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PERMIT NO. 202201368
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GUIDING SOLUTIONS IN THE
NATURAL ENVIRONMENT

Environmental Impact Study Towpath Drian Realignment Northwest Welland Secondary Plan Area

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Date: Project:

August 223098

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1. Introduction

Beacon Environmental Limited (Beacon) was retained by Upper Canada Consultants Ltd. (UCC) to prepare an Environmental Impact Study (EIS) in support of a proposed realignment of the Towpath Drain (the drain) within the City of Welland Northwest Secondary Plan Area (NWSPA 2019). The section of the drain to be realigned is located north of Quaker Road, from the Niagara Street crossing upstream (west) to Montgomery Road, a straight-line distance of 2 km (**Figure 1**). The proposed realignment is to facilitate stormwater control for future residential subdivision development for properties within the NWSPA. The drain and associated headwater drainage features are regulated by the Niagara Peninsula Conservation Authority (NPCA) pursuant to Ontario Regulation 155/06 under the provisions of Section 28 (1) of the *Conservation Authorities Act*, and therefore a permit from the NPCA is required to conduct the works. A draft design has been developed by UCC which was submitted to the NPCA as part of a permit application (NPCA file No. 202201368). In support of the application Beacon prepared a Memorandum (Memo), Bio-Physical Assessment of the Towpath Drain within the Northwest Welland Secondary Plan Area, dated July 12, 2022. Following review of the design and Memo the NPCA provided UCC with comments on January 29, 2023. In the Ecological Response Section, the NPCA identifies that an EIS will be required in support of the permit application.

The purpose of the EIS is to identify, delineate and evaluate natural heritage features, assess the potential impacts of the proposed drain realignment on ecological features and functions, and recommend mitigation measures to avoid, minimize, or off-set impacts. As required by the NPCA, Beacon provided the NPCA a Terms of Reference, dated April 26, 2023, to undertake the EIS.

2. Policy Context

The following sections provides of summary of NPCA development policies and regulations pertaining to watercourses and wetlands which the NPCA regulates pursuant to Ontario Regulation 155/06 and relevant provincial natural heritage policies.

2.1 NPCA Policies for Planning and Development

The NPCA November 2022 planning document “Policies for Planning and Development in the Watersheds of the Niagara Peninsula Conservation Authority” provides the principles, objectives, and policies for the administration of the NPCA’s mandate under Ontario Regulation 155/06, Regulation of Development, Interference with Wetland, and Alterations to Shorelines and Watercourses. For the proposed realignment of the Towpath Drain, development polices that apply are those for wetlands and watercourses and are detailed below.

2.1.1 Wetlands

Development policies for wetlands are detailed in Section 8 of the policy document. The policy framework within this document recognizes several classes of wetlands: Provincially significant

wetlands (PSW); b) Non-Provincially significant wetlands (non-PSW); and, c) Unevaluated wetlands. The wetland areas associated with the proposed realignment of the drain are unevaluated wetlands.

For unevaluated wetlands Section 8.1.2.3 (d) states that where an unevaluated wetland is determined to be a non-PSW wetland and there is no reasonable alternative to avoid development within the non-PSW, in accordance with the Protection Hierarchy (avoid/minimize/mitigate first), the NPCA may allow for the reconfiguration and re-creation of the wetland in accordance with NPCA Procedures and subject to the following policies;

- i) The wetland to be reconfigured or re-created is within a Settlement Area;*
- ii) The wetland to be reconfigured or re-created has been evaluated in accordance with the OWES Protocol and approved by the MNRF and is not a PSW under the OWES Protocol;*
- iii) The Protection Hierarchy has been followed and all efforts to protect the feature have been exhausted first;*
- iv) the wetland to be reconfigured or re-created is not protected by any other applicable federal, provincial or municipal requirement(s);*
- v) An EIS is provided for review and approval to demonstrate conformity with Section 8.1.2.3 d);*
- vi) The proposed development will not have a negative impact on any species of concern, significant habitat types or species at risk;*
- vii) The proposed development will not have a negative impact on the hydrological or ecological function of any remaining portions of the wetland;*
- viii) A restoration plan for the reconfigured or re-created wetland is provided and demonstrates an ecological net gain to the watershed natural system;*
- ix) A multi-year monitoring program is required (minimum five years) to ensure the long-term establishment of the reconfigured or re-created wetland;*
- x) A security deposit in an amount approved by the NPCA is provided to establish the reconfigured or re-created wetland and guarantee its establishment;*
- xi) The applicant is required to enter into a restoration agreement with the NPCA that will be registered on the title of the property containing the reconfigured or re-created wetland that will provide the necessary details to implement the policies of Section 8.1.2.3 d); and*
- xii) Additional information, such as a hydrologic study, restoration plan and or other studies as required depending on site-specific characteristics.*

With respect to buffer requirements to wetlands, Section 8.2.3.1 provides the following:

- 1) Where development is proposed adjacent to a wetland, a minimum 30 metre buffer shall be provided.*
- 2) Notwithstanding Section 8.2.3.1, a reduction to a non-PSW buffer shall only be considered where:*
 - a) There is no other reasonable alternative; and*
 - b) where supported by an EIS in accordance with NPCA Procedural Manual.*

Towpath Drian Realignment

Legend

- Ponds
- Provincially Significant Wetland (MNRF 2021)
- H3 – Headwater to Drain



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Last Revised: July 2023

Client: Prepared by: BD
Checked by: LW

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2.1.2 Watercourses

Development policies for watercourses are detailed in Section 9. Section 9.2.3.1 Watercourse Alterations details policies with respect to alterations to a watercourse and states that the NPCA may allow the alteration of a watercourse for the following works:

- Channel realignments;
- Vegetation alteration/spot removal of sediment accumulation;
- Full or partial diversions;
- Retaining walls;
- Revetments;
- Bridges;
- Culverts;
- Docks;
- Erosion control measures;
- Storm sewer outlets; and
- Enclosures greater than 20 metres.

Section 9. 2.3.2 details criteria for Assessing Watercourse Alterations and identifies that the following policies apply to the alteration of a watercourse:

- a. *The need for the watercourse alteration has been demonstrated to the satisfaction of the NPCA;*
- b. *The watercourse has been evaluated under NPCA's Procedural Manual and the alteration would be supported;*
- c. *The proposed works are in accordance with NPCA standards;*
- d. *Any proposed channel realignment shall only be allowed such that any required riparian buffer will not cross any property lines;*
- e. *The proposed watercourse alteration does not increase flood plain elevations, flood frequency, erosion rates or erosion frequency along either side of the watercourse, upstream and/or downstream of the proposed works;*
- f. *The works will not adversely affect the ecological and hydrologic function of the watercourse;*
- g. *and riparian zone;*
- h. *Adequate erosion protection measures are utilized when required; and*
- i. *Sediment control measures are incorporated during the construction phase to the satisfaction of the NPCA.*

With respect to buffer requirements Section 9.2.5.1 states the following buffer requirements apply to development and site alteration adjacent to a watercourse:

- A 30 metre buffer shall be provided where the watercourse contains permanent flow, cool water or coldwater systems or specialized aquatic or riparian habitat (such as but not limited to fish spawning areas, habitat of species at risk or species of concern, forested riparian areas or Type 1 Critical Fish. Habitat). Notwithstanding this requirement, the buffer may be reduced where supported by an EIS in accordance with the NPCA Procedural Manual, but in no case shall the buffer be reduced below 15 metres; and

- A 15 metre buffer shall be provided for watercourses containing intermittent flow, warmwater systems or general/impacts aquatic or riparian habitat, or Type 2 Important Fish Habitat or Type 3 Marginal Fish Habitat. Notwithstanding this requirement, the buffer may be reduced where supported by an EIS in accordance with the NPCA Procedural Manual.

2.2 Endangered Species Act (2007)

Ontario's *Endangered Species Act* (ESA, 2007) came into effect on June 30, 2008, and replaced the former 1971 Act.

Endangered or threatened species and their habitats receive protection under the regulations of the ESA. Specifically, Section 9 of the ESA prohibits the killing, harming, harassing, possession, collection, buying and selling of extirpated, endangered, and threatened species on the Species at Risk in Ontario (SARO) List; and Section 10 prohibits the damage or destruction of protected habitat of species listed as extirpated, endangered or threatened on the SARO List.

Authorization from the Ministry of the Environment, Conservation, and Parks (MECP) is required for any activity that could harm a threatened or endangered species or negatively impact their habitat.

2.3 Fisheries Act (1985)

The Federal *Fisheries Act* protects fish and fish habitat in Canadian Waters. Section 34 details Fish and Fish Habitat Protection. Section 34.4 (1) states that no person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish. Section 35 (1) states that no person shall carry on any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish habitat.

3. Methodology

The following details the area assessed for this EIS, background review, and the field assessment methods that were undertaken.

3.1 Study Area

This assessment addresses the Towpath Drain from the Niagara Street crossing upstream to Montgomery Road, a straight-line distance of 2 km (**Figure 1**). For the assessment the study area was divided into four areas based on property ownership. Area 1 extends westward from Rice Road to Montgomery Road. Area 2 extends 400 m east of Rice Road. Area 4 extends from Niagara Street, west to First Avenue. Area 3 represents the portion of the drain that flows through a wetland unit of the Provincially Significant (PSW) Niagara Street - Cataract Road Wetland Complex, located upstream of First Avenue. This section of the drain and associated headwaters were not assessed as no realignment

is proposed for this section of the drain. For the sections of the drain where realignment works are proposed, field investigations included the drain proper and 15 m adjacent lands, representing and 30 m wider corridor. In addition, headwater features that flow to the sections of the drain where realignment works are proposed were also surveyed. The study area is provided in **Figure 1**.

3.2 Background Review

The section of the drain in the study area lies within the Northwest Welland Secondary Plan Area (NWSPA). For the development of the secondary plan, an assessment of the natural heritage features and functions within the plan area was undertaken by Aquafor Beech Limit and detailed in a report titled Natural Heritage and Natural Hazards Existing Conditions Report for Northwest Welland Secondary Plan Area (SGL 2019). In addition to conducting field investigations, for the assessment, extensive reviews of background information was also undertaken for the report. The information in this report was reviewed for this EIS.

3.3 Field Investigations

Beacon ecologists undertook seasonal field investigations within the drain corridor over a three-year period, from 2021 through 2023. Seasonal surveys included headwater drainage features assessment, floral inventory, vegetation community classification, breeding bird and amphibian surveys, and bat habitat assessment and acoustic monitoring. Incidental wildlife observations were also noted. A summary of the seasonal field visits and survey dates is presented in **Tables 1 and 2**. More detailed survey descriptions are provided in the subsections that follow.

Table 1. Areas 1 and 2 Field Investigations

Field Investigation	Dates
Headwater Features Assessment	March 17, May 26, July 6, 2022
Amphibian Breeding Surveys	April 11, May 24, June 12, 2022
Breeding Bird Surveys	May 24 and June 15, 2022
Night Whip-poor-will/Night Hawk Survey	June 13 2022
Ecological Land Classification and Flora	May 24, June 15, July 6, September 5, 2022
Leaf Off Bat Habitat Assessment	March 14, 2022
Bat Acoustic Monitoring habitat assessment	June 1 st through 12 th , 2022

Table 2. Area 4 Field Investigations

Field Investigation	Dates
Headwater Features Assessment	March 15, 2021, and March 17, May 26, 2022, and March 10, 2023
Amphibian Breeding Surveys	April 17, June 2, 2021
Breeding Bird Surveys	May 25, June 17, 2021, and May 24 and June 15, 2022
Night Whip-poor-will/Night Hawk Survey	June 13, 2022
Ecological Land Classification and Flora	June 20 July 20, 2021, and May 24, September 6, 2022

Field Investigation	Dates
Leaf Off Bat Habitat Assessment	March 10, 2021, March 14, 2022
Wetland Boundary Staking with NPCA Staff	May 31, 2023.

3.3.1 Headwater Drainage Features Assessment

Foot surveys of the drain and headwater drainage features were undertaken to assess the flow regime and the vegetation communities associated within the flow channel and riparian corridor. The headwater features were assessed following the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (HDFG) (TRCA/CVC 2014).

