Issue Contributing Areas (ICAs) were also defined for municipal sources, as needed, where historical raw water quality data suggested that anthropogenic activity could be deteriorating drinking water quality. Vulnerable areas and ICAs are regulated under the Clean Water Act. Land use policies have been developed to control “drinking water threats” in these areas; where a “drinking water threat” is defined as an activity or



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condition that adversely affects, or has the potential to adversely affect, the quality or quantity of any water that is or may be used as a source of drinking water.

The Cataraqui SPA Source Protection Plan (SPP) (CSPC 2014) identifies the vulnerable areas, and applicable “drinking water threats”, which are subject to regulation.

The following sections present the local vulnerable areas, identify where “drinking water threats” are controlled per the SPP, and discuss the relevance of the above to the proposed project for Highway 401.

**2.5.1 Well Head Protection Areas**

There are no WHPAs delineated in the vicinity of the Sites. The nearest WHPA is associated with the Village of Merrickville-Wolford Well Supply and located greater than 30 km northwest of the Sites (CSPC 2017; MECP 2024b).

**2.5.2 Significant Groundwater Recharge Areas**

SGRAs exist where water from the surface more easily infiltrates the ground to recharge the aquifers. Recharge is expected to occur at a low rate in the CSPA, however, may be widespread and diffused across a large area as water moves through complex fracture networks within bedrock (CSPA 2014).

Figure 5 shows the SGRAs in the vicinity of the Study Area along with vulnerability scoring. Vulnerability scores indicate the susceptibility of aquifers to surface or near surface contamination, and range from 2 to 6, with high vulnerability areas scored 6, medium vulnerability areas scored 4, and low vulnerability areas scored 2 (CSPA 2014).



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As shown in Figure 5, the Sites do not intercept a SGRA; however, there are medium and high vulnerability SGRAs mapped near the Butlers Creek Culvert (16X-0238/C0) and Sharpe's Lane Underpass (16X-0125/B0) and at the western and eastern project limits that intercept segments of the highway corridor within the Study Area (Figure 5).

The Cataraqui SPA SPP (CSPC 2014) includes policies related to SGRAs for fuel and chemical use and/or storage that may apply to the proposed construction activities. Applicable mitigation measures should be included for construction within SGRAs.

### **2.5.3 Highly Vulnerable Aquifers**

As part of the source water assessment, aquifer vulnerability mapping was completed to describe the risk that contamination originating at ground surface might enter an underlying aquifer. Figure 5 shows the HVA area mapping in the vicinity of the Study Area which indicates that the Butlers Creek Culvert (16X-0238/C0) and areas to the west of the Sharpe's Lane Underpass (16X-0125/B0) lie within HVA areas having an assigned vulnerability score of 6 (MECP 2024b).

The Cataraqui SPA SPP (CSPC 2014) includes policies related to HVAs for fuel and chemical use and/or storage that may apply to the proposed construction activities. Applicable mitigation measures should be included for construction within HVA areas.

### **2.5.4 Intake Protection Zones / Event Based Areas**

IPZ are areas of land and water, where run-off from streams or drainage systems, in conjunction with currents in lakes and rivers, could influence the quality of the source water at the municipal drinking water intakes. IPZ-1 is the area immediately surrounding the intake, typically a 1 km radius around an intake plus a setback along the shore. IPZ-2 is the area of water and land that is outside IPZ-1 and encompasses areas where the flow of water along shorelines, tributaries and municipal drains would reach the intake within 2 hours. IPZ-3 extends outward from IPZ-2 and covers larger watershed areas and includes all rivers and tributaries where modelling demonstrates that



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contaminant spills may reach the intake during an extreme rainfall or windstorm event. All IPZs also include lands within 120 m setback from waterways or the flood plain regulated areas, whichever is greater.

There are no IPZs mapped within the Study Area. The nearest IPZ is for the City of Brockville's WTP, with IPZ-2 being located approximately 3 km southwest of the Butlers Creek Culvert (16X-0238/C0) (CSPC 2017 and MECP 2024b).

### **2.5.5 Issue Contributing Areas**

There are no mapped ICAs in the Cataraqui SPA (MECP 2024b).

## **2.6 Construction Dewatering**

Proposed construction activities for highway widening, the replacement of the Sharpe's Lane Underpass (16X-0125/B0), and replacement or rehabilitation and extension of Butlers Creek Culvert (16X-0238/C0), and associated drainage improvements will likely include below ground excavation. Available geological mapping, MECP WWRs, and foundation investigation reports indicate thin overburden (1 to 4 m in thickness) is present across much of the Study Area with thicker overburden (up to 10 m) noted in the vicinity of Sharpe's Lane Underpass (16X-0125/B0). Overburden materials primarily consist of topsoil, till and/or sand and are underlain by limestone and/or sandstone bedrock (Section 2.2). Groundwater levels near ground surface were reported in boreholes completed within overburden at Sharpe's Lane Underpass (16X-0125/B0). Shallow groundwater conditions are also likely to be present nearby Butlers Creek Culvert (16X-0238/C0) given the vegetation in the area.

Under Ontario Regulation (O. Reg.) 64/16 and O. Reg. 63/16A, an Environmental Activity Sector Registry (EASR) registration is required for daily dewatering volumes greater than 50,000 L. It is noted that since July 1, 2025, an EASR is suitable to support construction dewatering regardless of rate. The need for an EASR in select areas would be determined as part of the detailed design.



### **3 Constraints and Mitigation Measures**

Based on the preliminary review of available data, the following constraints are identified.

