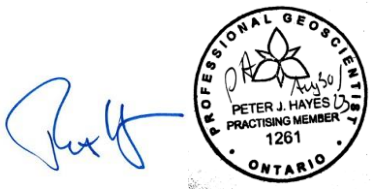
APPENDIX S

Erosion and Sedimentation Overview Risk Assessment

MEMO

TO: Ministry of Transportation of Ontario – Eastern Region



FROM: Peter Hayes, P.Geo., WSP Canada Inc. and Emily Stephenson, P.Geo, WSP Canada Inc.

SUBJECT: Highway 401 Planning Study from Colborne to Brighton – Preliminary Design and Class Environmental Assessment Study (GWP 4054-17-00) – Erosion and Sedimentation Overview Risk Assessment

DATE: August 30, 2023

PROJECT NO.: 17M-01712-11

WSP was retained by the Ontario Ministry of Transportation (MTO), Eastern Region to undertake the Planning, Preliminary Design and Class Environmental Assessment (Class EA) Study on Highway 401 for the replacement / rehabilitation of bridges and structural culverts, establishing the future Highway 401 footprint for an interim six lanes and ultimate eight lanes to address current and future transportation needs, and commuter parking lot improvements from 0.8 km east of Percy Street to 0.4 km west of Christiani Road (**Figure 1**). The study area traverses Northumberland County, the Township of Cramahe, Municipality of Brighton, and borders the City of Quinte-West and Hastings County. The Class EA involves the rehabilitation or replacement of seven bridges and culverts, and commuter parking lot improvements at County Road 30.

As part of the Class Environmental Assessment and Preliminary Design Study, an Erosion and Sedimentation Overview Risk Assessment (ESORA) was completed for the proposed construction. The site location is shown on attached **Figure 1**.

The objective of the ESORA is to provide a preliminary assessment on the site to support future location specific erosion and sediment control assessments. WSP is providing recommendations for the next design phase and future construction.

LAND USE AND NATURAL FEATURES

The proposed construction crosses through mainly forest and agriculture settings. Land uses predominately include a range of natural, farm land and rural residential houses.

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There are many natural features areas in the study area, including multiple watercourses, waterbodies and a number of wetlands, including Provincially Significant Wetlands. Natural features are shown on attached **Figures 2 to 2.6**.

CLIMATE

WSP completed a review of Canadian Climate Normals 1981 to 2010 (29 years) for the closest Government of Canada weather station, Trenton Airport, which is located approximately 13.5 km east of the eastern end of the project alignment. Temperatures follow typical trends of the region, with average daily temperatures from -6.8 Celsius (°C) in January to 20.7°C in July. Monthly precipitation ranges from approximately 56.5 millimetres (mm) in February to 95.5 mm in September. Average annual precipitation is approximately 911.4 mm. Approximately 29 days of the year have more then 10 mm of precipitation on average and approximately 6 days of the year have more then 25 mm of precipitation on average.

PHYSIOGRAPHY, TOPOGRAPHY AND DRAINAGE

The site is located in the Iroquois Plain and South Slope physiographic regions of eastern Ontario, as per Chapman and Putnam (1984).

The site is located within the Newcastle to Trenton subsection of the Iroquois Plain and in the vicinity of the site specifically there are large drumlins, some with a height of 46m or more, the hallows between the drumlins are floored with silt.

The eastern portion of the South Slope in Northumberland County (site location) has many large drumlins, with fine sand and silt overlying the till up to a depth of approximately 2.4 m (Chapman and Putnam, 1984).

Topographic contours across the study area range from approximately 160 m above mean sea level (AMSL) to 230 m AMSL. Topographic contours for the area are shown on attached **Figures 2 to 2.6**. Drainage is anticipated to be directed to local road side ditches or storm sewers which flow south into Lake Ontario.

SURFICIAL GEOLOGY

The surficial geology of the region is mainly composed of coarse textured glaciolacustrine foreshore, basinal and littoral deposits (sand, gravel, minor silt and clay). Along with areas of till (sandy silt to silty sand till on paleozoic terrain).

A glaciofluvial deposit (gravel) is located along the eastern section of the alignment. Additionally the are organic deposits (peat, muck, marl) and modern alluvial deposits (clay, silt, sand, gravel, may contain organic remains) along some of the watercourses/wetland features. Surficial geology is shown on attached **Figures 2 to 2.6**.

Surficial geology was verified for the site based on WSP (2023) foundation investigations for three bridges as follows:

- County Road 26 and Highway 401 - gravelly silty sand to sand fill over sand and silt;
- Herley Road and Highway 401 - sand and gravel fill over sand; and
- Lake Road and Highway 401 – gravelly silty sand over silty sand.

ASSESSMENT OF EROSION AND SEDIMENTATION RISK

To complete the erosion and sedimentation risk assessment for the site WSP prepared attached **Figures 2 to 2.6**, which includes topographic contours, natural features and surficial geology. WSP divided the site into six (6) polygons (lettered A through F) of similar characteristics including geology, topography and natural features.

Each polygon was assessed based on the following MTO's (2015) Hierarchy of Soil Erodibility (**Tables 5.1**), which classifies various soil types (surficial geology mapping) as low, medium or high soil erodibility and MTO's (2015) Erosion Potential Associated with Slope Length, Slope Gradient and Slope Erodibility Rating (**Table 5.2**), which defines the erosion potential associated with the various polygons based on the soil erodibility from **Table 5.1** and the slope gradient and length (approximated based on the topography of the polygons). The results of the assessment are provided in **Table 1** and are shown on attached **Figures 2 to 2.6**.