3.3.2 Fish Sampling

Fish sampling of drain by Aquafor Beech on May 18, 2018, at the eastern limit of the study area (sample site TDR1 200 m upstream of the Niagara Street crossing) did not capture fish. Other upstream areas identified by Aquafor Beech for fish sampling (TDR2 located at the First Ave crossing and TDR3 on a small headwater tributary (H3) north of Quaker Road) were dry and could not be sampled. With the exception of the stormwater pond at the western limit of the drain, field survey by Beacon did not find summer refuge pockets of standing water that could support fish. Therefore a fish sampling program was not undertaken for EIS.

3.3.3 Vegetation

Vegetation communities associated with the drain corridor were mapped and described following the protocols of the Ecological Land Classification (ELC) system for Southern Ontario (Lee *et al.* 1998). This involved delineating vegetation communities on aerial photos of the property and recording pertinent information on the community structure and composition.

For wetland areas associated with the drain corridor, the wetland boundaries were flagged by Beacon and verified by NPCA staff during a site survey conducted on May 31, 2023.

A three season (spring, summer, fall) floral inventory was undertaken along the length of the drain corridor and a list of all species observed was compiled.

3.3.4 Wildlife Habitat

3.3.4.1 Amphibian Breeding Surveys

Amphibian surveys were undertaken at five locations along the drain in April, May and June in 2021 and 2022 during suitable weather conditions to confirm the presence or absence of breeding frogs and toads. **Tables 3 and 4** summarizes survey start times and weather conditions.

Table 3. Areas 1 and 2 2022 Amphibian Breeding Field Survey Dates and Conditions

Date	Start Time (pm)	Temp °C	Wind (Beaufort Scale)	Cloud Cover
April 11 th	10:03 – 11:15	8	Light Air (1)	8/8
May 24 th	8:40 – 9:46	12	Light Air (1)	4/8
June 12 th	10:30 – 11:17	20	Light Air (1-2)	6/8

Table 4. Area 4 2021 Amphibian Breeding Field Survey Dates and Conditions

Date	Start Time (pm)	Temp °C	Wind (Beaufort Scale)	Cloud Cover
April 17 th	8:25 – 9:10	12	Light Air (1)	4/8
June 2 nd	8:40 – 9:10	22	Light Air (0-1)	6/8

For the survey, species were identified by call, and an abundance code for each species heard calling was assessed by the following the Amphibian Monitoring protocol:

- Code 0 - No calls heard;
- Code 1 - Calls not overlapping or simultaneous, number of individual frogs can be counted;
- Code 2 - Calls overlapping or simultaneous, number of individuals can still be distinguished, number of individual frogs cannot be counted, but a reliable estimate of numbers can be made based on location and call voices; or
- Code 3 - Full chorus, calls simultaneous and overlapping, numbers of calling males cannot be reasonably counted or estimated.

Using this code method, areas that support a Code 1 for a species indicate very low population numbers in the local area, and/or low-quality breeding habitat. Code 2 indicates a moderate population and/or moderate quality breeding habitat. Code 3 for species indicates a healthy population and high-quality breeding habitat.

3.3.4.2 Breeding Bird Surveys

Breeding bird surveys were conducted in May and June in 2021 and 2022. Surveys were conducted in the morning on days with low winds (0 to 1 on the Beaufort scale), with temperatures within 5°C of normal and no precipitation. For each survey a foot walk along the drain corridor was conducted and all birds seen or heard were recorded, including birds in the adjacent lands. Point count or transit survey methods were not undertaken, as these survey methods are typically only required for collecting statistically valid data sets for long term studies, or for the survey of large (>100 ha) areas of land.

In addition to the day surveys, a specific night survey to detect calls for the Threatened Whip-poor-will (*Antrostomus vociferus*) and Special Concern Common Nighthawk (*Chordeiles minor*) was undertaken following the MNRF Survey Protocol (MNRF 2016) during the full moon of June 13, 2022, **Tables 5 and 6** summarizes survey start times and weather conditions.

Table 5. Areas 1 and 2 Breeding Bird Field Survey Dates and Conditions

Date	Start Time (am)	Temp °C	Wind (Beaufort Scale)	Cloud Cover
May 24 th	7:02 – 8:35	12	Light Air (1)	1/8
June 15 th	6:06 – 7:45	15	Light Air (1)	2/8
Night Survey June 13 th , 2022	10:30 – 11:10	16	Light Air (1)	1/8

Table 6. Area 4 Breeding Bird Field Survey Dates and Conditions

Date	Start Time (am)	Temp °C	Wind (Beaufort Scale)	Cloud Cover
May 25 th 2021	8:15 – 8:40	23	Light Air (1)	2/8
June 17 th 2021	6:10 – 6:30	22	Light Air (0-1)	4/8
Night Survey June 13 th , 2022	9:45 – 10:20	16	Light Air (1)	1/8
June 15 th 2022	7:32– 8:05	15	Light Air (1)	2/8

3.3.4.3 Bat Habitat Assessment

Several bat species are listed as endangered in Ontario, including Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifugus*), Northern Myotis (*Myotis septentrionalis*), and Tri-colored Bat (*Perimyotis subflavus*). These species over-winter in caves and mines. Maternal roosts are often associated with cavity trees and sometimes old buildings (e.g. attics).

The *Survey Protocol for Species at Risk Bats within Treed Habitats Little Brown Myotis, Northern Myotis & Tri-Colored Bat* (MNRF 2017) includes three steps for identifying habitat of Endangered bats:

- Step 1: Complete ELC mapping to determine if any coniferous, deciduous or mixed wooded ecosite, including treed swamps, that includes trees at least 10 cm diameter-at-breast height (dbh) are present. If suitable habitat is to be impacted by a proposed activity, project proponents should proceed to step 2.
- Step 2: Conduct surveys for suitable bat maternity roost trees within the coniferous, deciduous or mixed wooded ecosites. Trees with cavities, loose bark, and/or cracks may support maternity roost habitat for Little Brown Myotis and Northern Myotis (MNRF 2017). In

addition, according to the MNRF guidelines (2017), oak trees and, to a lesser extent, maple trees are preferred habitat for Tri-colored Bat and the following trees should be documented:

- Any oak tree >10cm DBH;
- Any maple tree >10cm DBH if the tree includes dead/dying leaf clusters; and
- Any maple tree >25cm DBH.

Step 3: Conduct acoustic surveys within each ELC ecosite determined to be suitable maternity roost habitat in Step 1 to confirm presence/absence of Endangered bat species. The optimal locations of acoustic detectors within the ELC communities are determined based on the data collected in Step 2.

Snag surveys (Step 2) were conducted along the interior drain corridor in March 2021 and 2022. Based on ELC mapping, most of the drain corridor supports shrub/thicket habitat, with scattered young trees. Woodland ecosites are limited to Area 1 and these wooded areas were identified as potential bat habitat during the secondary plan studies. Acoustic monitoring (Step 3) was completed from June 1 - June 12, 2022, to determine what species of bats, if any, inhabit the woodlands. Five SM4BAT passive monitors, equipped with a SMM-U1 ultrasonic, omni-directional, microphone were installed in the woodlands. The microphones were deployed at least 2.5 m above the ground and was oriented to optimize echolocation detections. The monitor was programmed to record during triggered events each night for a period of six hours beginning at half an hour before sunset. A 12dB gain setting was used based on the SMM-U1 microphone, the surrounding habitat and proximity to potential roost trees. The unit was programmed to record with a 256 kHz sample rate and the high pass filter was set to 16 kHz to eliminate low frequency noise but to still capture the lowest frequency bat calls (e.g., Hoary Bat for the study area). All files were recorded as full spectrum in .WAV format.

Recordings from the detectors were analyzed using Kaleidoscope software.

3.3.4.4 Incidental Wildlife

Incidental observations for the presence of mammals (including direct observation, tracks, scat, and other signs), reptiles and insects were recorded during all other field surveys.

4. Existing Conditions

4.1 The Drain and Headwater Drainage Features

Detailed assessment of drain watercourse and headwater drainage features was provided to the NPCA in a Memorandum titled, *Bio-Physical Assessment of the Towpath Drain within the Northwest Welland Secondary Plan Area*, dated July 12, 2022, in support of the development of a design for the re-alignment of sections of the Towpath Drain and the following provides a summary of the assessment.

4.1.1 Towpath Drain

The drain supports an ephemeral flow regime which is dependant on precipitation surface flows, primarily spring freshet snow melt and rains, with flow ending by the end of May. No ground water base flows occur to maintain post freshet flows. Summer periodic short term flows (days) can occur following heavy and/or prolonged rain events.

The morphology of the watercourse is primarily a straight ditch, with a bank full flow width of 1 to 2 m, and maximum water depth of 20 -30 cm. Throughout the length of the drain no meanders or riffle- pool features are present. Substrate within the flow channel throughout the drain is clay, with some pockets supporting a shallow accumulation of silt and organic debris over the clay substrate. No gravel or cobble beds are present.

Two small ponds are found within the drain flow channel in Area 1 (**Figure 2a in Appendix A**). The one pond is located at the rear of lots along Montgomery Road and is a constructed online stormwater pond which maintains standing water into July (**Photograph 1**). The second pond, located just upstream of Rice Road, is a small ephemeral pond that is dry by end of May (**Photograph 2**).

Two sections of the drain are enclosed. In Area 1 at the western limit a 170 m section of the drain is piped through a culvert under soccer fields. At the upstream end of the culvert flow from the online stormwater pond enters the culvert and is conveyed downstream to an open section of the drain (**Photograph 3**). At the eastern limit in Area 4 the box culvert at the Niagara Street crossing has a total length of 35 m. At the upstream end of the culvert the drain follows through a 92 m long piped section under the paved parking lot of Toronto Autoparts (**Photograph 4**).



Photograph 1. Area 1 Online Stormwater Pond at the Western Limit of the Drain July 2022, Looking West



Photograph 2. Area 1 Ephemeral Online Pond in the Drain Upstream of Rice Road March 2022, Looking West



Photograph 3. Area 1 Soccer Field Piped Section Outfall to Channel of the Drain March 2022



**Photograph 4. Piped Drain Under Parking Lot Upstream of the Box Culvert Crossing at Niagara Street
March 2023, Looking Upstream**

Within the study area the drain flows through soccer fields and active farm fields. The drain corridor supporting riparian vegetation is narrow, varying from 10 to 30 m in width and is dominated by shrub thicket (**Photographs 5 & 6**). Only one short section of the drain supports a woodland riparian corridor, in Area 1 at the downstream end of the piped section the drain flows through a 20-30 m wide 175 m long mature woodland corridor to Rice Road. Throughout the drain the annual spring freshet wetted flow channel is vegetated predominately by grasses with small emergent marsh pockets (cattail/rushes) scattered throughout. The largest single wetland area is a 0.22 ha cattail marsh located in Area 2 directly east of the Rice Road crossing (**Figure 2b in Appendix A**). A detailed description of the vegetation communities associated with the drain corridor is provided in Section 4.3

Following the FDHG as the drains support ephemeral flows, it has limited hydrological function. The primary hydrological function of the drain is to convey surface water flows and allochthonous material and nutrients downstream to aquatic habitats associated with the Towpath Drain located downstream of Niagara Street. The primary ecological function of the drain is supporting an aquatic and terrestrial movement corridor.



Photograph 5. Section of Drain in Area 2 Through Narrow Riparian Corridor, Looking East Downstream



Photograph 6. Section of the Drain in Area 4 Through a Thirty-Meter-Wide Riparian Corridor, Looking West

4.1.2 Headwater Drainage Features

Within the study area nine headwater drainage features flow to drain (**Figure 1**). These shallow watercourses flow through active farm fields and support spring freshet ephemeral flows. No riparian corridor is associated with these features (**Photographs 7 & 8**).

Following the FDHG as the headwater watercourses support ephemeral flows, combined they have limited hydrological function. The primary hydrological function of these watercourses is to convey surface water flows and allochthonous material and nutrients downstream to aquatic habitats associated with the Towpath Drain. These headwater watercourses that flow through active farm fields do not provide or support ecological functions.



Photograph 7. Area 2 Headwater H2 Through Ploughed Farm Field March 2022, Looking West Upstream from the Drain



Photograph 8. Area 4 Headwater H7 through Farm Field March 2021, Looking North Upstream from the Drain

4.2 Fish Habitat

Assessment of the drain by Aquafor Beech Limited for the NWSPA and Beacon over a two-year period has established that no permanent standing water is associated with these sections of the drain and therefore permanent fish habitat is not present. There is the potential for seasonal fish habitat during high flow condition with fish migrating from downstream, upstream into these sections of the drain. However, as noted the culvert and 92 m piped section of the drain at the Niagara Street crossing represent a significant barrier to seasonal upstream fish migration. Therefore the drain is not considered to support annual seasonal fish habitat. The drain is assessed to provide indirect fish habitat through contribution of water flows and allochthonous material and nutrients to downstream to aquatic habitats associated with the Towpath Drain east of the Niagara Street crossing.