- The Butlers Creek Culvert (16X-0238/C0) and the western half of the project Study Area lie within HVA areas having an assigned vulnerability score of 6. Applicable mitigation measures should be included for construction within HVA areas.
- The Sites do not intersect a mapped highly vulnerable SGRA, however, there are medium and high vulnerability SGRAs mapped near the Butlers Creek Culvert (16X-0238/C0) and Sharpe's Lane Underpass (16X-0125/B0). There are also segments of the highway corridor within the Study Area that intersect medium and high vulnerability SGRAs. Applicable mitigation measures should be included for construction within SGRAs.

Based on the preliminary review of available data, the following recommendations are provided:

- It is anticipated that a groundwater EASR registration may be required for work involving bridge replacement and culvert rehabilitation / replacement. The need for an EASR in select areas would be determined as part of the detailed design. It is our understanding that MTO will complete additional geotechnical work in support of the detailed design.
- Based on review of MECP WWRs, it is interpreted that private groundwater supply wells are located within 500 m of the project limits. The potential private wells are predominantly completed within bedrock to depths ranging between approximately 25 m BGS and 55 m BGS. The need for and extent of private well monitoring in select areas of excavation should be confirmed as part of the detailed design.
- Various mitigation techniques will be employed during construction to reduce the risk of impacts to natural environment features. During construction activity, the primary concern regarding groundwater quality would be the potential for a contaminant spill. To address this concern, the following mitigation measures are proposed:
  - Refueling of equipment should be completed away from surface water features, SGRAs and HVAs, whenever possible, to minimize potential impacts to surface water/groundwater quality in the event that an accidental spill occurs.



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- To minimize the impact of potential contaminant spills, the Contractor should implement best management protocols such as secondary containment of any temporary fuel storage and preparation of a spill response plan and proper facility management during operation and maintenance.
- Materials for spill response such as drip pans and spill contingency kits must be maintained on site.



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## 4 References

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## 4 References

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# **Appendices**



**Groundwater Assessment Report: Highway 401 Planning Study East of  
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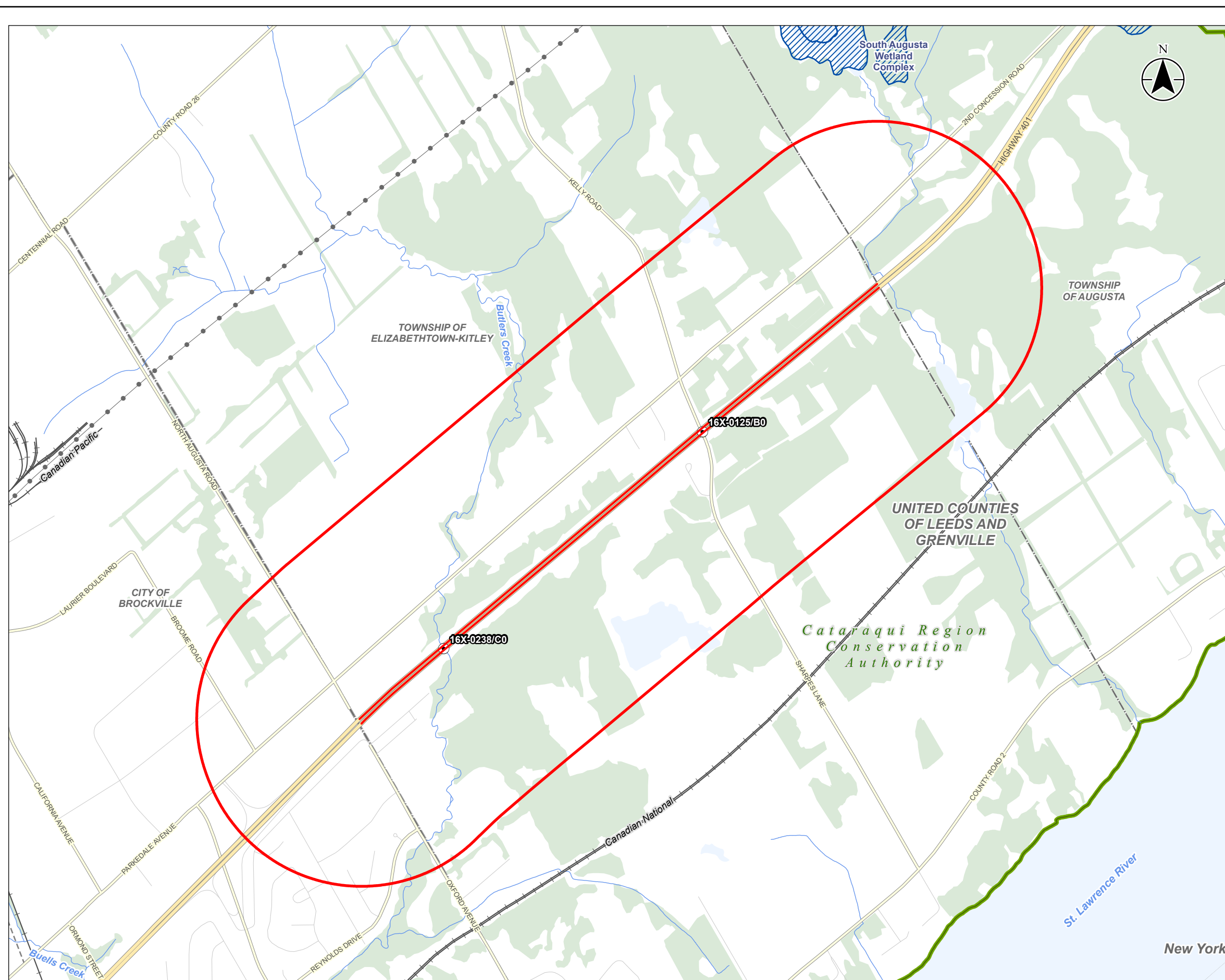
**Appendix A Figures**