Table 5.1 Hierarchy of Soil Erodibility (MTO, 2015)

Erodibility Classification	Soil Type	Soil Erodibility
Most	Silt	High
	Silty Loam	High
	Loam	High
	Silty Sand	High
	Sandy Loam	Medium
	Silty Clay Loam	Medium
	Sandy Clay Loam	Medium
	Silty Clay	Medium
	Sandy Clay	Low
	Clay	Low
	Heavy Clay	Low
	Loamy Sand	Low
	Sand	Low
	Poorly Graded Gravel	Low
Least	Well-Graded Gravel	Low

Table 5-2 Erosion Potential Associated with Slope Length, Slope Gradient and Slope Erodibility Rating (MTO, 2015)

Slope Gradient	Soil Erodibility	Slope Length	
		<70 m	>70 m
0-10%	Low	Low	Low
	Medium	Low	Moderate
	High	Moderate	High
10-20%	Low	Low	Moderate
	Medium	Moderate	High
	High	High	High
>20%	Low	Moderate	Moderate
	Medium	High	High
	High	High	High

Individual assessment of each polygon for **Table 5.1 and 5.2** (MTO, 2015) are provided in following **Table 1**.

Table 1: Erosion Potential and Consequence Assessment

Polygon	Watercourses / Wetlands	Surficial Geology	Soil Erodibility	Slope Length	Slope Gradient	Erosion Potential	Consequence
A	Waterbody unnamed watercourses not evaluated wetland Per OWES	sand, gravel, minor silt and clay sandy silt to silty sand till	High	<70	>20%	High	High
B	Waterbody (Little Lake) unnamed watercourses wetlands not evaluated Per OWES	sand, gravel, minor silt and clay clay, silt, sand, gravel, may contain organic remains	Medium	<70	0 - 10%	Low	High
C	Waterbody unnamed watercourses wetlands not evaluated Per OWES evaluated wetlands (other)	sand, gravel, minor silt and clay sandy silt to silty sand till peat, muck, marl	High	<70	>20%	High	High
D	unnamed watercourses wetlands not evaluated Per OWES	sand, gravel, minor silt and clay sandy silt to silty sand till gravel	High	<70	>20%	High	High
E	unnamed watercourses wetlands not evaluated Per OWES	sand, gravel, minor silt and clay gravel	Low	<70	0-10%	Low	High
F	Waterbodies unnamed watercourses wetlands not evaluated Per OWES	sand, gravel, minor silt and clay sandy silt to silty sand till gravel	High	<70	>20%	High	High

Polygons were found to have high to low erosion potential. Polygons are considered to have high potential for consequences given the numerous waterbodies, watercourse and wetlands, including Provincially Significant Wetlands in the polygons. The anticipated high potential risk is considered manageable through the implementation of a proper erosion and sediment control plan, utilizing erosion and sediment control Best Management Practices (BMPs).

EROSION AND SEDIMENT CONTROL

Based on an assessment of the existing conditions at the site and the anticipated work to be completed, WSP recommends as a minimum the following Ontario Provincial Standard Specifications (OPSSs) for erosion and sediment control during construction:

Ontario Provincial Standard Specifications (OPSSs)

1. OPSS Prov. 100: MTO General Conditions of Contract
2. OPSS Prov. 180: Management of Excess Materials
3. OPSS Prov. 801: Protection of Trees
4. OPSS Muni. 802: Topsoil
5. OPSS Prov. 803: Vegetative Cover
6. OPSS Prov. 804: Temporary Erosion Control
7. OPSS Prov. 805: Temporary Sediment Control
8. OPSS Prov. 517: Dewatering
9. SSP 101F23 Amendments to OPSS 182, April 2020 – Timing of In-Water Works, Oversight Requirements, and Measures to Avoid Harm to Fish

In addition, WSP considers that the following Ontario Provincial Standard Drawings (OPSD) applicable to this project:

Perimeter Sediment Control BMPs

1. OPSD 219.100 Light-Duty Straw Bale Barrier
2. OPSD 219.110 Light-Duty, Silt Fence Barrier / MTOD 219.110 Sediment Fence Barrier
3. OPSD 219.120 Light Duty, Fibre Roll Barrier / MTOD 219.120 Fibre Roll Barrier
4. OPSS 219.130 Heavy Duty Silt Fence Barrier
5. OPSS 219.131 Heavy Duty Wire Backed Silt Fence Barrier / MTOD 219.131 Wire-Backed Sediment Fence Barrier
6. OPSD 219.150 Sandbag Barrier
7. OPSD 219.160 Fibre Roll Grade Breaks
8. WSP has prepared a diagram for a double-heavy duty row of silt fence with straw bales in between. This installation is recommended to be used where a high level of perimeter sediment control protection is required adjacent to an environmentally sensitive feature, such as a watercourse, riparian zone, or wetland. It is also recommended at the base of slopes, because this silt fence configuration is more sturdy and robust as compared to a single silt fence installation. A diagram of this BMP is provided in **Attachment A**. This BMP is recommended to be used as a perimeter sediment control in the following situations:

a. To protect all watercourses deemed as fish habitat;
b. To protect all designated wetland areas;
c. To protect adjacent woodlots, valley lands, meadows, agricultural fields, and private properties, where the slope from the work site is downward towards such areas (for slopes greater than 10 percent, which are also more than 10 metres long, and / or more than two metres high relative to the site perimeter);
d. Around soil stockpiles, if soil is to be stockpiled at the work site perimeter; and
e. This BMP must be carefully designed to also include gaps with check dams and sediment basins, where concentrated flow of water leaves the work site.

The final recommendations for erosion and sediment control fencing during detail design should be reviewed with the project ecologists to determine site-specific wildlife fencing (e.g. snake and turtle deterrence / exclusion fencing).