4.3 Vegetation Communities within the Drian Corridor

Vegetation communities within the drain corridor were identified as illustrated in **Figures 2a, 2b and 2c in Appendix A**. The ELC groups vegetation communities into two broad categories, naturally occurring communities, and cultural communities. Cultural communities represent vegetated areas that support a plant community that has been strongly influenced by human activities, both past and present, for example the naturalization of a fallowed agricultural field.

Anthropogenic

All lands adjacent to the drain 30 m corridor where realignment is proposed are anthropogenic, supporting active farm fields and soccer fields.

Natural Communities

The lands associated with drain corridor have been historically cleared for agriculture, and the drain is a man-made dug feature. As a result of historic alteration, no naturally occurring vegetation community occurs within the corridor.

Cultural Communities

All vegetation communities within the drain corridor support plant communities that has been strongly influenced by human activities, both past and present. Communities that have been identified are described below.

Open Aquatic (OAO)

A small 0.06 ha online pond is located in the drain upstream of Rice Road (**Photograph 9**) in Area 1 (**Figure 2a**). The pond dries down by late May and supports sparse vegetation, with scatter Rice Cut Grass and Common Water-plantain.



Photograph 9. Area 1 Ephemeral Online Pond in the Drain Upstream of Rice Road, March 2022, Looking West

Mineral Shallow Marsh Ecosite (MAS2)

Four very narrow linear pockets of shallow marsh are associated with the drain flow channel approaching Niagara Street in Area 4 (**Figure 2c**). Shallow standing water pockets are present from March through May. The community supports a mix of grasses, sedges, rushes, bur-reed and cattail (**Photographs 10 & 11**). A band of Red-osier Dogwood (*Cornus stolonifera*) and Gray Dogwood (*Cornus foemina*) is found along the margins of the community.



Photograph 10. Shallow Marsh in Drain Flow Channel Supporting Grasses and Large Bur-reed, May 26, 2022, Looking East Downstream to Niagara Street



Photograph 11. Shallow Marsh in Drain Flow Channel Supporting Grasses and Cattail, May 25, 2021, Looking West Upstream

Cattail Mineral Shallow Marsh Type (MAS2 -1)

A small 0.24 ha wetland pocket supporting a homogenous stand of cattail (**Photograph 12**) is found in the channel corridor in Area 2 directly east of the Rice Road crossing (**Figure 2b in Appendix A**)



Photograph 12. Drain Through Cattail Marsh East of the Culvert Under Rice Road in Area 2, May 31, 2023, Looking East Downstream from Rice Road

Mineral Meadow Marsh Type (MAM2)

A small 0.02 ha pocket of grass meadow marsh is found in the channel corridor east of First Ave in Area 4 (**Figure 2c in Appendix A**). This community supports a variety of wetland grasses including *Agrostis stolonifera*, *Glyceria striata*, *Poa palustris*, and *Leersia oryzoides* (**Photograph 13**).



Photograph 13. Grass Meadow Marsh in the Drain Corridor in Area 4, May 31, 2023, Looking East Downstream from Rice Road

Forb Mineral Meadow Marsh Type (MAM2-10)

A small 0.13 ha pocket of forb meadow marsh is found in the channel corridor east of First Ave in Area 4 (**Figure 2c in Appendix A**). The community supports wetland grasses and an abundance of forbs including Asters (*Symphyotrichum puniceum*, *S. lanceolatum*, *Euthamia graminifolia*), Mint (*Mentha*), Boneset (*Eupatorium perfoliatum*), Swamp Milkweed (*Asclepias incarnata*) and Purple Loosestrife (*Lythrum salicaria*) (**Photographs 14 & 15**). A band of Red-Osier Dogwood and Gray Dogwood is found along the margins of the community.



Photograph 14. Dry Channel with Forb Marsh Pocket in Area 4 Downstream of First Avenue, June 17, 2021, Looking East



Photograph 15. Dry Channel with Forb Marsh Pocket in Area 4 Downstream of First Avenue, June 1, 2023, Looking North

Mineral Thicket Swamp (SWT2)

Linear strips of thicket swamp are the most abundant wetland type associated with the drain corridor with a combined total area 2 ha. The community is dominated by shrubs of Dogwood (*Cornus stolonifera*, *C. foemina*) and willow with a mixed understory of grasses, sedges (*Carex*), rushes (*Juncus*, *Scirpus*), Cattail (*Typha*) and forbs (**Photographs 16 & 17**).



**Photograph 16. Linear Thicket Swamp within the Drain Corridor Area 2 Downstream of Rice Road
June 1, 2022, Looking East**



**Photograph 17. Linear Thicket Swamp within the Drain Corridor Area4 Downstream of First Ave
June 1, 2022**

Mineral Cultural Woodland (CUW1)

Located in Area 1 west of Rice Road, a 0.41 ha riparian woodland is associated with the drain corridor (**Figure 2a in Appendix A**). The woodland supports a variety of trees species of various age, including Black Locust (*Robinia pseudo-acacia*), Eastern Cottonwood (*Populus deltoides*), White Pine (*Pinus strobus*), Weeping Willow (*Salix babylonica*), and Maple (*Acer rubrum*, *A. negundo*) (**Photograph 18**).



**Photograph 18. Cultural Woodland (CUW1) within the Drain Corridor in Area 1 East of Rice Road
June 1, 2022**

Mineral Cultural Thicket (CUT1)

A dense growth of cultural thicket is found throughout the drain corridor (**Photographs 18, 19 and 20**). This community with a total area of 1.15 ha is dominated by Common Buckthorn (*Rhamnus cathartica*), Glossy Buckthorn (*Rhamnus frangula*), Gray Dogwood and Multiflora Rose (*Rosa multiflora*). The outer edge of the community supports a ground cover of field weeds and grasses.



Photograph 19. Buckthorn Cultural Thicket within the Drain



Photograph 20. Buckthorn Cultural Thicket within the Drain Corridor



Photograph 21. Cultural Thicket within the Drain Corridor in Area 4

4.3.1 Rare Vegetation Communities

As has been noted, the vegetation communities within the drain corridor are cultural in nature and no rare natural vegetation communities are found within the drain corridor. The NWSPA study identified two provincially rare vegetation communities; a small pocket of FOD9-5, Fresh-Moist Bitternut Hickory Deciduous Forest (S3S4) that is located to the north of the drain in Area 1, and SWD1-2, Bur Oak Mineral Deciduous Swamp Complex (S3), that is located in a woodlot south of Quaker Road along Clare Ave.

4.4 Flora

A total of 226 vascular plant species were observed within the drain corridor. A list is provided in **Appendix B**. Of the species recorded, 140 (62%) are native to Ontario and 86 (38%) are non-native. In the Niagara Region vegetation communities typically support a floristic composition that is 65% native species and 35% non-native/introduced species (Oldham and Sutherland 1995). For the drain corridor the high occurrence of non-native species can be attributed the presence of invasive field weed species that are common to the edges of farm fields and hedgerows in the agricultural areas of Niagara. No species with a Coefficient of Conservatism of 6 or greater was found to occur (with a total range from low 0 to high 10 - Oldham and Sutherland 1995). All native species have a provincial conservation status of Secure (S5) or Apparently Secure (S4), indicating that they are generally common in Ontario.

No regionally rare plant species were found to occur (Oldham 2010).

4.4.1 Endangered and Threatened Species

During the site surveys emphasis was placed on the potential for the occurrence of several endangered and threatened species that were identified by Beacon and the MNRF as having the potential to occur. **Table 7** presents plant species that could potential occur.

Table 7. Potential Endangered and Threatened Species of Plants for the Subject lands

Species	Status
American Chestnut (<i>Castanea dentata</i>)	Endangered
Butternut (<i>Juglans cinera</i>)	Endangered
Cucumber Tree (<i>Magnolia acuminata</i>)	Endangered
Red Mulberry (<i>Morus rubra</i>)	Endangered
Cherry Birch (<i>Betula lenta</i>)	Endangered
Eastern Flowering Dogwood (<i>Cornus florida</i>)	Endangered
Round-leaved Greenbrier (<i>Smilax rotundifolia</i>)	Threatened
White Wood Aster (<i>Eurybia divaricata</i>)	Threatened

None of these species were found to occur within the drain corridor where regalement works are proposed. Three species, the Butternut, Eastern Flowering Dogwood and White Wood Aster were found to occur in woodlands adjacent to online stormwater pond in Area 1 and their location is presented in **Figure 2a**. These three species were the only rare species found to occur in the NWSPA study area and were also identified to occur in this woodland. This wooded area where these species occur will not be impacted by drain realignment works.

4.5 Amphibians

Monitoring for breeding amphibians was undertaken at five locations (see **Figures, a, b and c in Appendix A**). **Table 8** provides a summary of the monitoring.

A total of four species were recorded. Typical for the Niagara Region (Yagi et al. 2009), the Chorus Frog (*Pseudacris triseriata*) and Spring Peeper (*Hyla crucifer*) are the most common species and were recorded all five sites. For these two species the stormwater pond at Site 1 had highest breeding code, code 3, and code 2 calls were recorded at survey Site 2 for the small ephemeral pond upstream of Rice Road and cattail marsh east of Rice Road. American Toad (*Bufo americanus*) and Northern Leopard Frog (*Rana pipiens*) were recorded in low numbers. Marsh wetland in the drain near Niagara Steet that supports prolonged standing water also supported four species The more aquatic Green Frog (*Rana clamitans*) and Bull Frog (*Rana catesbeiana*) were not recorded at any of the survey sites. The survey data indicate that the limited areas of ponds/wetlands in the drain which only support short hydro periods for standing is a limiting factor for amphibian diversity and abundance.

Table 8. Amphibian Breeding Survey

Survey Site	Highest Calling Code Recorded for Species	
Site 1	Chorus Frog	3
	Spring Peeper	3
	American Toad	1
	Northern Leopard Frog	1
Site 2	Chorus Frog	2
	Spring Peeper	2
Site 3	Chorus Frog	1
	Spring Peeper	1
Site 4	Chorus Frog	1
	Spring Peeper	1
	American Toad	1
Site 5	Chorus Frog	3
	Spring Peeper	2
	American Toad	1
	Northern Leopard Frog	1

4.6 Reptiles

The NWSPA study did not survey for reptiles and no observations for snakes or turtles is provided. Field surveys conducted by Beacon identified two species of snake, the Garter Snake (*Thamnophis sirtalis*) and the Dekay's Brownsnake (*Storeria dekayi*). Both species are common in the Niagara region.

The drain corridor does not provide permanent ponds or aquatic wetlands to provided habitat for turtles.

4.7 Breeding Birds

Thirty-four (34) species of birds were recorded for the study area and are presented in **Table 9**. All species recorded are common and are widespread in the urban and rural open fragmented habitats which characterizes the study area and surrounding lands. A total of 43 bird species were recorded during the breeding bird surveys for the NWSPA study.

Of the species recorded, only fifteen (15) are considered to be actively breeding in the habitats that are found within the drain corridor. These species are habitat generalist typically found in thickets, hedgerows and forest edges. The mid June full moon night surveys did not detect the calls of the Threatened Whip-poor-will or Special Concern Common Nighthawk. No species ranked as S1 through S3 (Critically Imperiled through Vulnerable) by the province were recorded breeding within or adjacent to the drain corridor. Aerial feeding flights over the study area by Barn Swallow (*Hirundo rustica*), which has been down listed to Special Concern under the *Endangered Species Act* (ESA 2017), were noted, however, no structures that typically could provide nesting habitat for Barn Swallow occurs within the drain corridor. No species that are considered to be rare for the Niagara Region (OBBA 2021) were recorded.