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**Appendix A      Figures**

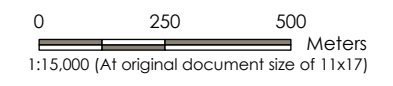


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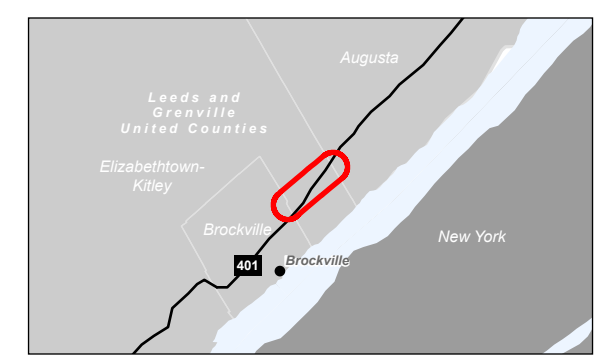


**Legend**

- MTO Structure
- Project Extent
- ▭ Study Area
- Expressway / Highway
- Major Road
- Minor Road
- Railway
- Hydro Line
- UT- Unknown Transmission Line
- Watercourse (Intermittent)
- Watercourse (Permanent)
- ▭ Conservation Area
- ▭ Administrative Boundary
- ▨ Wetland, Provincially Significant
- ▭ Waterbody
- ▭ Municipal Boundary - Lower Tier
- ▭ Municipal Boundary - Upper Tier
- ▭ Wooded Area



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.



Project Location: 165001328 REVA  
 United Counties of Leeds and Grenville  
 Prepared by cstaufler on 2024-05-16  
 Technical Review by ABC on yyyy-mm-dd

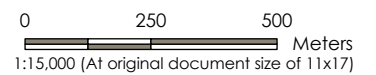
Client/Project: Ministry of Transportation  
 Highway 401 Widening and Bridge Rehab/  
 Replacement (GWP 4111-022-00)

Figure No.: **1**  
 Title: **Project Location**

C:\0224-pp160\work\_group\01650\active\165001328\preliminary\maps\Hydrology\411-022-00\_HYD\_Estimg.aprx\1328\_4111\_HYD\_Fig02\_StudyArea  
 Revised: 2024-07-17 By: cstaufer



- Legend
- MTO Structure
  - ▭ Study Area
  - Railway
  - - - Watercourse (Intermittent)
  - Watercourse (Permanent)
  - ▨ Wetland, Provincially Significant
  - ▧ Wetland, Unevaluated
  - - - Municipal Boundary - Lower Tier



- Notes
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
  3. Orthoimagery obtained from New York State, Maxar

Project Location: United Counties of Leeds and Grenville  
 Prepared by: cstaufer on 2024-07-17  
 Technical Review by: ABC on yyyy-mm-dd

Client/Project: Ministry of Transportation  
 Highway 401 Widening and Bridge Rehab/Replacement (GWP 4111-022-00)

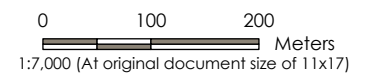
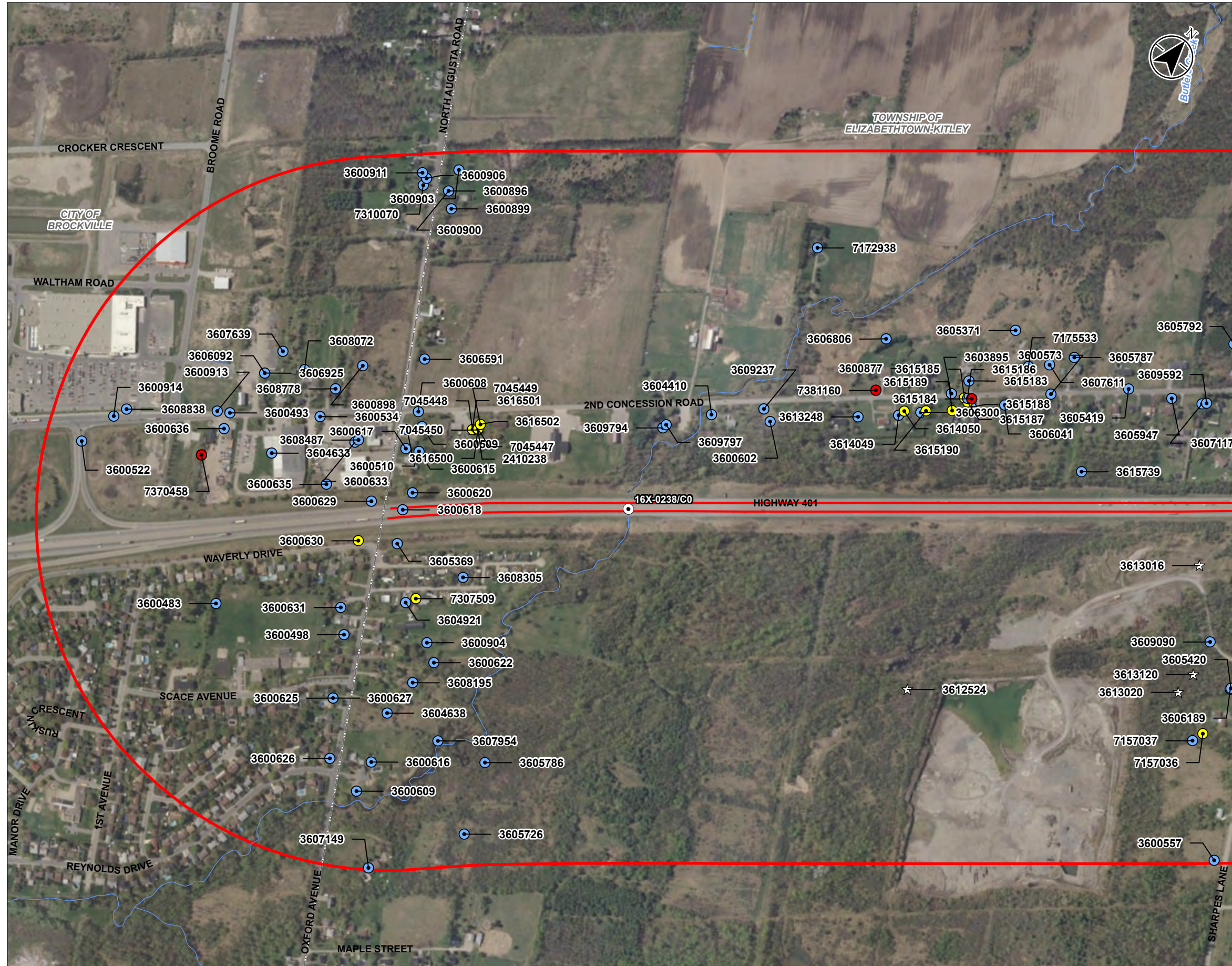
Figure No. **2**