Check Dams, Drainage, and Sedimentation Basin BMPs

9. OPSD 219.180: Straw Bale Flow Check Dam (OPSD 219.191, 219.200, 219.210 and 219.211 are favored options over 219.180)
10. OPSD 219.191 Fibre Roll Flow Check Dam
11. OPSD 219.200 Sandbag Flow Check
12. OPSD 219.210 Temporary Rock Flow Check, V-Ditch / MTOD 219.210 Rock Flow Check Dam V-Ditch
13. OPSD 219.211 Temporary Rock Flow Check, Flat Bottom Ditch or Channel / MTOD 219.211 Rock Flow Check Dam Flat Bottom Ditch
14. OPSD 219.220 Sediment Trap in Ditch
15. OPSD 219.230 Temporary Slope Drain for Sediment Trap / MTOD 219.230 Slope Drain for Sediment Trap
16. OPSD 219.231 Temporary Berm Barrier for Slope Drain / MTOD 219.231 Berm Barrier for Slope Drain
17. OPSD 219.240 Sediment Trap for Dewatering

In-Water Works BMPs

18. OPSD 221.010 Temporary Water Passage System – Culvert in Watercourse
19. OPSD 221.020 Temporary Water Passage System – Pumping and Piping
20. Specific in-water works will need to be designed, which are not depicted through OPSDs, and such measures may include:
    a. In-water working platforms;
    b. Cofferdams;
    c. Dewatering cofferdams and excavations within a marine setting;
    d. Shoreline protection;
    e. Temporary access bridges between in-water working platforms and the mainland; and
    f. Placement of earth fill and shoreline protection materials within the lake.

Tree Protection BMPs

21. OPSD 220.010 Barrier for Tree Protection

Best Management Practices (BMP)

MTO's Environmental Guide for Erosion and Sediment Control during Construction of Highway Projects (2015) provides fact sheets and supporting drawings for thirty-seven (37) erosion and sediment control BMPs as follows:

1. BMP #1: Topsoiling;
2. BMP #2: Seeding;
3. BMP #3: Mulching;
4. BMP #4: Hydroseeding - Hydromulching;
5. BMP #5: Sodding, Sod Buffer Strips;
6. BMP #6: Riparian Zone Preservation;
7. BMP #7: Riprap/Riverstone Armouring;
8. BMP #8. Gabions;
9. BMP #9. Aggregate Cover (Granular B);
10. BMP #10. Stabilized Worksite Entrance (Gravel area at construction access road entrances to paved roads); The contractor needs to ensure that vehicles leaving the Site are clean with respect to mud and debris. Due to space limitations, the contractor may need to make a smaller vehicle washing station than this BMP depicts;
11. BMP #11: Rolled Erosion Control Products (RECP);
12. BMP #12. Plastic Sheeting (on highly troublesome steep slopes);
13. BMP #13. Cellular Confinement System (Plastic Honeycombs to stabilize topsoil on a slope);
14. BMP #14. Chemical Stabilization;
15. BMP #15. Slope Texturing / Grading (Cat-Tracking);
16. BMP #16. Slope Flattening;
17. BMP #17. Slope Serration (Cutting 'benches' in higher, steeper slopes, especially shale cuts);
18. BMP #18. Slope Drains;
19. BMP #19. Groundwater Control (Through weeping tiles);
20. BMP #20. Synthetic Permeable Barrier (I.e. Filter log check dam);
21. BMP #21: Silt Fence Barrier;
22. BMP #22. Straw Bale Barrier;
23. BMP #23. Berm (Earth Dyke) Barrier;
24. BMP #24. Brush or Rock Berm;
25. BMP #25. Sand Bag Barrier;
26. BMP #26: Check Dam (Rock, Sandbag, Log, Straw Bales, Silt Fence);
27. BMP #27 Fibre Rolls / Wattles (fascines);
28. BMP #28. Diversion Ditch;
29. BMP #29. Temporary Stream Diversion (Flume, pumping system, or temporary channel);
30. BMP #30 Coffer Dams;
31. BMP #31 Energy Dissipators;
32. BMP #32. Turbidity Curtains;
33. BMP #33. Drain Inlet Sediment Barrier ;
34. BMP #34. Continuous Berm (i.e. Filter Logs);
35. BMP #35: Sediment Traps and Basins (for dewatering);
36. BMP #36: Storm Sewer Protection; and

37 BMP #37: Pumped Silt Control System (Filter bags for dewatering discharge water).

Additionally, dust control strategies should be implemented to minimize wind-blown dust.

A qualified terrestrial ecologist and aquatic biologist should evaluate the erosion and sediment control plan in detail design and determine if additional and specific measures are needed for wildlife protection. Although site perimeter controls (silt fence, safety fencing, etc.) may also function to some degree as wildlife exclusion fencing, further evaluations are required as follows:

- Identify areas where temporary wildlife exclusion fencing is needed, with respect to species of concern, along with recommended or required wildlife exclusion strategies.
- Specific measures and activities needed to search for and rescue any SARs or other species of concern from work areas, along with strategies to exclude them from the work area throughout the construction program and restore their habitat post-construction.
- With respect to any work in designated wetlands, a qualified geomorphologist, ecologist, and aquatic biologist, should be retained to develop watercourse restoration plans and / or creek realignments as necessary, and provide oversight during construction; and
- All erosion and sediment control measures are to be inspected and maintained by the Contractor to ensure they are functioning as intended throughout the construction period and until such time that construction is complete and disturbed areas have been stabilized. All erosion and sediment control measures that are failing must be repaired / replaced by the Contractor as soon as possible as identified in OPSS 182 and OPSS 805. All erosion and sediment control measures that are non-biodegradable should be removed from the site when work is complete, and the site is stabilized.