Table 9. 2021- 22 Breeding Birds Recorded Within and Adjacent to the Drain Corridor

Species	Common Name	COSEWIC ¹	COSSARO ²	S Rank ³
Red-tailed Hawk	<i>Buteo jamaicensis</i>			S5
Wild Turkey	<i>Meleagris gallopavo</i>			S5
American Kestrel	<i>Falco sparverius</i>			S4
Killdeer	<i>Charadrius vociferus</i>			S5
Mourning Dove	<i>Zenaida macroura</i>			S5
Spotted Sandpiper	<i>Actitis macularia</i>			S5
Downy Woodpecker	<i>Picoides pubescens</i>			S5
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>			S4
Northern Flicker	<i>Colaptes auratus</i>			S5
Willow Flycatcher	<i>Empidonax traillii</i>			S5
Great Crested Flycatcher	<i>Myiarchus crinitus</i>			S4
Eastern Kingbird	<i>Tyrannus tyrannus</i>			S4
Barn Swallow	<i>Hirundo rustica</i>		Special Concern	S4
Blue Jay	<i>Cyanocitta cristata</i>			S5
American Crow	<i>Corvus brachyrhynchos</i>			S5
Black-capped Chickadee	<i>Poecile atricapillus</i>			S5
House Wren	<i>Troglodytes aedon</i>			S5
Carolina Wren	<i>Thryothorus ludovicianus</i>			S4
American Robin	<i>Turdus migratorius</i>			S5
Northern Mockingbird	<i>Mimus polyglottus</i>			S4
Gray Catbird	<i>Dumetella carolinensis</i>			S4
European Starling	<i>Sturnus vulgaris</i>			SE
Warbling Vireo	<i>Vireo gilvus</i>			S5
Yellow Warbler	<i>Setophaga petechia</i>			S5
Common Yellowthroat	<i>Geothlypis trichas</i>			S5
Northern Cardinal	<i>Cardinalis cardinalis</i>			S5
Chipping Sparrow	<i>Spizella passerina</i>			S5
Savannah Sparrow	<i>Passerculus sandwichensis</i>			S4
Song Sparrow	<i>Melospiza melodia</i>			S5
Red-winged Blackbird	<i>Agelaius phoeniceus</i>			S4
Common Grackle	<i>Quiscalus quiscula</i>			S5
Baltimore Oriole	<i>Icterus galbula</i>			S4
American Goldfinch	<i>Spinus tristis</i>			S5
House Sparrow	<i>Passer domesticus</i>			SNA

Species in bold are considered to be breeding within the drain corridor

1 Committee on the Status of Endangered Wildlife in Canada

2 Committee on the Status of Species at Risk in Ontario

3 Provincial Conservation Status: S4=Apparently Secure, S5=Secure, SNA=No status

4.8 Mammals

With the exception of bats, surveys targeting mammals were not undertaken as part of this study. However, several common mammal species were observed incidentally during field surveys, either

directly or by other sign (e.g., tracks, scat, etc.). These included: Virginia Opossum (*Didelphis virginiana*), Meadow Vole (*Microtus pennsylvanicus*), Eastern Grey Squirrel (*Sciurus carolinensis*), Striped Skunk (*Mephitis mephitis*), Northern Raccoon (*Procyon lotor*), Red Fox (*Vulpes vulpes*), Coyote (*Canis latrans*), and White-tailed Deer (*Odocoileus virginianus*). All species are common to the urban/rural areas of Niagara.

4.8.1 Bat Habitat

Only one section of the drain, directly upstream of Rice Road in Area 1 supported woodlands that could provide maternity or roosting habitat for bats. This woodland corridor along the drain was identified in the NWSPA study as potential bat habitat. Five acoustic monitors were deployed and recorded bat activity for 10 nights in June. The location of the detectors are shown in **Figure 2a in Appendix A**. The acoustic monitoring detected six bat species, including: Big Brown Bat (*Eptesicus fuscus*), Eastern Red Bat (*Lasiurus borealis*), Hoary Bat (*Lasiurus cinereus*), Silver-haired Bat (*Lasionycteris noctivagans*), Little Brown Myotis (*Myotis lucifugus*) and Tri-colored Bat (*Perimyotis subflavus*). **Appendix C** provides a summary of the bat calls detected.

Detectors 37 and 38 were located in the Cultural Woodland associated with the drain. Over the 10 days of monitoring detector 37 recorded 60 calls that could be confirmed for five species, including Big Brown Bat, Eastern Red Bat, Hoary Bat, Silver-haired Bat and one recorded call for the Endangered Little Brown Myotis. No calls were recorded for the Endangered Tri-colored Bat. For detector 38 a total of 75 call were recorded that could be confirmed to species, including Big Brown Bat, Hoary Bat and Silver-haired Bat. No calls of the Little Brown Myotis or Tri-colored Bat were recorded. Based the data recorded, the Cultural Woodland does not provide roosting or maternity habitat the Endangered Little Brown Myotis or Tri-colored Bat. In addition, the low number of total calls for all species for the two detectors, with only 135 calls over 10 days of monitoring, indicates that the Cultural Woodland does not support significant bat roosting or maternity habitat.

Detectors 40 and 41 that were located in mature hardwoods to the north of the storm pond that flows into the drain recorded higher numbers of total bat calls, with over 3 thousand calls recorded over the 10 days of monitoring, including 47 calls for Little Brown Myotis. Based on the timing of the calls they are considered to represent calls made during night feeding flights. No works are proposed within these hardwood woodlands.

5. Summary of Natural Heritage Features and Functions

Based on information collected through background review and field investigations, features associated with the drain corridor were identified/evaluated for significance according to criteria and guidance provided in the Niagara Region Official Plan and provincial guidelines, including the Significant Wildlife Habitat Technical Guide (OMNR 2000) and the Significant Wildlife Habitat (SWH) Criteria Schedules for Ecoregion 7E (MNRF 2015).

5.1 Habitat for Threatened and Endangered Species

A screening for habitat for threatened or endangered species is included in **Appendix D**. The screening is based on existing SAR species records within the area of the City of Welland and assessment of potential suitable habitat for species based on field survey.

No species that is listed as threatened or endangered was found to occur or expected to occur within the habitat that is found in the drain corridor. As discussed in Section 4.4.1 three species of flora, the Butternut, Eastern Flowering Dogwood and White Wood Aster were found to occur in woodlands outside the drain corridor, however the required habitat for these species is not found with the drain corridor. As discussed in Section 4.7.1 calls of the endangered Little Brown Myotis were recorded in the woodlot adjacent to online stormwater pond. The proposed drain realignment will no occur in this area. Analysis of the acoustic data found that woodland roosting/maternity habitat for the endangered Little Brown Myotis or Tri-colored Bat is not associated wit the Cultural Woodland (CUW1) that occurs along the drain in Area 1 west of Rice Road.

5.2 Provincially Significant Wetlands

There are no PSWs within the drain corridor where realignment works are proposed. No works will be undertaken in the wetland unit of the PSW Niagara Street - Cataract Road Wetland Complex through which the drain flows through in Area 3.

5.3 Areas of Natural and Scientific Interest

There are no ANSI within, or adjacent to, the drain corridor where realignment works are proposed.

5.4 Significant Valleylands

There are no valleylands within or adjacent to the drain corridor.

5.5 Significant Wildlife Habitat

According to the Significant Wildlife Habitat Technical Guidelines (MNR 2000), there are four main categories of Significant Wildlife Habitat (SWH):

- Seasonal Concentration Areas of Animals;
- Rare Vegetation Communities or Specialized Habitat for Wildlife;
- Habitat for Species of Special Concern; and
- Animal Movement Corridors.

Within each of these categories, there are multiple types of SWH, each intended to capture a specialized type of habitat that may or may not be captured by other existing feature-based categories (e.g.,

significant wetlands, significant woodlands). The Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR 2015) was used as a preliminary screening for SWH on the property. A full SWH screening table is included in **Appendix D**.

5.5.1 Seasonal Concentration Areas

No areas or habitats are found within the drain corridor that supports seasonal concentrations of animals.

5.5.2 Rare Vegetation or Specialized Habitat for Wildlife

No rare or specialized vegetations communities are found within, or adjacent to, the drain corridor. The NWSPA study identified a potential snake hibernaculum in Area 3, however, no features or structures that could be potential snake hibernacula was found to occur in Areas 1, 2 or 4 where the realignment works are proposed. At the local level, the small wetland pockets within the drain can be considered to provide low quality specialized breeding habitat for frogs and toads. No habitat for rare species of flora or fauna was found to occur.

5.5.3 Habitat for Species of Special Concern

No species of Special Concern was found to occur in the drain corridor where works are proposed.

The NWSPA study and screening in **Appendix D** identifies that there is the potential for Milksnake (*Lampropeltis triangulum*) and Eastern Ribbonsnake (*Thamnophis sauritus*). Though the drain corridor can be considered to support general habitat for these two species, for the local population the habitats associated with the large area of PSW in Area 3 can be considered to be the core habitat.

The NWSPA study also identified specialized habitat for the Special Concern Monarch Butterfly (*Danaus plexippus*) to be associated with open meadows or similar habitats containing milkweeds and other wildflowers. The drain corridor does not support open meadow habitat with an abundance of milkweeds or wildflowers.

5.5.4 Animal Movement Corridors

The primary ecological function of the drain corridor is to provide a local east-west terrestrial and aquatic movement corridor within a landscape that is dominated by agricultural fields.

5.6 Significant Woodlands

Based on Regional Policy that defines significant woodlands and the findings of the NWSPA study, no significant woodland is associated with the drain corridor.

5.7 Fish Habitat

There are no aquatic features within the drain that could support fish habitat.

6. Proposed Development

The proposed realignment is to facilitate stormwater control for future residential subdivision development for properties within the NWSPA. Detail design has been undertaken by UCC and has been provided to the NPCA for review. A general design of the proposed realignment is provided in **Appendix E**. The works will include excavation of a new watercourse channel that will be located within a 30 m wide corridor. The realignment will also include new culverts at Rice Road, First Avenue and Niagara Street.

The construction works will be undertaken in two stages, east and west. The east stage includes the section between Niagara Street and First Avenue. The west stage includes the section east and west of Rice Road. During construction flows will be maintained by temporary swales. Once a section is completed flow will be directed to the new channel and the temporary swales will be removed. Detailed information on the staging of the works has been provided to the NPCA by UCC.

The drain corridor will have minimum width of 30 m and total length of 1.77 km. The total area of the new drain corridor will be 5.07 ha. The realignment design includes a number of wetland areas located throughout the corridor representing a total area of 3.89 ha. In addition, the new watercourse will include riffles areas with cobble gravel substrate that will be located throughout the drain corridor. The entire drain corridor will be naturalised by plantings of trees and shrubs and vegetation.

7. Impact Assessment

7.1 Impact Assessment

The following sections describe the anticipated impacts of the proposed realignment of the sections of the Towpath Drain and identify measures to be utilized to minimize impacts to existing natural features.

7.1.1 Drain Corridor

All of the existing vegetation within the drain corridor, a total area of 4.21 ha, will be removed and/or significantly altered. As detailed above, with the exception of the providing limited hydrological function through the downstream conveyance of surface water, and providing a local wildlife movement corridor, no features and functions are associated with the drain corridor that its removal or alteration would represent a significant impact to the existing natural heritage within the NWSPA. The primary ecological function of the drain is providing thicket vegetation supporting local populations of common species of flora and fauna and providing an aquatic and terrestrial movement corridor. The new drain corridor, with naturalization plantings, will maintain these ecological functions.

7.1.2 Headwater Drainage Features

A detailed assessment of the headwater drainage features was provided to the NPCA in a Memo prepared by Beacon (July 2022). The NWSPA identified nine headwater watercourses to be associated with the sections of the Drain that will be re-aligned (**Figure 1**). As the drain and headwater watercourses support ephemeral flows, combined they have limited hydrological function. The primary hydrological function of the headwater watercourses is to convey surface water flows and allochthonous material and nutrients downstream to aquatic habitats associated with the Towpath Drain located downstream of Niagara Street. Though not directly impacted by the drain realignment, the headwater watercourses will be removed during the development of the lands, and surface water that they currently convey to the drain will be collected in storm ponds that will be discharge to the new drain. These watercourses are located in active farm fields and are regularly ploughed through and do not support wetlands or riparian habitat, and therefore they have very limited ecological function. **Table 10** provides a summary of their assessment following the Headwater Drainage Features Guidelines (HDFG) (TRCA/CVC 2014).