Title: **Natural Features**



Legend

- MTO Structure
- Project Extent
- Study Area
- Watercourse (Permanent)
- Municipal Boundary - Lower Tier
- MECP Water Well Record (within 500 m)
- Unknown
- Not Used/ Abandoned
- Observation Wells
- Water Supply



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
  3. Orthoimagery obtained from New York State, Maxar

Project Location: United Counties of Leeds and Grenville  
 Prepared by: cstauffer on 2024-05-16  
 Technical Review by: ABC on yyyy-mm-dd

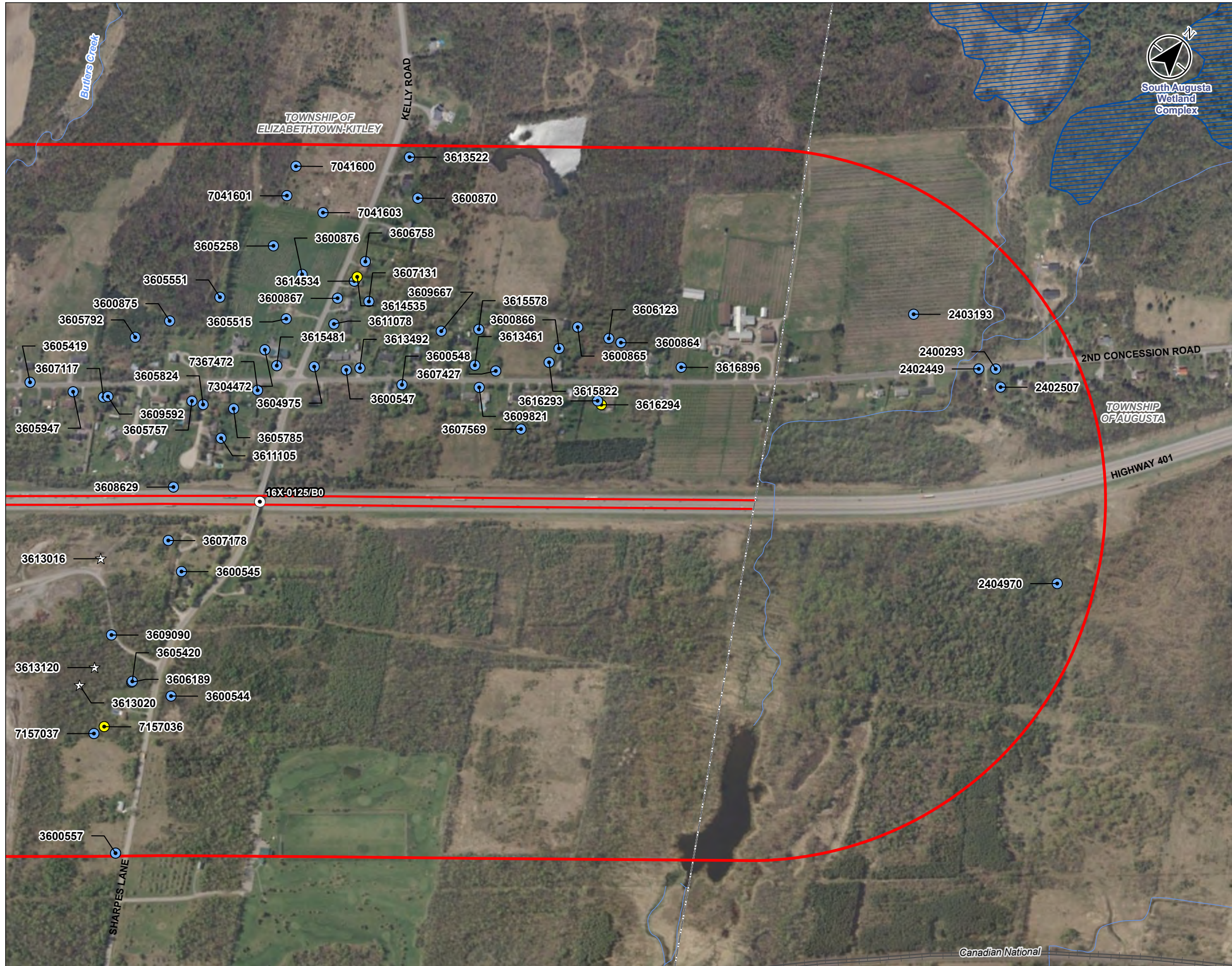
Client/Project: Ministry of Transportation  
 Highway 401 Widening and Bridge Rehab/  
 Replacement (GWP 4111-022-00)