CONCLUSIONS AND RECOMMENDATIONS

The three Erosion and Sediment Control Plan Approaches as per MTO Guidance are briefly described as follows:

- Approach 1: Best Management Practices – the consultant recommends BMPs on contract drawings; and the contractor installs, maintains, and removes the BMPs:
- Approach 2: Erosion and Sediment Control Plan (ESCP) – the consultant prepares drawings, a Non-Standard Special Provision (NSSP) and a technical memo; and the contractor implements the ESCP; and
- Approach 3: Two Part ESCP Main and Supplemental - the consultant prepares drawings, a Non-Standard Special Provision (NSSP) and a technical memo; and the contractor prepares a supplemental ESCP to address construction methods.

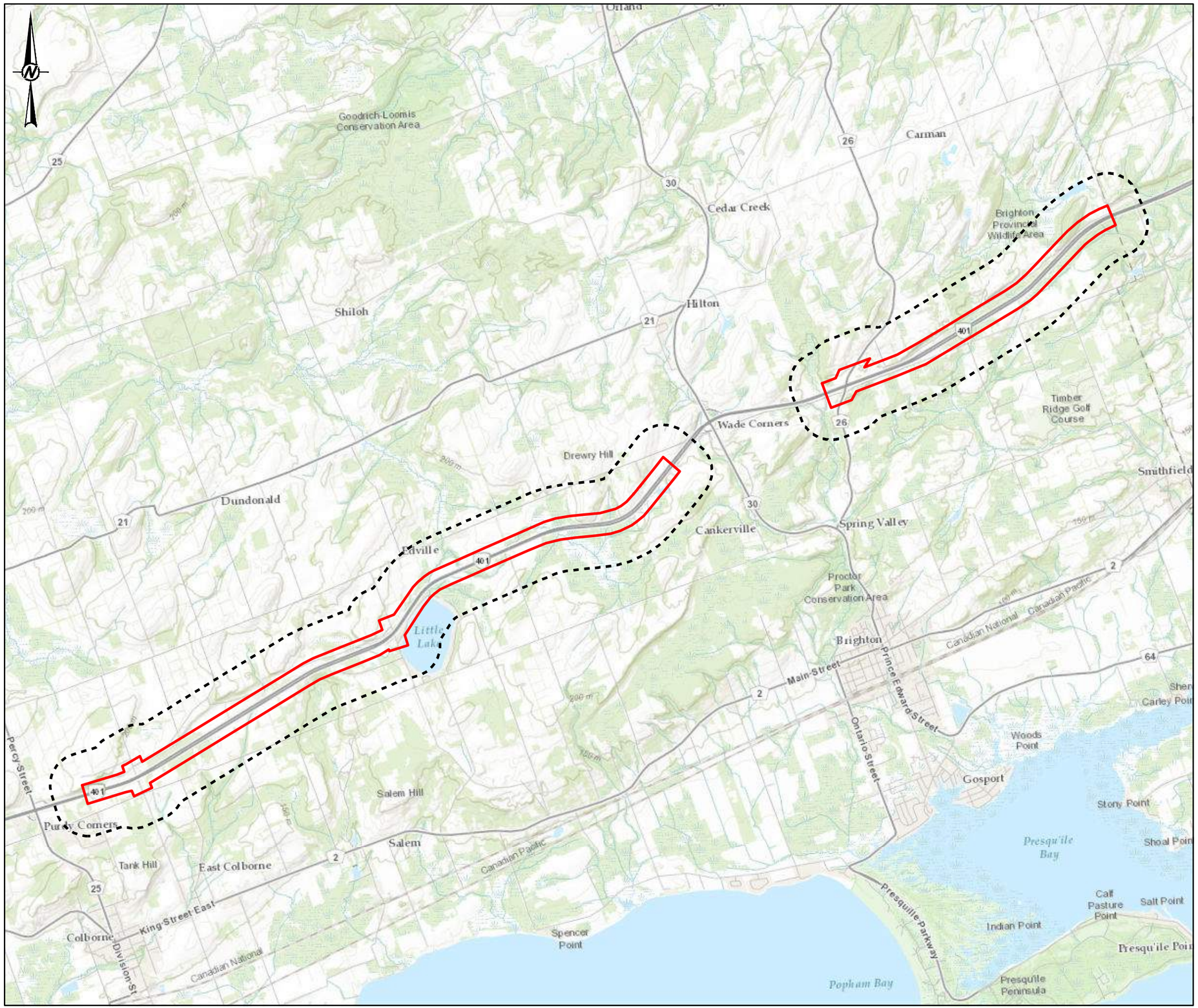
Given the high consequences of adverse effects of uncontrolled erosion and resultant sedimentation because of the very close proximity to numerous waterbodies, watercourse and wetlands, including Provincially Significant Wetlands, WSP recommends Approach 3: Two-Part Main and Supplemental Erosion and Sediment Control Plan be completed prior to construction. This approach is recommended as it incorporates the contractor’s thought and preparation of a supplemental erosion and sediment control plan prior to the start of construction and during detail design.

Figures:
Figure 1: Site Location
Figures 2 to 2.6 : Erosion and Sediment Overview Risk Map
Attachment A: Diagram of a Double Heavy Duty Silt Fence with Straw Bales In between

References:

- Chapman, L.J. and Putnam, D.F. (1984). The Physiography of Southern Ontario, Ontario Geological Survey Special Volume 2.
- Government of Canada (2022). Canadian Climate Normals 1981-2010 Station Data Trenton A: https://climate.weather.gc.ca/climate_normals/results_1981_2010_e.html?searchType=stnProx&txtRadius=25&selCity=&selPark=&optProxType=custom&txtCentralLatDeg=44&txtCentralLatMin=3&txtCentralLatSec=51&txtCentralLongDeg=77&txtCentralLongMin=46&txtCentralLongSec=55&txtLatDecDeg=&txtLongDecDeg=&stnID=5126&dispBack=0
- MTO (2015). Environmental Guide for Erosion and Sediment Control During Construction of Highway Projects
- MTO (2016). Ontario Provincial Standards for Road and Public Works. URL: http://www.raqsb.mto.gov.on.ca/techpubs/OPS.nsf/OPSHomepage
- WSP, 2023. Preliminary Foundations Investigation and Design Report. Replacement of Highway 401/County Road 26 Underpass.
- WSP, 2023. Preliminary Foundations Investigation and Design Report. Replacement of Highway 401/Herley Road Underpass.
- WSP, 2023. Preliminary Foundations Investigation and Design Report. Replacement of Highway 401/Lake Road Underpass.