Table 10. Assessment of Management Requirements for Alterations to the Towpath Drain and Headwater Features

Drainage Feature	Step 1		Step 2	Step 3	Step 4	HDF Management Assessment
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat	
Drain in Areas 1, 2 and 3 to PSW Boundary	Contributing Functions	Road Culverts, on-line ponds, piped section	Important Functions	Contributing Functions	Contributing Functions	Mitigation
Drain Through PSW in Area 3	Valued Functions	None	Important Functions	Contributing Functions	Important Functions	Conservation
Drain in Area 4	Contributing Functions	Road Culverts	Important Functions	Contributing Functions	Contributing Functions	Mitigation
Headwater H-1	N/A not found					N/A
Headwater H2	Contributing Functions	Ploughed through	Limited Functions	Contributing Functions	Limiting Functions	Mitigation/ No Management Required
Headwater H3	Contributing Functions	Road Culverts	Valued Functions	Contributing Functions	Limiting Functions	Mitigation/ No Management Required
Headwater H4	Contributing Functions	Ploughed through	Limited Functions	Contributing Function	Limiting Functions	Mitigation/ No Management Required
Headwater H5	Contributing Functions	Ploughed through	Limited Functions	Contributing Function	Limiting Functions	Mitigation/ No Management Required
Headwater H6	Contributing Functions	Ploughed through	Limited Functions	Contributing Function	Limiting Functions	Mitigation/ No Management Required

Drainage Feature	Step 1		Step 2	Step 3	Step 4	HDF Management Assessment
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat	
Headwater H7	Contributing Functions	Ploughed through	Limited Functions	Contributing Function	Limiting Functions	Mitigation/ No Management Required
Headwater H8	Contributing Functions	Ploughed through	Limited Functions	Contributing Function	Limiting Functions	Mitigation/ No Management Required

Figures 1 & 2 Present the Location of the Headwaters

For the drain proper, based on the HDFG mitigation to maintain or replicate terrestrial and aquatic linkage is an appropriate management recommendation. For the headwater watercourses through the farm fields, the no management required assessment is appropriate for the individual watercourses, however, for the removal of all these watercourses a management assessment of mitigation is also identified. This mitigation can be addressed through design features of the new drain as detailed in Section 8.1.

7.1.3 Wetlands Within the Drain

Small linear pockets of wetland are found throughout the drain corridor and have been described in Section 4.3. All these wetland areas, representing a total area of 2.65 ha, will be removed as a result of the realignment of the drain. **Table 11** provides a summary of the wetland areas that will be removed and their primary ecological functions.

Table 11. Wetland Areas Within the Drain Corridor

Wetland Type	Area (ha)	Primary Functions
Open Water Pond (OAO)	0.06	<ul style="list-style-type: none"> • Small area limits ecological functions. • Amphibian breeding site.
Mineral Shallow Marsh (MAS2)	0.20	<ul style="list-style-type: none"> • Small area limits ecological functions. • Amphibian breeding site. • Feeding habitat for amphibians. • Flora diversity by providing habitat for aquatic wetland plants. • Aquatic movement corridor.
Mineral Cattail Marsh (MAS2-1)	0.24	<ul style="list-style-type: none"> • Absence of standing water limits amphibian breeding habitat functions. Early spring breeding site for Spring Peeper and Chorus Frog. • Breeding habitat for three species of bird, Song Sparrow, Common Yellowthroat, and Red-winged Blackbird. • Aquatic and terrestrial movement corridor.
Mineral Meadow Marsh (MAM2)	0.02	<ul style="list-style-type: none"> • Small area limits ecological functions. • Absence of standing water limits amphibian breeding habitat functions. Early spring breeding

Wetland Type	Area (ha)	Primary Functions
		<ul style="list-style-type: none"> • Site for Spring Peeper and Chorus Frog. • Feeding habitat for amphibians. • Breeding habitat for two species of bird, Song Sparrow and Common Yellowthroat. • Flora diversity by providing habitat for wetland grasses and sedges. • Aquatic and terrestrial movement corridor.
Forb Meadow Marsh (MAM2-10)	0.13	<ul style="list-style-type: none"> • Small area limits ecological functions. • Absence of standing water limits amphibian breeding habitat functions. Early spring breeding site for Spring Peeper and Chorus Frog. • Feeding habitat for amphibians. • Breeding habitat for two species of bird, Song Sparrow and Common Yellowthroat. • Flora diversity by providing habitat for a variety of wetland plants, grasses, and sedges. • Aquatic and terrestrial movement corridor.
Mineral Thicket Swamp (SWT2)	2.0	<ul style="list-style-type: none"> • Breeding habitat for 15 species of birds. • Breeding/feeding habitat for local mammal populations. • Feeding habitat for amphibians. • Flora diversity by providing habitat for a variety of wetland shrubs, trees, plants, grasses and sedges. • Terrestrial movement corridor.

As noted, the realigned drain will be located in a 30 m wide naturalized corridor that will continue to support an east-west wildlife movement corridor. Generally, the ecological functions associated with the wetland areas within the drain corridor are very limited due to the small size of the wetlands pockets. However, as the lands adjacent to the drain corridor are extensive agricultural fields, the removal of these small wetland areas will impact on local flora diversity and local wildlife populations including amphibians, birds and mammals, however no rare wetland type or species of concern will be impacted. Direct impacts on breeding birds and amphibians can be avoided by removing vegetation at the appropriate time of year (see Section 8.2 below).

7.1.4 PSW Wetland

The drain flows through a wetland unit of the PSW Niagara Street - Cataract Road Wetland Complex within Area 3. No works are proposed to be undertaken for this section of the drain; however, the new drain works have the potential to impact the existing water balance of the wetland unit. This assessment will be undertaken by a water balance study by Terra-Dynamics Consulting Inc. and will be provided to the NPCA in a separate report.

8. Mitigation Measures

8.1 Design Mitigation for the New Drain Corridor

The following details design mitigation measures that will offset the impacts of the removal/alteration of the existing corridor as described in Section 7. The general design of the proposed drain corridor is presented in **Appendix E**.

8.1.1 Design of New Corridor

The drain corridor will have a minimum width of 30 m and a total length of 1.77 km. The total area of the new drain corridor will be 5.07 ha, representing a 0.86 ha increase. For the existing drain, two sections of the drain are enclosed. In Area 1 at the western limit a 170 m section of the drain is piped through a culvert under soccer fields. At the eastern limit in Area 4 the drain follows through a 92 m long piped section under the paved parking lot of Toronto Autoparts. For the new corridor these piped sections of the drain will be daylighted, resulting in a continuous corridor. The opening of these sections of the drain will greatly enhance the aquatic and terrestrial corridor function of the drain.

8.1.2 Naturalization of the New Corridor

For the mitigation and enhancement of the ecological function of the new drain, the following features have been included in the design:

- A corridor width of 30 m;
- Flow channel meanders;
- Diversify in flow channel substrate (gravel/cobble pockets);
- Creation of wetland areas for compensation for wetland loss at a minimum ratio of 1:1;
- Wetland function enhancement through the creation of shallow and deep-water wetland pockets; and
- Plantings to create a naturalized corridor.

The proposed design as presented in **Appendix E** will include a number of wetland areas located throughout the corridor representing a total area of 3.89 ha, a 1.24 ha increase, consisting of shrub thicket wetland and deep aquatic pools, representing a 1.41 ha increase in wetland area. The combined area of the deep water pools that will be located throughout the drain corridor is 1.66 ha, representing 43% of the total wetland areas that will be created. The absence of prolonged standing water within the existing drain is a limiting factor for the existing wetland functions, and the proposed design represents a significant enhance for wetland functions. In addition, the existing flow channel in drain only supports a clay substrate and the design for the new watercourse will include riffles with cobble gravel substrate that will be located throughout the drain corridor which will increase the diversity of habitats.

Details regarding the plans/plantings and enhanced ecological conditions will be provided in a design brief that will be prepared by and Ecological & Environmental Solutions (“EES”) and provided to the NPCA under a separate cover. As identified in the Beacon Memo, an initial list of plant species that could be considered for the naturalization of the channel is provided below.

Table 12. Terrestrial Corridor

Trees	Shrubs
<i>Sugar Maple (Acer saccharum)</i>	<i>Allegheny Serviceberry (Amelanchier laevis)</i>
<i>Red Maple (Acer rubrum)</i>	<i>Alternate leaved Dogwood (Cornus alternifolia)</i>
<i>Shagbark Hickory (Carya ovata)</i>	<i>Gray Dogwood (Cornus racemose)</i>
<i>Burr Oak (Quercus macrocarpa)</i>	<i>Red Osier Dogwood (Cornus sericea)</i>
<i>Pin Oak (Quercus palustris)</i>	<i>Pin Cherry (Prunus pensylvanica)</i>
<i>Red Oak (Quercus rubra)</i>	<i>Choke Cherry (Prunus virginiana)</i>
<i>Basswood (Tilia americana)</i>	<i>Choke Cherry (Prunus virginiana)</i>
<i>American Elm (Ulmus americana)</i>	<i>Staghorn Sumac (Rhus typhina)</i>
<i>White Spruce (Picea glauca)</i>	
<i>White Pine (Pinus strobus)</i>	
<i>Cedar (Thuja occidentalis)</i>	

Table 13. Wetland Ponds Shallow Zone (1 to 0.5m depth)

Shallow Zone
<i>Tall Mannagrass (Glyceria grandis)</i>
<i>Manna-grass (Glyceria grandis)</i>
<i>American Bur-Reed (Sparganium Americanum)</i>
<i>Giant Bur-Reed (Sparganium eurycarpum)</i>
<i>Soft-stemmed Bulrush (Schoenoplectus tabernaemontani)</i>
<i>Cattail (Typha latifolia)</i>

Table 14. Wetlands and Flow Channel (0 to 035m Depth)

Shrubs	Grasses, Sedges and Forbs
<i>Bebb's Willow (Salix bebbiana)</i>	<i>Canada Blue Joint (Calamagrostis canadensis)</i>
<i>Pussy Willow (Salix discolor)</i>	<i>Spreading Bentgrass (Agrostis stolonifera)</i>
<i>Red Osier Dogwood (Cornus sericea)</i>	<i>Rice Cut Grass (Leersia oryzoides)</i>
<i>White Meadowsweet (Spiraea alba)</i>	<i>Fowl Manna Grass (Glyceria striata)</i>
	<i>Bebb's Sedge (Carex bebbii)</i>
	<i>Fringed Sedge (Carex crinita)</i>
	<i>Fox Sedge (Carex vulpinoidea)</i>
	<i>Porcupine Sedge (Carex hystericina)</i>
	<i>Torreys Rush (Juncus torreyi)</i>
	<i>Bulrush (Scirpus atrovirens)</i>
	<i>Bulrush (Scirpus Validus)</i>
	<i>Swamp Aster Symphyotrichum puniceum</i>
	<i>Spotted Joe Pye Weed (Eupatorium maculatum)</i>
	<i>Common Boneset (Eupatorium perfoliatum)</i>
	<i>Swamp Milkweed (Asclepias incarnata)</i>

8.1.3 Buffers

The new drain corridor will have a minimum width of 30 m. No buffer lands to this corridor are proposed. However, as part of the corridor design to address post development impacts on the new corridor, post construction a Chain Link fence will be located along the perimeter of the corridor. Also, a no-gate by-law is recommended to reduce human encroachment and limit the movement of pets into the adjacent natural corridor.

For intermittent or ephemeral watercourses that do not support fish habitat and non PSW wetlands NPCA development policy is to provide a 15 metre buffer. The new drain watercourse will be located centrally within the 30 m wide naturalized corridor, which will provide a 15 m buffer to each side of most of the watercourse. It is noted that the design includes meanders in the watercourse so that at some locations the outer side of the meander will have a reduced buffer by 2 to 5 m. The reconstructed watercourse has varying setbacks from the newly constructed wetland of 6-9 metres average with additional width in various locations. The entire corridor will be planted to create a vegetated buffer to the watercourse and wetlands and in addition to the vegetation buffer in the corridor, the corridor will be protected from direct post development impacts by the erection of chain link fencing along the corridor perimeter. With the naturalization in the buffer and the fencing, localized reductions in the 15 m buffer to wetland areas and the watercourse is not considered significant with respect to protecting the ecological function of the watercourse and wetlands within the new drain corridor.

8.1.4 PSW Water Balance Impacts

As noted, to address potential water balance impacts on the PSW in Area 3 a study is being undertaken by Terra-Dynamics Consulting Inc. Should the study identify mitigation measures to address potential impacts, these are to be addressed by the drain realignment design, and/or design requirements for the development of the lands within the NWSPA.