Figure No.

**4-1**

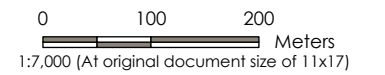
Title

**MECP Wells Within 500 m**



Legend

- MTO Structure
- Project Extent
- ▭ Study Area
- Railway
- Watercourse (Permanent)
- ▨ Wetland, Provincially Significant
- ▭ Municipal Boundary - Lower Tier
- MECP Water Well Record (within 500 m)
- Not Used/ Abandoned
- ☆ Observation Wells
- Water Supply



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 18N
  2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
  3. Orthoimagery obtained from New York State, Maxar

Project Location: United Counties of Leeds and Grenville  
 Prepared by: cstauffer on 2024-05-16  
 Technical Review by: ABC on yyyy-mm-dd

Client/Project: Ministry of Transportation  
 Highway 401 Widening and Bridge Rehab/  
 Replacement (GWP 4111-022-00)

Figure No.

**4-2**

Title

**MECP Wells Within 500 m**

Legend

- MTO Structure
  - Project Extent
  - Study Area
  - Major Road
  - Highway
  - Minor Road
  - Watercourse (Intermittent)
  - Watercourse (Permanent)
  - Municipal Boundary, Lower
  - Municipal Boundary, Upper
  - Waterbody
  - Wooded Area
  - Source Protection Boundary - Cataraqui
  - Highly Vulnerable Aquifer (HVA)
- Significant Groundwater Recharge Area (SGRA)  
Vulnerability Score
- Vulnerability = 6
  - Vulnerability = 4



Notes

1. Coordinate System: NAD 1983 UTM Zone 18N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © King's Printer for Ontario, 2024.
3. Source water protection data (boundary, HVA, VS) obtained from Ontario Ministry of Environment, Conservation and Parks (MECP) Source Protection information Atlas, April 2024. © King's Printer for Ontario and its licensors, 2024.

Project Location: United Counties of Leeds and Grenville  
 Prepared by: cstauffer on 2024-05-16  
 Technical Review by: ABC on yyyy-mm-dd

Client/Project: Ministry of Transportation  
 Highway 401 Widening and Bridge Rehab/  
 Replacement (GWP 4011-22-00)

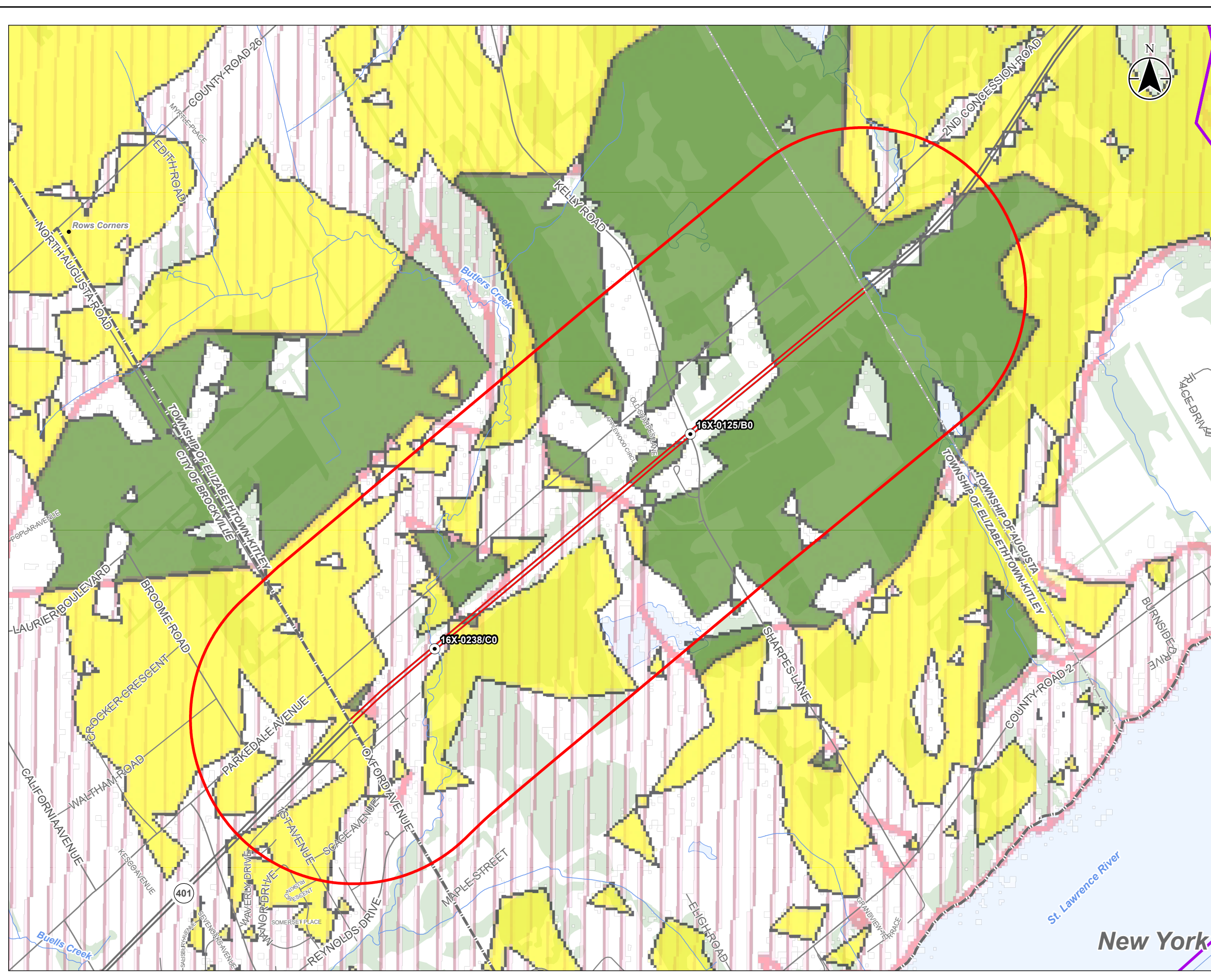
Figure No.