FIGURES



KEY MAP

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LEGEND

500m STUDY AREA

SITE BOUNDARY

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NOTE(S)

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. IMAGERY CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT

MINISTRY OF TRANSPORTATION

PROJECT

EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE

SITE LOCATION

CONSULTANT

wsp

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APPROVED	----

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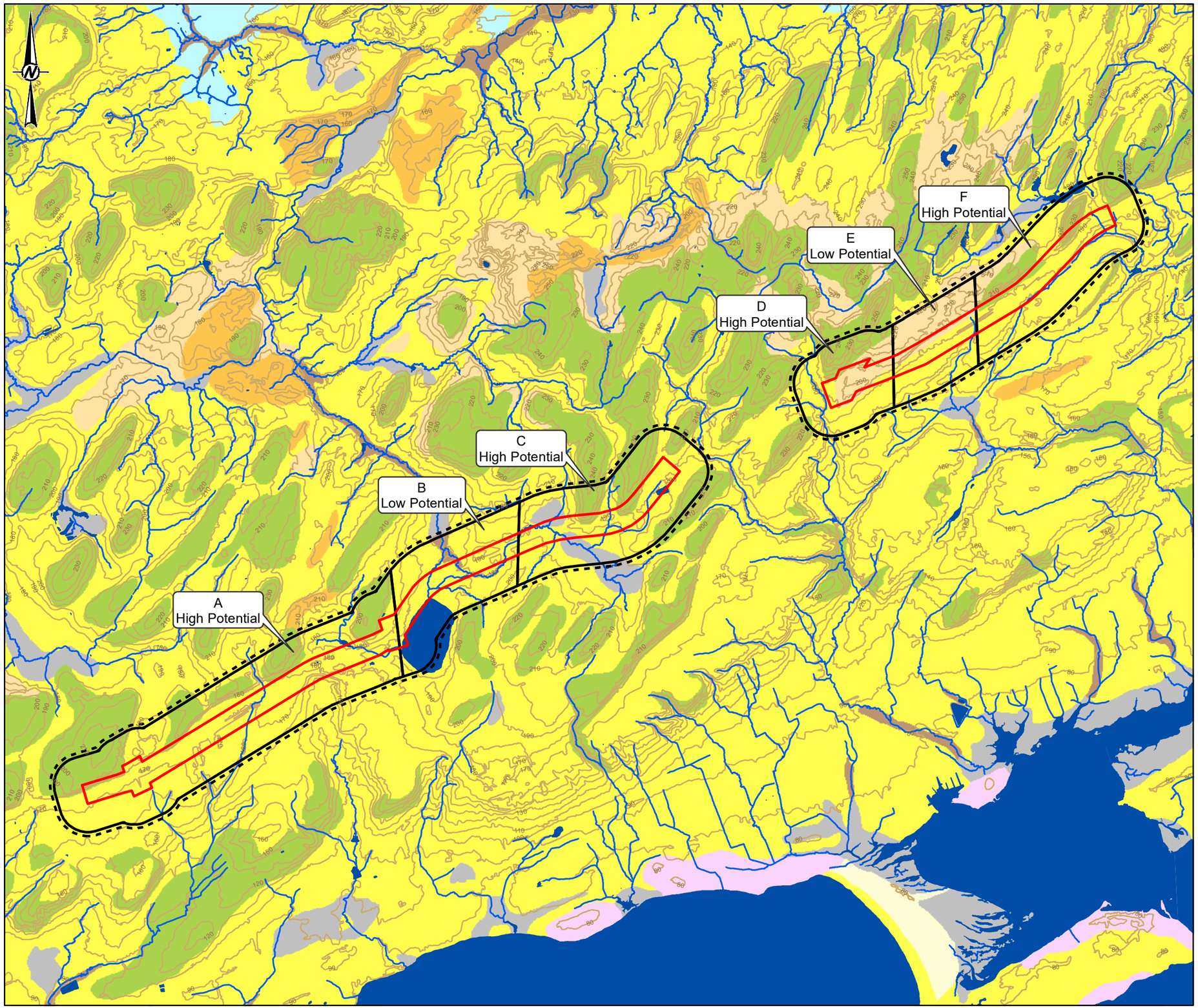

LEGEND

- 500m STUDY AREA
- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- WATERBODY
- WATERCOURSE
- 10M TOPOGRAPHIC CONTOURS

SURFICIAL GEOLOGY

- 3: PALEOZOIC BEDROCK
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 6: ICE-CONTACT STRATIFIED DEPOSITS
- 6A: IN MORAINES, KAMES, ESKERS AND CREVASSE FILLS
- 7A: SANDY DEPOSITS
- 7B: GRAVELLY DEPOSITS
- 8A: MASSIVE-WELL LAMINATED
- 9B: LITTORAL-FORESHORE DEPOSITS
- 9C: FORESHORE-BASINAL DEPOSITS
- 14B: LITTORAL-FORESHORE DEPOSITS
- 17: EOLIAN DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 550 1,100 2,200

1:60,000 METRES

NOTE(S)

REFERENCE(S)