8.2 Construction Mitigation

The following construction mitigation measures are recommended for the realignment works.

- Soil erosion from construction sites can result in adverse environmental impacts if sediment-laden stormwater runoff reaches the drain. Therefore, an erosion and sediment control plan should be implemented prior to any site alteration or construction. This plan is to be approved by the NPCA;
- All construction and development related activities should be confined to the established limit of development, except for those areas subject to naturalization where landscaping works are permitted;
- To avoid impacts on breeding birds and other wildlife, removal of vegetation should be conducted between October 1 and March 31; and
- Storage of equipment and materials and the fueling of equipment should not be permitted within 30 m of a watercourse or PSW boundary. Ontario Provincial Standard Specification 180 is to be followed for the management of excess materials.

9. Residual Impact

The existing drain corridor does not support significant features and functions that its removal or alteration would represent a significant impact to the existing natural heritage within the NWSPA. The proposed design for the new drain corridor will increase the overall area of the existing natural corridor by 0.86 ha, daylight 262 m which is currently piped, and increase the total area of wetland (1.24 ha) within the corridor, including a significant increase in the area of standing water aquatic wetland.

The primary ecological function of the drain is providing thicket vegetation supporting local populations of common species of flora and fauna and providing an aquatic and terrestrial movement corridor. The new drain corridor, with naturalization plantings, will maintain and enhance these ecological functions.

Combined the new drain design is assessed to represent a positive residual impact.

10. Policy conformity

Relevant provincial and federal environmental policies and NPCA development policies and regulations for watercourses and wetlands were discussed in **Section 2**. An evaluation of how the proposed realignment complies with these applicable environmental policies and legislation is summarized below in **Table 15**.

Table 15. Policy Conformity Assessment

Applicable Policy / Legislation	Policy Intent	EIS Findings & Recommendations
1. Ontario Endangered Species Act	The Act does not permit development or site alteration in habitat for threatened and endangered species except in accordance with provincial requirements.	No habitat for endangered or threatened species is found within or adjacent to the drain, or in the location of the proposed realignment.
2. Federal Fisheries Act	Development and site alteration are not permitted in fish habitat except in accordance with federal requirements.	No fish habitat is associated with the drain. Construction mitigation have identified to prevent downstream impacts.
3. Provincial Policy Statement (PPS)	The PPS does not permit development or site alteration in Provincially Significant Wetlands (PSW).	No works will occur within areas identified as PSW.
	Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.	No fish habitat is associated with the drain.
	Development and site alteration shall not be permitted in the habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.	No habitat for endangered or threatened species is found within or adjacent to the drain, or in the location of the proposed realignment.

Applicable Policy / Legislation	Policy Intent	EIS Findings & Recommendations
4. NPCA Wetlands Section 8.1.2.3(d)	The wetland to be reconfigured or re-created is within a Settlement Area.	The area is located with the City of Welland Urban Boundary.
	The wetland to be reconfigured or re-created is not a PSW under the OWES Protocol.	The small wetland areas within the drain are not PSW under the OWES Protocol.
	The Protection Hierarchy has been followed and all efforts to protect the feature have been exhausted first.	Stormwater design requirements have been assessed and the realignment of the drain has been identified as the preferred solution.
	The wetland to be reconfigured or re-created is not protected by any other applicable federal, provincial or municipal requirement(s).	Wetlands are not protected by provincial policies, or the development polices of the Niagara Region.
	An EIS is provided for review and approval to demonstrate conformity with Section 8.1.2.3 d.	This EIS will be provided to the NPCA.
	The proposed development will not have a negative impact on any species of concern, significant habitat types or species at risk.	The EIS has determined that there will be not negative impacts on species of concern or at risk, or on significant habitats.
	The proposed development will not have a negative impact on the hydrological or ecological function of any remaining portions of the wetland.	No works are proposed for the section of the drain that flows through PSW.
	A restoration plan for the reconfigured or re-created wetland is provided and demonstrates an ecological net gain to the watershed natural system.	A naturalization plan, including the creation of wetland areas, for the new drain corridor will be prepared by EES, and a design brief will also be provided to the NPCA.
	A multi-year monitoring program is required (minimum five years) to ensure the long-term establishment of the reconfigured or re-created wetland.	The naturalization plan and design brief to be prepared by EES will provide direction for a 5-year monitoring program for both the wetlands and corridor plantings.
	A security deposit in an amount approved by the NPCA is provided to establish the reconfigured or re-created wetland and guarantee its establishment.	A deposit in the amount approved by the NPCA will be provided.
	The applicant is required to enter into a restoration agreement with the NPCA that will be registered on the title of the property containing the reconfigured or re-created wetland that will provide the necessary details to implement the policies of Section 8.1.2.3 d).	The applicant will enter into a restoration agreement with the NPCA that will be registered on the title of the drain corridor.
	Additional information, such as a hydrologic study, restoration plan and or other studies as required depending onsite-specific characteristics.	A water balance study for the PSW is being undertaken by Terra-Dynamics Consulting Inc. and will be provided to the NPCA in a separate report.
	Section 8.2.3.1 identifies that where development is proposed adjacent to a wetland, a minimum 30 metre buffer shall be provided. A reduction to a non-PSW buffer shall only be considered where there is no other reasonable alternative and were supported by an EIS in accordance with NPCA Procedural Manual.	Wetlands areas to be created will be in the new 30 m wide naturalized drain corridor. This will allow for 15 to 10 m vegetated buffers. In addition, the corridor will be protected from direct post development impacts by the erection of chain link fencing along the corridor perimeter.

Applicable Policy / Legislation	Policy Intent	EIS Findings & Recommendations
<p>5. NPCA Watercourses</p>	<p>The need for the watercourse alteration has been demonstrated to the satisfaction of the NPCA.</p>	<p>Upper Canada Consultants (UCC) has provided justification for the realignment of the drain to facilitate future development of lands within the Northwest Welland Secondary Plan Area.</p>
	<p>The watercourse has been evaluated under NPCA's Procedural Manual and the alteration would be supported.</p>	<p>This EIS has provided an assessment of the drain corridor and potential impacts, and the realignment of the drain to a 30 m wide naturalized corridor is supported.</p>
	<p>The proposed works are in accordance with NPCA standards.</p>	<p>The works will be in accordance with the NPCA standards.</p>
	<p>Any proposed channel realignment shall only be allowed such that any required riparian buffer will not cross any property lines.</p>	<p>All the landowners where the realignment of the drain will occur are in agreement to support the works.</p>
	<p>The proposed watercourse alteration does not increase flood plain elevations, flood frequency, erosion rates or erosion frequency along either side of the watercourse, upstream and/or downstream of the proposed works.</p>	<p>The UCC design of the new drain channel has addressed flood and erosion.</p>
	<p>The works will not adversely affect the ecological and hydrologic function of the watercourse and riparian zone.</p>	<p>The new naturalized drain corridor will ensure that the exiting ecological and hydrological functions of the existing drain will be maintained and enhanced.</p>
	<p>Adequate erosion protection measures are utilized when required and sediment control measures are incorporated during the construction phase to the satisfaction of the NPCA.</p>	<p>An Erosion and sediment control plan will be prepared and provided to the NPCA for review and comment.</p>
	<p>A 15 metre buffer shall be provided for watercourses containing intermittent flow, warmwater systems or general/impacts aquatic or riparian habitat, or Type 2 Important Fish Habitat or Type 3 Marginal Fish Habitat. Notwithstanding this requirement, the buffer may be reduced where supported by an EIS in accordance with the NPCA Procedural Manual.</p>	<p>The drain does not support fish habitat and supports ephemeral/intermittent warmwater flow.</p> <p>The new drain watercourse will be centrally located within a 30 m naturalized vegetated corridor, and this will allow for 15 to 10 m vegetated buffers. In addition, the corridor will be protected from direct post development impacts by the erection of chain link fencing along the corridor perimeter.</p>

11. Conclusion

This EIS has been prepared in support of a proposed realignment of the Towpath Drain within the City of Welland Northwest Secondary Plan Area (NWSPA). The drain and associated headwater drainage features are regulated by the Niagara Peninsula Conservation Authority (NPCA) pursuant to Ontario Regulation 155/06 under the provisions of Section 28 (1) of the *Conservation Authorities Act*, and therefor a permit from the NPCA is required to conduct the works. For the permit application the NPCA

requires that an EIS be undertaken. This EIS detailed and evaluated the natural heritage features associated with the drain corridor and assessed the potential impacts of the proposed drain realignment on ecological features and functions. No significant natural heritage features and functions were identified that would result in a significant negative impact by the realignment of the drain. To mitigate the loss/alteration of the existing drain corridor, the design for the new drain will include a 30 m wide naturalized corridor, including wetland areas within the watercourse flow channel. The proposed design and works are in conformity with environmental policies of the NPCA, Ontario, and Canada.

This EIS concludes that with the implementation of the recommended design and construction mitigation measures, the proposed realignment of sections of the Towpath Drain within the City of Welland Northwest Secondary Plan Area is supported with respect to maintaining the natural heritage system of the City of Welland, Niagara Region and the Province.

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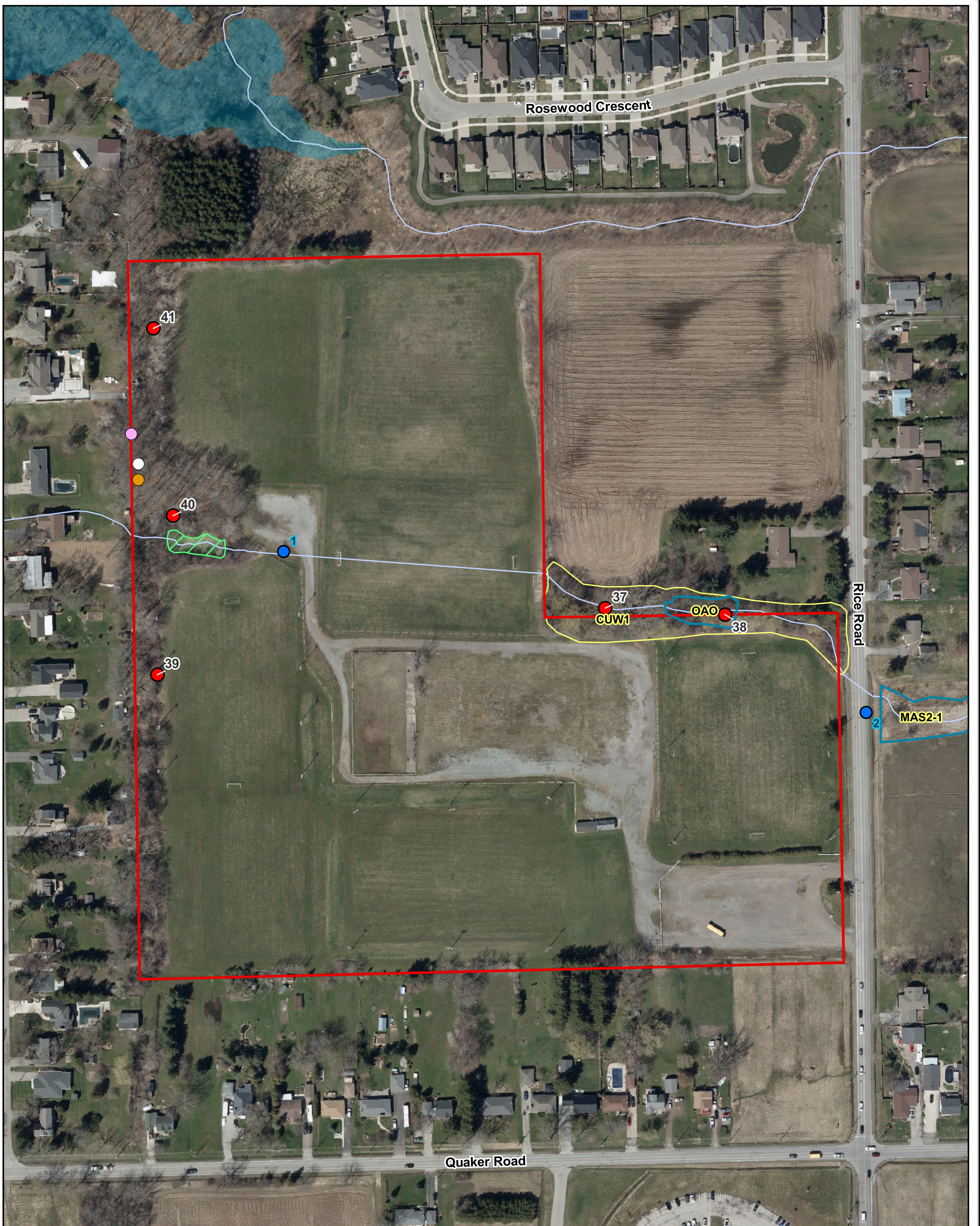
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Appendix A