**5**

Title

**Highly Vulnerable Aquifer & Significant  
Groundwater Recharge Areas**

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**New York**

**Groundwater Assessment Report: Highway 401 Planning Study East of  
Brockville, Township of Elizabethtown-Kitley (GWP 4111-22-00)**

**Appendix B Table**

February 27, 2026

**Appendix B      Table**



**TABLE 1**  
**SUMMARY OF MECP WATER WELL RECORD DATA**  
**GWP 4111-22-00**

MECP Well ID	Easting	Northing	Date Completed	Well Depth (m BGS)	Well Type	Depth to Bedrock (m BGS)	Static Water Level (m BGS)	Well Use
2400293	448304	4942641	6-Mar-64	14.6	Bedrock	2.7	0.3	Domestic
2402449	448281	4942622	22-Jun-72	30.5	Bedrock	7.3	3.4	Domestic
2402507	448331	4942622	24-Jul-73	26.2	Bedrock	3.0	3.0	Domestic
2403193	448331	4942622	19-Dec-75	32.3	Bedrock	4.0	2.7	Domestic
2404970	448331	4942421	27-Apr-84	26.5	Bedrock	12.8	7.6	Domestic
3600483	448331	4940206	16-Jun-56	12.2	Bedrock	0.9	1.5	Domestic
3600493	448331	4940479	8-Aug-60	27.7	Bedrock	1.5	5.5	Domestic
3600498	448331	4940309	16-May-61	21.3	Bedrock	1.5	5.5	Domestic
3600509	448331	4940678	28-May-62	18.3	Bedrock	0.6	6.1	Commerical
3600510	448331	4940657	29-May-62	18.3	Bedrock	0.6	6.1	Domestic
3600522	448331	4940273	21-Sep-64	32.0	Bedrock	2.1	6.1	Domestic
3600534	448331	4940576	27-Nov-67	21.3	Bedrock	0.9	3.7	Domestic
3600544	448331	4941265	4-Sep-53	12.2	Bedrock	8.2	3.0	Domestic
3600545	448331	4941445	17-Oct-53	21.3	Bedrock	9.1	12.8	Domestic
3600547	448331	4941904	25-Nov-64	44.8	Bedrock	12.2	9.1	Domestic
3600548	448331	4941947	14-Jan-65	32.3	Bedrock	9.1	6.1	Domestic
3600557	448331	4940990	15-Jul-55	18.0	Bedrock	0.6	9.1	Domestic
3600573	448331	4941434	14-Aug-51	7.6	Bedrock	3.7	3.0	Domestic
3600602	448331	4941079	9-Aug-63	31.7	Bedrock	14.6	12.2	Domestic
3600608	448331	4940694	25-Jun-51	15.2	Bedrock	1.2	7.6	Domestic
3600609	448331	4940112	10-Apr-52	9.8	Bedrock	6.4	0.0	Domestic
3600615	448331	4940641	16-May-57	21.0	Bedrock	-	7.6	Domestic
3600616	448331	4940168	14-Jun-57	19.8	Bedrock	0.9	4.3	Domestic
3600617	448331	4940630	17-Jun-57	16.8	Bedrock	6.7	3.7	Domestic
3600618	448331	4940544	11-Sep-57	28.0	Bedrock	-	6.1	Domestic
3600620	448331	4940578	11-Nov-60	26.8	Bedrock	6.1	3.7	Domestic
3600622	448331	4940373	2-Sep-66	29.3	Bedrock	0.3	7.6	Commerical
3600625	448331	4940211	31-Dec-49	10.1	Bedrock	2.1	1.8	Domestic
3600626	448331	4940126	18-Feb-53	15.2	Bedrock	6.1	1.8	Domestic
3600627	448331	4940211	11-Apr-53	11.0	Bedrock	0.6	3.0	Domestic
3600629	448331	4940520	28-Jul-53	14.3	Bedrock	3.7	4.6	Domestic