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2. IMAGERY CREDITS:
3. COORDINATE SYSTEM: NAD 1983 UTM ZONE 17N

CLIENT

MINISTRY OF TRANSPORTATION

PROJECT

EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE

EROSION AND SEDIMENT OVERVIEW RISK MAP

CONSULTANT

wsp

YYYY-MM-DD	2023-03-09
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PREPARED	RRD
REVIEWED	ES
APPROVED	----

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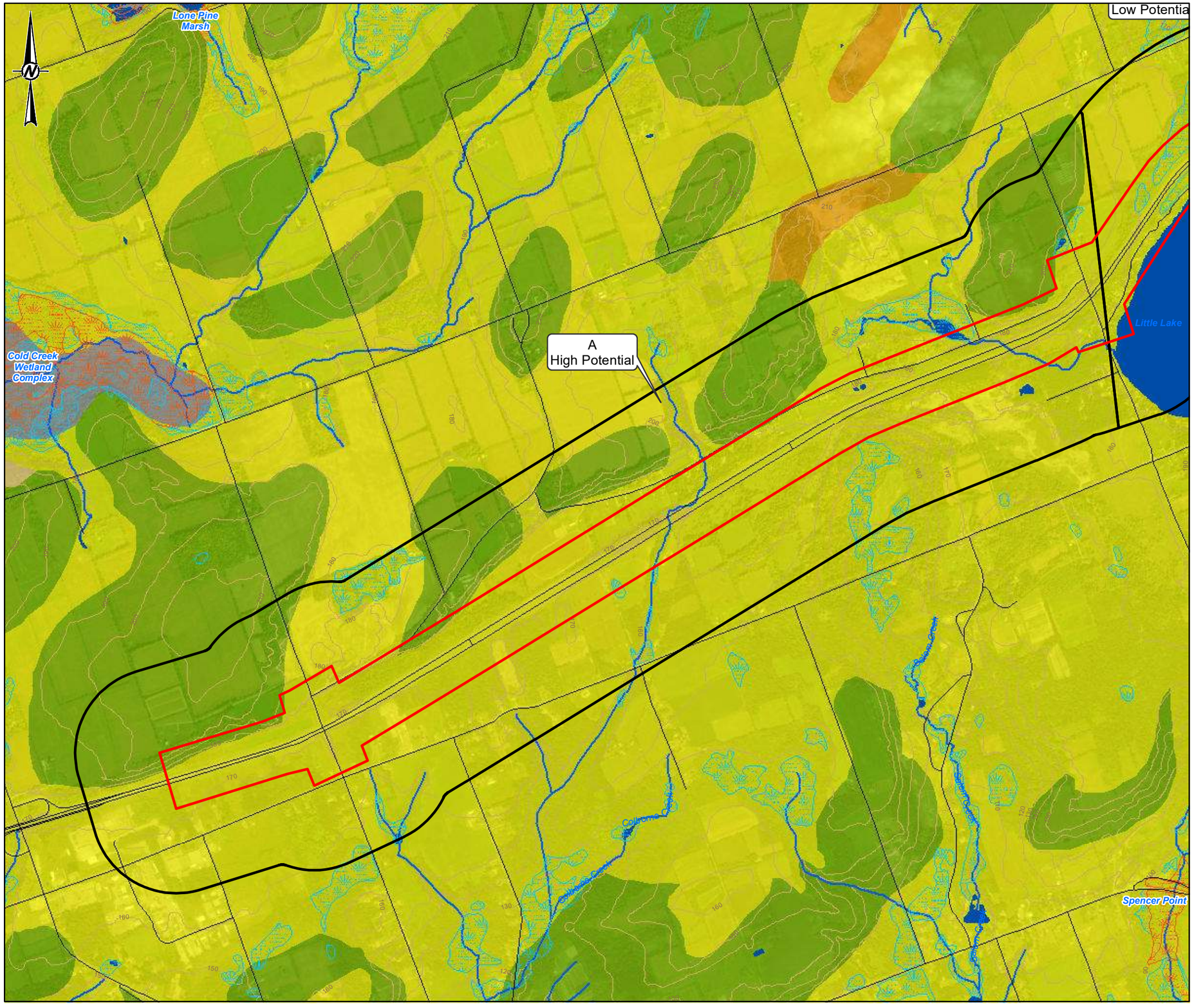
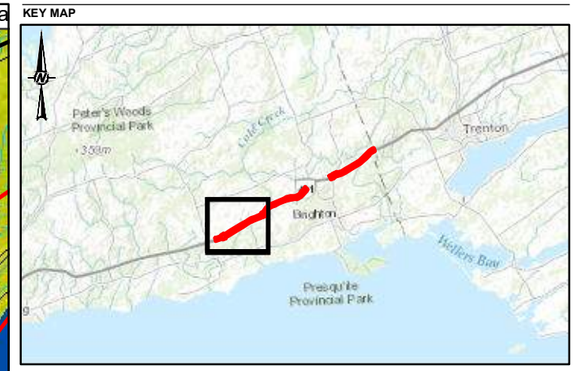


KEY MAP



SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- WATERBODY
- WATERCOURSE
- 10m TOPOGRAPHIC CONTOUR
- 3: PALEOZOIC BEDROCK
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 6: ICE-CONTACT STRATIFIED DEPOSITS
- 6A: IN MORAINES, KAMES, ESKERS AND CREVASSE FILLS
- 7A: SANDY DEPOSITS
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- 17: EOLIAN DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 200 400 800

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NOTE(S)

REFERENCE(S)

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SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT

MINISTRY OF TRANSPORTATION

PROJECT

EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE

EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA A

CONSULTANT

wsp

YYYY-MM-DD	2023-03-09
DESIGNED	----
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APPROVED	----