Report Figures



Legend

- Subject Property
- Ecological Communities
- H1 Headwater Watercourse
- Wetland Limit
- Provincially Significant Wetland (MNR 2020)
- Stormwater Pond
- Amphibian Survey Stations
- Acoustic Monitoring Locations
- Endangered Species**
- Eastern Flowering Dogwood
- White Wood Aster
- Butternut Tree

Code	Wetland Communities
MAS2-1	Cattail Mineral Shallow Marsh
Aquatic Communities	
OAO	Open Aquatic
Cultural Communities	
CUW1	Mineral Cultural Woodland
CUT1	Mineral Cultural Thicket

Existing Vegetation Communities		Figure 2A
Towpath Drian Realignment		
		Project: 223098 Last Revised: July 2023
Client:	Prepared by: BD Checked by: LW DRAFT	
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Existing Vegetation Communities

Figure 2

Towpath Drian Realignment

Legend

- Ecological Communities
- H1 Headwater Watercourse
- Wetland Limit
- Provincially Significant Wetland (MNRF 2020)
- Amphibian Survey Stations

Code	Wetland Communities
MAS2-1	Cattail Mineral Shallow Marsh
SWT2	Mineral Thicket Swamp
Cultural Communities	
CUT1	Mineral Cultural Thicket
Other Communities	
HE	Hedgerow



Project: 223098
Last Revised: July 2023

Client:

Prepared by: BD
Checked by: LW **DRAFT**



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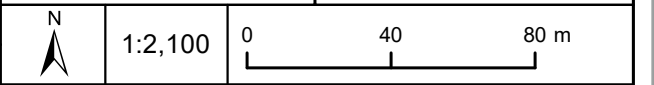
Towpath Drian Realignment

- Legend**
- Subject Property
 - Wetland Limit
 - Dripline
 - H1 Headwater Watercourse
 - Ecological Communities
 - Amphibian Survey Stations

Code	Wetland Communities
MAS2	Mineral Shallow Marsh
MAM2	Mineral Meadow Marsh
MAM2-10	Forb Mineral Meadow Marsh
SWT2	Mineral Thicket Swamp
	Cultural Communities
CUT1	Mineral Cultural Thicket

BEACON ENVIRONMENTAL Project: 223098
 Last Revised: July 2023

Client: XXXXXX Prepared by: BD
 Checked by: LW **DRAFT**



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Appendix B

Vascular Plant Species List

Appendix B

Vascular Plant Species List

Scientific Name	English Name	Srank	COSEWIC/ COSSARO	Niagara
<i>Equisetum arvense</i>	Field Horsetail	S5		
<i>Athyrium filix-femina</i>	Lady Fern	S5		
<i>Onoclea sensibilis</i>	Sensitive Fern	S5		
<i>Thelypteris palustris</i>	Marsh Fern	S5		
<i>Pinus strobus</i>	Eastern White Pine	S5		
<i>Pinus sylvestris</i>	Scotch Pine	SE5		
<i>Juniperus virginiana</i>	Eastern Red Cedar	S5		
<i>Typha angustifolia</i>	Narrow-leaved Cattail	S5		
<i>Typha latifolia</i>	Broad-leaf Cattail	S5		
<i>Sparganium emersum</i>	Greenfruit Bur-reed	S5		
<i>Sparganium eurycarpum</i>	Large Bur-reed	S5		
<i>Alisma triviale</i>	Northern Water-plantain	S5?		
<i>Agrostis gigantea</i>	Black Bentgrass	SE5		
<i>Agrostis perennans</i>	Perennial Bentgrass	S5		
<i>Agrostis stolonifera</i>	Spreading Bentgrass	S5		
<i>Bromus ciliatus</i>	Fringed Brome	S5		
<i>Bromus inermis</i>	Brome Grass	SE5		
<i>Bromus tectorum</i>	Cheat Grass	SE5		
<i>Dactylis glomerata</i>	Orchard Grass	SE5		
<i>Digitaria ischaemum</i>	Smooth Crabgrass	SE5		
<i>Digitaria sanguinalis</i>	Hairy Crabgrass	SE5		
<i>Echinochloa crusgalli</i>	Barnyard Grass	SE5		
<i>Elymus canadensis</i>	Nodding Wild-rye	S4S5		
<i>Elymus repens</i>	Quack Grass	SE5		
<i>Elymus virginicus</i>	Virginia Wild Rye	S5		
<i>Glyceria grandis</i>	American Mannagrass	S4S5		
<i>Glyceria striata</i>	Fowl Manna-grass	S4S5		
<i>Hordeum jubatum</i>	Foxtail Barley	SE5		
<i>Leersia oryzoides</i>	Rice Cutgrass	S5		
<i>Muhlenbergia mexicana</i>	Mexican Muhly	S5		
<i>Panicum capillare</i>	Old Witch Panic-grass	S5		
<i>Phalaris arundinacea</i>	Reed Canary Grass	S5		
<i>Phleum pratense</i>	Meadow Timothy	SE5		
<i>Phragmites australis</i>	Common Reed	S5		
<i>Poa compressa</i>	Canada Bluegrass	S5		
<i>Poa palustris</i>	Fowl Bluegrass	S5		
<i>Poa pratensis</i>	Kentucky Bluegrass	S5		
<i>Carex bebbii</i>	Bebb's Sedge	S5		
<i>Carex blanda</i>	Woodland Sedge	S5		
<i>Carex brunnescens</i>	Brownish Sedge	S5		
<i>Carex crinita</i>	Fringed Sedge	S5		
<i>Carex cristatella</i>	Crested Sedge	S5		
<i>Carex hystericina</i>	Porcupine Sedge	S5		
<i>Carex lupulina</i>	Hop Sedge	S5		
<i>Carex retrorsa</i>	Retorse Sedge	S5		

Scientific Name	English Name	Srank	COSEWIC/ COSSARO	Niagara
<i>Carex scoparia</i>	Pointed Broom Sedge	S5		
<i>Carex stipata</i>	Stalk-grain Sedge	S5		
<i>Carex vulpinoidea</i>	Fox Sedge	S5		
<i>Eleocharis elliptica</i>	Slender Spike-rush	S5		
<i>Eleocharis erythropoda</i>	Bald Spikerush	S5		
<i>Eleocharis obtusa</i>	Blunt Spike-rush	S5		
<i>Schoenoplectus tabernaemontani</i>	Soft-stem Club-rush	S5		
<i>Scirpus atrovirens</i>	Dark-green Bulrush	S5		
<i>Scirpus cyperinus</i>	Cottongrass Bulrush	S5		
<i>Scirpus pendulus</i>	Rufous Bulrush	S5		
<i>Lemna minor</i>	Lesser Duckweed	S5		
<i>Juncus brevicaudatus</i>	Narrow-panicked Rush	S5		
<i>Juncus bufonius</i>	Toad Rush	S5		
<i>Juncus dudleyi</i>	Dudley's Rush	S5		
<i>Juncus effusus</i>	Soft Rush	S5		
<i>Juncus tenuis</i>	Path Rush	S5		
<i>Convallaria majalis</i>	European Lily-of-the-valley	SE5		
<i>Erythronium americanum</i>	Yellow Trout-lily	S5		
<i>Hemerocallis fulva</i>	Orange Daylily	SE5		
<i>Maianthemum racemosum</i>	False Solomon's-Seal	S5		
<i>Iris versicolor</i>	Blueflag	S5		
<i>Populus alba</i>	White Poplar	SE5		
<i>Populus deltoides</i>	Eastern Cottonwood	SU		
<i>Populus tremuloides</i>	Trembling Aspen	S5		
<i>Salix bebbiana</i>	Bebb's Willow	S5		
<i>Salix discolor</i>	Pussy Willow	S5		
<i>Salix fragilis</i>	Crack Willow	SE5		
<i>Salix petiolaris</i>	Meadow Willow	S5		
<i>Salix purpurea</i>	Basket Willow	SE4		
<i>Salix x rubens</i>	Weeping Willow	SE4		
<i>Quercus macrocarpa</i>	Bur Oak	S5		
<i>Quercus palustris</i>	Pin Oak	S4		
<i>Ulmus americana</i>	American Elm	S5		
<i>Polygonum convolvulus</i>	Black Bindweed	SE5		
<i>Polygonum hydropiperoides</i>	Mild Water-pepper	S5		
<i>Polygonum lapathifolium</i>	Dock-leaf Smartweed	S5		
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	S5		
<i>Rumex crispus</i>	Curly Dock	SE5		
<i>Rumex obtusifolius</i>	Bitter Dock	SE5		
<i>Atriplex subspicata</i>	Orache	SU		
<i>Amaranthus powellii</i>	Green Amaranth	SE5		
<i>Arenaria serpyllifolia</i>	Thyme-leaf Sandwort	SE5		
<i>Cerastium fontanum</i>	Mouse-ear Chickweed	SE5		
<i>Dianthus armeria</i>	Deptford-pink	SE5		
<i>Silene antirrhina</i>	Sleepy Catchfly	S5		
<i>Silene vulgaris</i>	Bladder Champion	SE5		
<i>Stellaria graminea</i>	Little Starwort	SE5		
<i>Anemone canadensis</i>	Canada Anemone	S5		
<i>Ranunculus acris</i>	Tall Butter-cup	SE5		
<i>Ranunculus flabellaris</i>	Yellow Water-crowfoot	S4?		
<i>Ranunculus repens</i>	Creeping Butter-cup	SE5		

Scientific Name	English Name	Srank	COSEWIC/ COSSARO	Niagara
<i>Berberis vulgaris</i>	European Barberry	SE5		
<i>Podophyllum peltatum</i>	May Apple	S5		
<i>Chelidonium majus</i>	Greater Celandine	SE5		
<i>Alliaria petiolata</i>	Garlic Mustard	SE5		
<i>Barbarea vulgaris</i>	Yellow Rocket	SE5		
<i>Brassica nigra</i>	Black Mustard	SE5		
<i>Hesperis matronalis</i>	Dame's Rocket	SE5		
<i>Lepidium campestre</i>	Field Pepper-grass	SE5		
<i>Lepidium virginicum</i>	Poor-man's Pepper-grass	S5		
<i>Thlaspi arvense</i>	Field Penny-cress	SE5		
<i>Penthorum sedoides</i>	Ditch-stonecrop	S5		
<i>Ribes americanum</i>	Wild Black Currant	S5		
<i>Ribes rubrum</i>	Northern Red Currant	SE5		
<i>Agrimonia gryposepala</i>	Tall Hairy Groovebur	S5		
<i>Crataegus crus-galli</i>	Cockspur Hawthorn	S5		
<i>Crataegus mollis</i>	A Hawthorn	S5		
<i>Crataegus punctata</i>	Dotted Hawthorn	S5		
<i>Fragaria virginiana</i>	Virginia Strawberry	S5		
<i>Geum aleppicum</i>	Yellow Avens	S5		
<i>Geum canadense</i>	White Avens	S5		
<i>Malus pumila</i>	Common Apple	SE5		
<i>Potentilla norvegica</i>	Norwegian Cinquefoil	S5		
<i>Potentilla recta</i>	Rough-fruited Cinquefoil	SE5		
<i>Prunus virginiana</i>	Choke Cherry	S5		
<i>Pyrus communis</i>	Common Pear	SE4		
<i>Rosa blanda</i>	Smooth Rose	S5		
<i>Rosa multiflora</i>	Rambler Rose	SE4		
<i>Rubus allegheniensis</i>	Common Blackberry	S5		
<i>Rubus idaeus</i>	Red Raspberry	S5		
<i>Rubus odoratus</i>	Purple Flowering Raspberry	S5		
<i>Spiraea alba</i>	Meadow-sweet	S5		
<i>Lotus corniculatus</i>	Birds-foot Trefoil	SE5		
<i>Medicago lupulina</i>	Black Medic	SE5		
<i>Melilotus alba</i>	White Sweet Clover	SE5		
<i>Melilotus officinalis</i>	Yellow Sweetclover	SE5		
<i>Robinia pseudo-acacia</i>	Black Locust	SE5		
<i>Trifolium hybridum</i>	Alsike Clover	SE5		
<i>Trifolium pratense</i>	Red Clover	SE5		
<i>Vicia cracca</i>	Tufted Vetch	SE5		
<i>Oxalis dillenii</i>	Dillen's Woodsorrel	S5?		
<i>Geranium robertianum</i>	Herb-robert	SE5		
<i>Zanthoxylum americanum</i>	Northern Prickley Ash	S5		
<i>Rhus radicans ssp. rydbergii</i>	Poison Ivy	S5		
<i>Rhus typhina</i>	Staghorn Sumac	S5		
<i>Acer negundo</i>	Manitoba Maple	S5		
<i>Acer rubrum</i>	Red Maple	S5		
<i>Acer x freemanii</i>	Hybrid Maple	S?		
<i>Impatiens capensis</i>	Spotted Jewel-weed	S5		
<i>Rhamnus cathartica</i>	Buckthorn	SE5		
<i>Rhamnus frangula</i>	Glossy Buckthorn	SE5		
<i>Parthenocissus vitacea</i>	Virginia Creeper	S5		
<i>Vitis riparia</i>	Riverbank Grape	S5		