3600631	448331	4940342	2-Oct-54	18.3	Bedrock	14.0	1.8	Domestic
3600633	448331	4940581	14-Jul-56	25.6	Bedrock	0.3	8.2	Commerical
3600635	448331	4940492	3-Oct-57	24.4	Bedrock	0.0	11.0	Commerical
3600636	448331	4940451	20-Jun-58	25.0	Bedrock	3.7	6.7	Commerical
3600864	448331	4942252	8-Jan-58	29.9	Bedrock	7.3	5.5	Domestic
3600865	448331	4942224	12-Dec-64	39.0	Bedrock	12.2	6.1	Livestock
3600866	448331	4942174	2-Mar-65	20.1	Bedrock	4.6	3.0	Domestic
3600867	448331	4941991	26-May-53	24.4	Bedrock	-	7.6	Irrigation
3600870	448331	4942217	17-Nov-60	24.7	Bedrock	-	11.6	Livestock
3600875	448331	4941770	8-Dec-61	29.9	Bedrock	-	12.2	Domestic
3600876	448331	4941983	7-Nov-64	40.8	Bedrock	7.9	12.2	Irrigation
3600877	448331	4941318	16-Jun-55	16.2	Bedrock	-	7.6	Domestic
3600896	448331	4941026	15-Jun-49	12.8	Bedrock	1.2	1.8	Domestic
3600898	448331	4940693	15-Jun-49	12.8	Bedrock	2.4	1.8	Domestic
3600899	448331	4941005	15-Jul-49	10.1	Bedrock	1.8	4.6	Domestic
3600900	448331	4941026	15-Jul-49	13.7	Bedrock	1.5	1.8	Domestic
3600903	448331	4941066	2-Oct-53	10.7	Bedrock	1.2	1.8	Domestic
3600904	448331	4940392	31-Oct-56	16.2	Bedrock	0.9	7.6	Domestic
3600906	448331	4941018	4-Mar-54	11.6	Bedrock	4.0	2.4	Domestic
3600911	448331	4941021	13-May-58	12.2	Bedrock	1.2	4.6	Domestic
3600913	448331	4940467	12-Aug-59	19.2	Bedrock	-	7.9	Domestic
3600914	448331	4940343	14-Jun-51	12.8	Bedrock	1.5	6.1	Domestic
3603895	448331	4941322	25-May-68	22.9	Bedrock	1.2	10.7	Domestic
3604410	448331	4941022	6-Jun-69	33.5	Bedrock	1.8	0.0	Commerical
3604633	448331	4940472	30-Oct-68	23.2	Bedrock	6.1	5.2	Domestic
3604638	448331	4940252	8-Apr-71	16.8	Bedrock	3.4	0.0	Domestic
3604921	448331	4940422	17-Jan-72	21.0	Bedrock	4.9	4.6	Domestic
3604975	448331	4941872	16-Aug-72	40.2	Bedrock	11.3	14.6	Domestic
3605258	448331	4941989	23-Apr-73	65.8	Bedrock	6.7	18.3	Domestic
3605369	448331	4940492	20-Sep-73	33.5	Bedrock	16.5	4.6	Domestic
3605371	448331	4941480	5-Sep-73	28.0	Bedrock	1.8	18.3	Domestic
3605419	448331	4941529	1-Oct-73	28.3	Bedrock	1.8	18.3	Domestic
3605420	448331	4941241	22-Oct-73	34.4	Bedrock	-	12.2	Domestic
3605515	448331	4941905	19-Feb-73	28.0	Bedrock	9.1	12.8	Domestic
3605551	448331	4941859	10-Aug-73	39.6	Bedrock	9.8	10.4	Domestic
3605726	448331	4940176	13-Jun-74	21.6	Bedrock	2.4	4.6	Domestic
3605757	448331	4941687	17-Sep-74	50.0	Bedrock	4.3	27.4	Domestic
3605785	448331	4941724	14-Oct-74	29.0	Bedrock	1.2	18.3	Domestic
3605786	448331	4940296	21-Oct-74	21.0	Bedrock	0.3	7.6	Domestic