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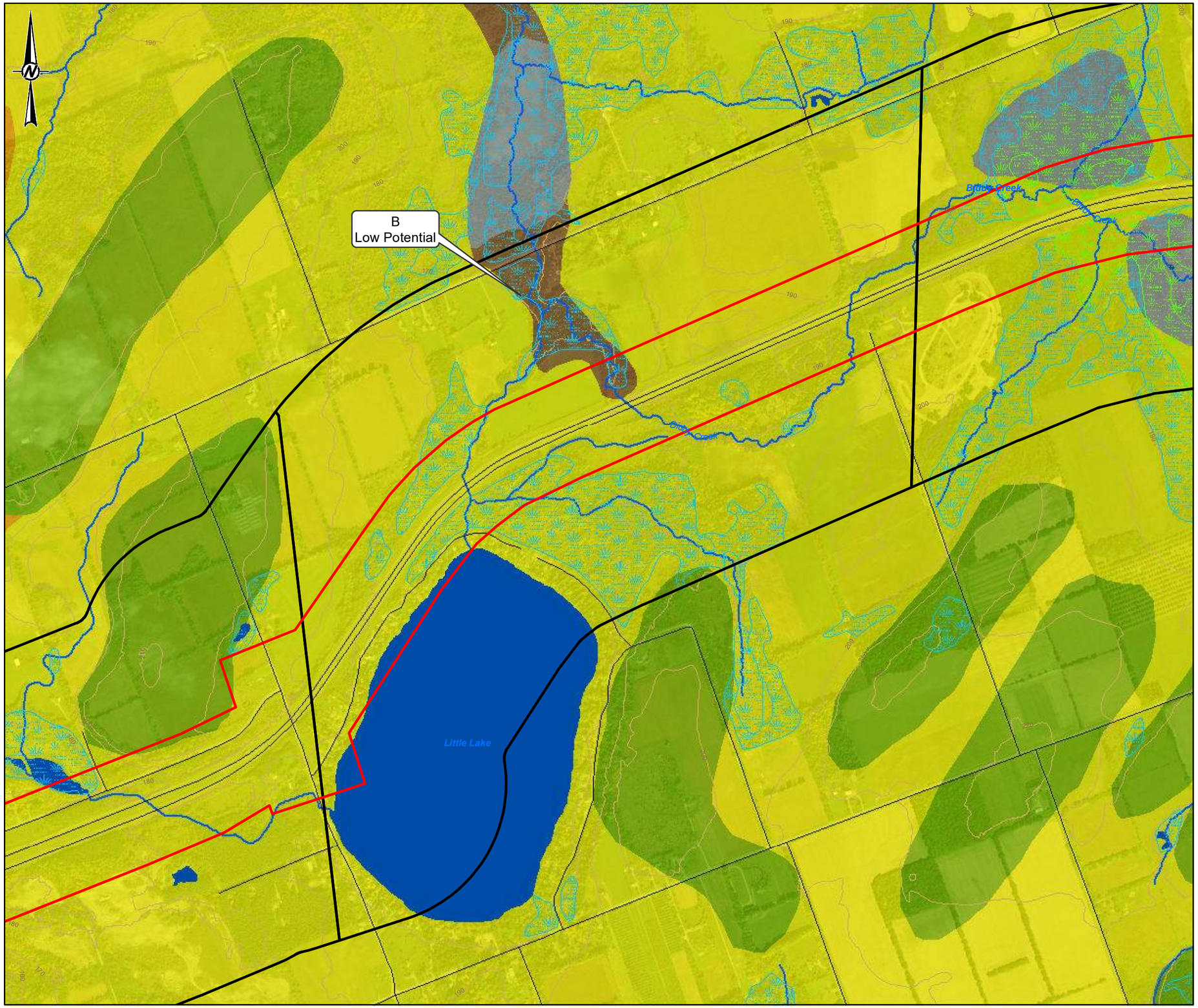

KEY MAP

SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
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0 120 240 480

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NOTE(S)

REFERENCE(S)

1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. IMAGERY CREDITS: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY

SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
MINISTRY OF TRANSPORTATION

PROJECT
EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE
EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA B

CONSULTANT

YYYY-MM-DD	2023-03-09
DESIGNED	----
PREPARED	RRD
REVIEWED	ES
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
17M-01712-11	0002	0	2.2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

PATH: S:\Clients\MTO\Hwy_401_Colborne_to_Brighton\09_PROJ\17M-01712-11_EIA\40_PROD\0002_ErosionSedimentation_RiskAssessment\17M-01712-11-0002-HS-0003.mxd PRINTED ON: 2023-03-09 AT: 10:38:38 PM

C
High Potential

Bibbs Creek

Cankerville Swamp

KEY MAP

SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- WATERBODY
- WATERCOURSE
- 10m TOPOGRAPHIC CONTOUR
- 3: PALEOZOIC BEDROCK
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 6: ICE-CONTACT STRATIFIED DEPOSITS
- 6A: IN MORAINES, KAMES, ESKERS AND CREVASSE FILLS
- 7A: SANDY DEPOSITS
- 7B: GRAVELLY DEPOSITS
- 8A: MASSIVE-WELL LAMINATED
- 9B: LITTORAL-FORESHORE DEPOSITS
- 9C: FORESHORE-BASINAL DEPOSITS
- 14B: LITTORAL-FORESHORE DEPOSITS
- 17: EOLIAN DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 120 240 480

1:12,000 METRES

NOTE(S)

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HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE
EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA C

CONSULTANT

wsp

YYYY-MM-DD	2023-03-09
DESIGNED	----
PREPARED	RRD
REVIEWED	ES
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
17M-01712-11	0002	0	2.3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

25mm

0

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D
High Potential

Matson Lake

KEY MAP

SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- WATERBODY
- WATERCOURSE
- 10m TOPOGRAPHIC CONTOUR
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- 9C: FORESHORE-BASINAL DEPOSITS
- 14B: LITTORAL-FORESHORE DEPOSITS
- 17: EOLIAN DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 80 160 320
1:8,000 METRES

NOTE(S)

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PROJECT
EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE
EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA D

CONSULTANT

YYYY-MM-DD	2023-03-09
DESIGNED	----
PREPARED	RRD
REVIEWED	ES
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
17M-01712-11	0002	0	2.4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

0 25mm

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E
Low Potential

Matson Lake

KEY MAP

SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- WATERBODY
- WATERCOURSE
- 10m TOPOGRAPHIC CONTOUR
- 3: PALEOZOIC BEDROCK
- 5B: STONE-POOR, CARBONATE-DERIVED SILTY TO SANDY TILL
- 6: ICE-CONTACT STRATIFIED DEPOSITS
- 6A: IN MORAINES, KAMES, ESKERS AND CREVASSE FILLS
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- 14B: LITTORAL-FORESHORE DEPOSITS
- 17: EOLIAN DEPOSITS
- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 85 170 340
1:8,500 METRES

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PROJECT
EROSION AND SEDIMENTATION OVERVIEW RISK ASSESSMENT
HIGHWAY 401 COLBORNE TO TRENTON, ONTARIO

TITLE
EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA E

CONSULTANT

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REVIEWED	ES
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
17M-01712-11	0002	0	2.5

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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F
High Potential

KEY MAP

SCALE 1:600,000

LEGEND

- SITE BOUNDARY
- EROSION POTENTIAL AREAS
- ROADWAY
- UNEVALUATED WETLAND
- EVALUATED WETLAND (NO SIGNIFICANCE)
- PROVINCIALLY SIGNIFICANT WETLAND (PSW)
- WATERBODY
- WATERCOURSE
- 10m TOPOGRAPHIC CONTOUR
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- 14B: LITTORAL-FORESHORE DEPOSITS
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- 19: MODERN ALLUVIAL DEPOSITS
- 20: ORGANIC DEPOSITS

0 120 240 480

1:12,000 METRES

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EROSION AND SEDIMENT OVERVIEW RISK MAP
EROSION POTENTIAL AREA F

CONSULTANT

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REVIEWED	ES
APPROVED	----

PROJECT NO.	CONTROL	REV.	FIGURE
17M-01712-11	0002	0	2.6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

0 25mm

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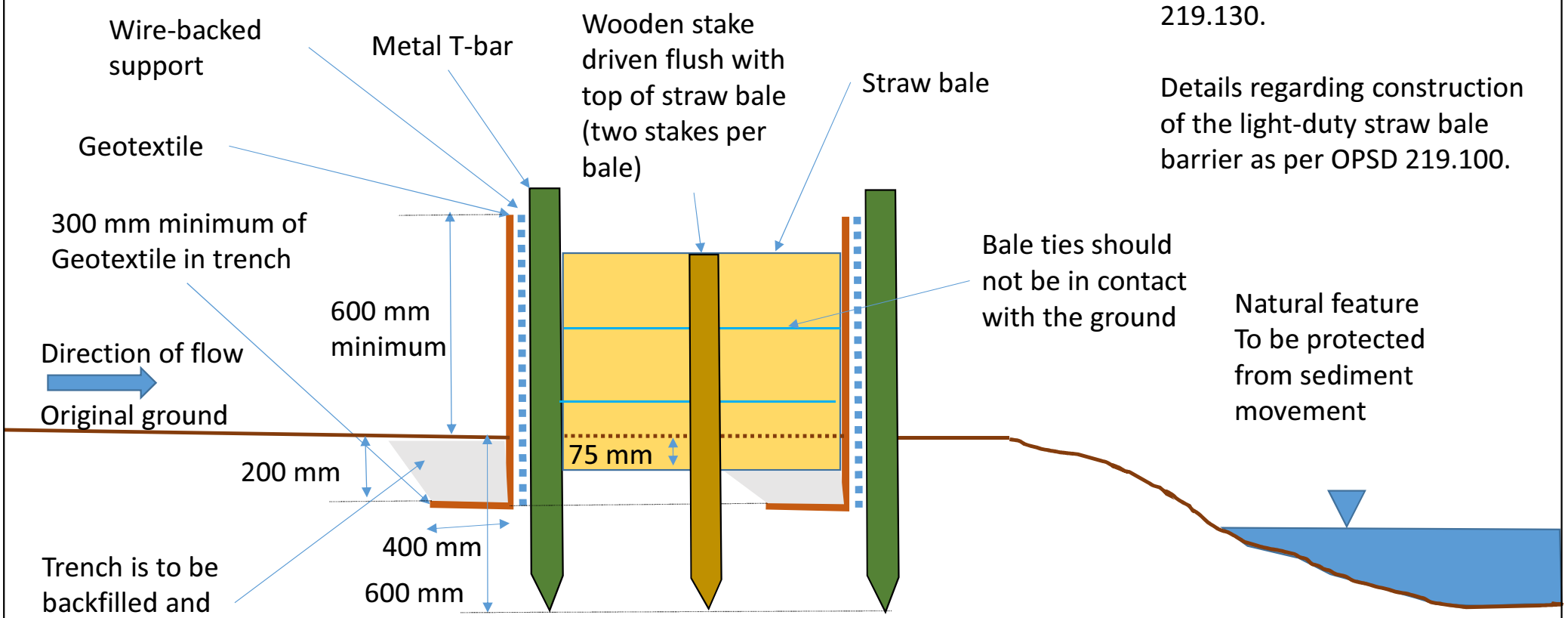
ATTACHMENT

A

DIAGRAM OF A DOUBLE HEAVY DUTY SILT FENCE WITH STRAW BALES IN BETWEEN

Double Heavy Duty Silt Fence with Straw Bale Barrier In-Between



Both wire backed silt fences have the same construction configurations

Notes:

Details regarding construction of the heavy-duty wire-backed silt fences as per OPSD 219.130.

Details regarding construction of the light-duty straw bale barrier as per OPSD 219.100.