**TABLE 1**  
**SUMMARY OF MECP WATER WELL RECORD DATA**  
**GWP 4111-22-00**

MECP Well ID	Easting	Northing	Date Completed	Well Depth (m BGS)	Well Type	Depth to Bedrock (m BGS)	Static Water Level (m BGS)	Well Use
3605787	448331	4941510	7-Oct-74	32.9	Bedrock	-	18.3	Domestic
3605792	448331	4941709	9-Oct-74	67.1	Bedrock	6.7	25.9	Domestic
3605824	448331	4941695	27-Nov-74	85.3	Bedrock	10.4	27.4	Domestic
3605947	448331	4941565	31-Mar-75	31.7	Bedrock	4.9	6.1	Domestic
3606041	448331	4941367	16-Jul-75	56.1	Bedrock	0.6	13.7	Domestic
3606092	448331	4940572	31-Jul-75	19.5	Bedrock	2.4	0.0	Commerical
3606123	448331	4942244	29-Jul-75	24.4	Bedrock	5.2	12.2	Domestic
3606189	448331	4941239	18-Sep-75	37.2	Bedrock	9.1	9.1	Domestic
3606300	448331	4941262	24-Sep-75	17.7	Bedrock	4.9	5.5	Domestic
3606591	448331	4940772	26-Jun-76	56.1	Bedrock	4.0	10.7	Public
3606758	448331	4942072	25-Nov-76	42.7	Bedrock	9.1	15.2	Domestic
3606806	448331	4941322	23-Dec-76	70.4	Bedrock	2.7	10.4	Domestic
3606925	448331	4940572	4-Jan-77	25.0	Bedrock	0.6	7.6	Domestic
3607117	448331	4941592	9-Aug-77	68.9	Bedrock	9.1	30.5	Domestic
3607131	448331	4942022	25-Aug-77	74.4	Bedrock	-	24.4	Domestic
3607149	448331	4940022	21-Sep-77	37.5	Bedrock	1.2	4.3	Domestic
3607178	448331	4941472	28-Sep-77	24.4	Bedrock	9.4	3.7	Livestock
3607427	448331	4942072	7-Jun-78	13.1	Bedrock	6.1	4.6	Domestic
3607569	448331	4942022	3-Oct-78	31.7	Bedrock	5.5	13.7	Domestic
3607611	448331	4941472	6-Oct-78	37.8	Bedrock	-	21.3	Domestic
3607639	448331	4940622	3-Nov-78	25.6	Bedrock	0.0	9.1	Domestic
3607954	448331	4940272	29-Aug-79	24.4	Bedrock	4.6	8.8	Domestic
3608072	448331	4940622	5-Oct-79	26.5	Bedrock	-	3.0	Domestic
3608195	448331	4940322	27-Feb-80	22.3	Bedrock	2.1	8.2	Domestic
3608305	448331	4940521	29-Jul-80	25.6	Bedrock	1.2	9.1	Domestic
3608487	448331	4940588	21-Jun-81	24.4	Bedrock	0.6	5.5	Commerical
3608629	448331	4941550	13-Aug-82	67.7	Bedrock	-	-	Domestic
3608778	448331	4940631	4-Jun-82	28.0	Bedrock	1.8	4.9	Domestic
3608838	448331	4940367	14-Jul-83	29.9	Bedrock	2.4	6.1	Domestic
3609090	448331	4941280	18-Oct-84	39.3	Bedrock	0.6	18.3	Domestic
3609237	448331	4941089	13-Nov-84	61.0	Bedrock	1.2	30.5	Domestic
3609592	448331	4941598	22-Nov-85	29.9	Bedrock	12.2	7.6	Domestic
3609667	448331	4942064	31-Dec-86	48.8	Bedrock	14.3	18.3	Domestic
3609794	448331	4940949	24-Oct-86	22.3	Bedrock	1.2	7.0	Domestic
3609797	448331	4940957	27-Oct-86	22.3	Bedrock	1.8	7.0	Domestic
3609821	448331	4942031	7-Jul-86	79.2	Bedrock	9.1	15.2	Domestic
3611078	448331	4941952	16-Dec-89	67.7	Bedrock	7.6	15.2	Domestic
3611105	448331	4941670	31-Jul-89	48.8	Bedrock	3.7	24.4	Domestic
3613248	448331	4941185	4-Aug-94	31.1	Bedrock	2.7	1.8	Commerical
3613461	448331	4942056	9-Nov-94	85.3	Bedrock	-	33.5	Domestic
3613492	448331	4941922	17-May-85	85.6	Bedrock	11.6	16.2	Domestic
3613522	448331	4942263	19-Jul-95	36.9	Bedrock	9.8	11.9	Domestic
3614049	448331	4941233	3-Jun-97	41.5	Bedrock	1.8	19.2	Domestic
3614534	448331	4942033	27-Jul-99	79.6	Bedrock	9.4	21.3	Domestic
3615183	448331	4941359	12-Jul-01	73.5	Bedrock	0.0	27.4	Domestic
3615186	448331	4941334	16-Jul-01	61.3	Bedrock	1.5	27.4	Domestic
3615188	448331	4941326	12-Jul-01	61.3	Bedrock	0.6	27.4	Domestic
3615481	448331	4941831	28-Feb-02	36.6	Bedrock	2.7	25.0	Domestic
3615578	448331	4942109	15-Jul-02	82.3	Bedrock	0.0	31.1	Domestic
3615739	448331	4941364	5-Nov-02	67.4	Bedrock	0.0	42.7	Domestic
3615822	448331	4942144	20-Apr-03	76.2	Bedrock	16.8	19.8	Domestic
3616293	448331	4942147	10-Sep-04	34.7	Bedrock	8.0	5.0	Domestic
3616896	448331	4942287	20-Jul-06	44.8	Bedrock	9.0	5.9	Domestic
7041600	448331	4942122	26-Sep-06	63.6	Bedrock	8.4	15.2	Domestic
7041601	448331	4942072	26-Sep-06	63.6	Bedrock	8.7	15.1	Domestic
7041603	448331	4942090	26-Sep-06	38.1	Bedrock	8.7	12.9	Domestic
7157037	448331	4941127	14-Oct-10	45.1	Bedrock	0.5	11.9	Domestic
7172938	448331	4941367	14-Oct-11	39.0	Bedrock	4.3	5.8	Domestic
7175533	448331	4941446	30-Nov-11	93.9	Bedrock	0.9	12.2	Domestic
7304472	448331	4941839	16-Aug-17	80.8	Bedrock	9.1	30.8	Domestic
7310070	448331	4941005	19-Dec-17	31.1	Bedrock	2.1	3.8	Domestic
7367472	448331	4941776	2-Sep-20	75.9	Bedrock	9.1	13.4	Domestic

Notes:

- m AMSL = meters above mean sea level
- m BGS = meters below ground surface
- = data not available
- \* = well incorrectly mapped