Scientific Name	English Name	Srank	COSEWIC/ COSSARO	Niagara
<i>Tilia americana</i>	American Basswood	S5		
<i>Hypericum perforatum</i>	Common St. John's-wort	SE5		
<i>Lythrum salicaria</i>	Purple Loosestrife	SE5		
<i>Circaea alpina</i>	Small Enchanter's Nightshade	S5		
<i>Epilobium ciliatum</i>	Hairy Willow-herb	S5		
<i>Oenothera parviflora</i>	Northern Evening-primrose	S5?		
<i>Daucus carota</i>	Queen Anne's Lace	SE5		
<i>Cornus amomum</i>	Silky Dogwood	S5		
<i>Cornus foemina</i>	Gray Dogwood	S5		
<i>Cornus stolonifera</i>	Red-osier Dogwood	S5		
<i>Lysimachia nummularia</i>	Creeping Jennie	SE5		
<i>Fraxinus americana</i>	White Ash	S5		
<i>Fraxinus pennsylvanica</i>	Green Ash	S5		
<i>Apocynum androsaemifolium</i>	Spreading Dogbane	S5		
<i>Apocynum cannabinum</i>	Clasping-leaf Dogbane	S5		
<i>Asclepias incarnata</i>	Swamp Milkweed	S5		
<i>Asclepias syriaca</i>	Common Milkweed	S5		
<i>Convolvulus arvensis</i>	Field Bindweed	SE5		
<i>Echium vulgare</i>	Common Viper's-bugloss	SE5		
<i>Myosotis stricta</i>	Small-flowered Forget-me-not	SE4		
<i>Verbena hastata</i>	Blue Vervain	S5		
<i>Clinopodium vulgare</i>	Field Basil	S5		
<i>Dracocephalum parviflorum</i>	American Dragonhead	S5		
<i>Glechoma hederacea</i>	Ground Ivy	SE5		
<i>Hedeoma pulegioides</i>	American Pennyroyal	S4		
<i>Leonurus cardiaca</i>	Common Mother-wort	SE5		
<i>Lycopus europaeus</i>	European Bugleweed	SE5		
<i>Lycopus uniflorus</i>	Northern Bugleweed	S5		
<i>Prunella vulgaris</i>	Self-heal	S5		
<i>Physalis longifolia</i> var. <i>subglabrata</i>	Smooth Ground-cherry	S4?		
<i>Solanum dulcamara</i>	Climbing Nightshade	SE5		
<i>Linaria vulgaris</i>	Butter-and-eggs	SE5		
<i>Penstemon digitalis</i>	Foxglove Beardtongue	S4S5		
<i>Verbascum thapsus</i>	Common Mullein	SE5		
<i>Veronica americana</i>	American Speedwell	S5		
<i>Veronica officinalis</i>	Common Speedwell	SE5		
<i>Catalpa speciosa</i>	Northern Catalpa	SE1		
<i>Plantago lanceolata</i>	English Plantain	SE5		
<i>Plantago major</i>	Common Plantain	SE5		
<i>Galium asprellum</i>	Rough Bedstraw	S5		
<i>Galium mollugo</i>	Great Hedge Bedstraw	SE5		
<i>Galium tinctorium</i>	Stiff Marsh Bedstraw	S5		
<i>Lonicera involucrata</i>	Fly Honeysuckle	S5		
<i>Lonicera tatarica</i>	Tartarian Honeysuckle	SE5		
<i>Sambucus canadensis</i>	Common Elderberry	S5		
<i>Dipsacus fullonum</i>	Fuller's Teasel	SE5		
<i>Achillea millefolium</i>	Yarrow	S5		
<i>Ambrosia artemisiifolia</i>	Annual Ragweed	S5		
<i>Ambrosia trifida</i>	Great Ragweed	S5		
<i>Anaphalis margaritacea</i>	Pearly Everlasting	S5		
<i>Arctium minus</i>	Common Burdock	SE5		

Scientific Name	English Name	Srank	COSEWIC/ COSSARO	Niagara
<i>Artemisia biennis</i>	Biennial Wormwood	SE5		
<i>Bidens cernua</i>	Nodding Beggar-ticks	S5		
<i>Bidens frondosa</i>	Devil's Beggar-ticks	S5		
<i>Centaurea jacea</i>	Brown Starthistle	SE5		
<i>Cichorium intybus</i>	Chicory	SE5		
<i>Cirsium arvense</i>	Canada Thistle	SE5		
<i>Cirsium vulgare</i>	Bull Thistle	SE5		
<i>Doellingeria umbellata</i>	Flat-top White Aster	S5		
<i>Erigeron hyssopifolius</i>	Daisy Fleabane	S5		
<i>Eupatorium maculatum</i>	Spotted Joe-pye Weed	S5		
<i>Eupatorium perfoliatum</i>	Common Boneset	S5		
<i>Euthamia graminifolia</i>	Flat-top Fragrant-golden-rod	S5		
<i>Hieracium aurantiacum</i>	Orange Hawkweed	SE5		
<i>Hieracium scabrum</i>	Rough Hawkweed	S4		
<i>Inula helenium</i>	Elecampane Flower	SE5		
<i>Matricaria matricarioides</i>	Pineapple-weed Chamomile	SE5		
<i>Solidago altissima</i>	Tall Goldenrod	S5		
<i>Solidago canadensis</i>	Canada Goldenrod	S5		
<i>Solidago rugosa</i>	Rough-leaf Goldenrod	S5		
<i>Sonchus oleraceus</i>	Common Sowthistle	SE5		
<i>Symphotrichum lanceolatum</i>	Panicled Aster	S5		
<i>Symphotrichum novae-angliae</i>	New England Aster	S5		
<i>Symphotrichum puniceum</i>	Swamp Aster	S5		
<i>Tanacetum vulgare</i>	Common Tansy	SE5		
<i>Taraxacum officinale</i>	Brown-seed Dandelion	SE5		
<i>Tragopogon pratensis</i>	Meadow Goat's-beard	SE5		
<i>Tussilago farfara</i>	Colt's Foot	SE5		

KEY

COSEWIC = Committee on the Status of Endangered Wildlife in Canada

COSSARO = Committee on the Status of Species at Risk in Ontario

END = Endangered, THR = Threatened, SC = Special Concern

SRANK = Natural Heritage Information Centre occurrence status

S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure)

SE (exotic, i.e. non-native)

R= Rare in Niagara Region (Oldham 2010)

Appendix C

Bat Monitoring Data

Appendix C

Summary of Bat Calls Recorded at Five Acoustic Monitors

Table 1. Total Calls Recorded for All Species by Detector

Count of ID Detector	Big Brown Bat	Big Brown Bat/Silver-haired Bat	Eastern Red Bat	Hoary Bat	Little Brown Myotis	Myotis species	NoID	Silver-haired Bat	Tri-colored Bat	Grand Total
Detector 37	36		1	10	1		10	12		70
Detector 38	65			6			20	4		95
Detector 39	215		2	58			131	18		424
Detector 40	248	2			23		130	14	1	418
Detector 41	2141	2	40	51		1	487	82		2804
Grand Total	2705	4	43	125	24	1	778	130	1	3811

Table 2. Call Summary for Little Brown Myotis at the Two Monitors where the Species was Recorded

Count of ID Detector	Date	ID Little Brown Myotis
Detector 37	2022-06-11	1
Detector 37 Total		1
Detector 40	2022-06-03	23
Detector 40 Total		23
Grand Total		24

Table 3. Date and Time of Little Brown Myotis Calls at Monitor 40

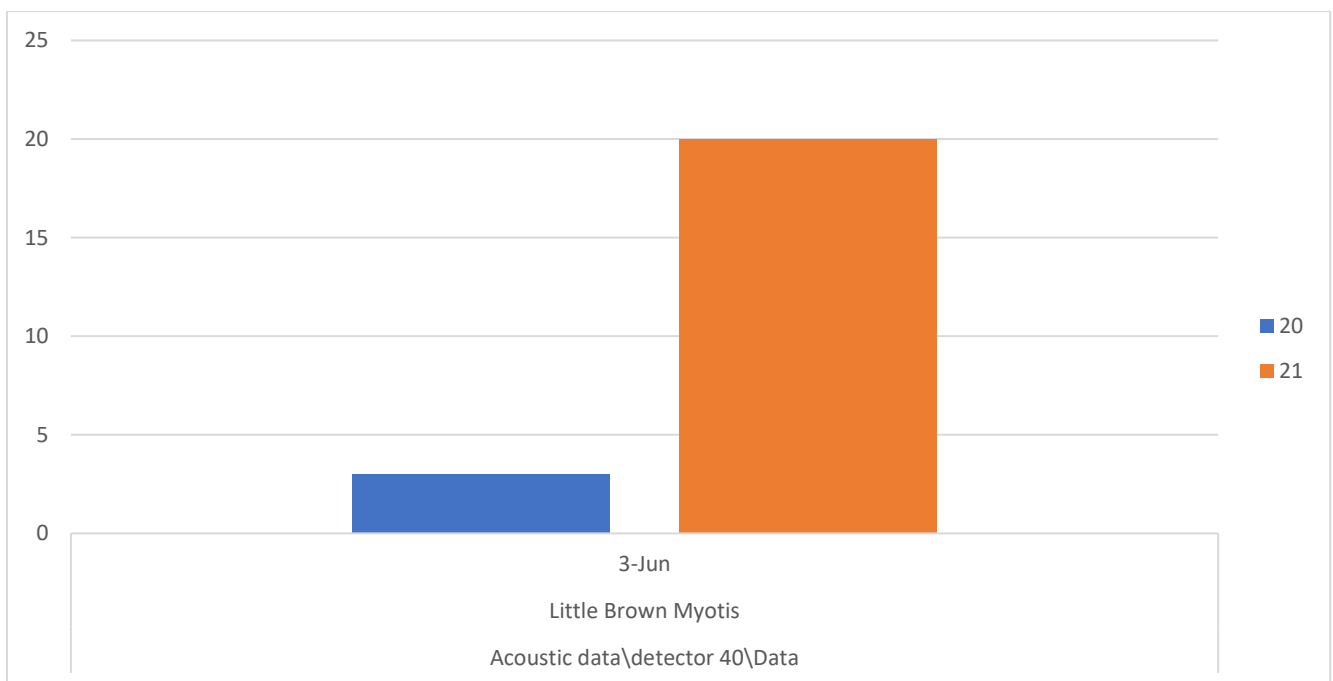


Table 4. Call Summary for unidentified Myotis species at the One Monitor where the Species was Recorded

Count of ID Detector	Date	ID Myotis species
Detector 41	2022-06-01	1
Detector 41 Total		1
Grand Total		1

Table 5. Call Summary for Tri-colored Bat species at the One Monitor where the Species was Recorded

Count of ID	Date	ID
Detector		Tri-colored Bat
Detector 40	2022-06-12	1
Detector 40 Total		1
Grand Total		1

Table 6. Total Bat Calls Recorded at Each Monitor by Date

Count of ID Detector	Date	Big Brown Bat	Big Brown Bat/Silver-haired Bat	Eastern Red Bat	Hoary Bat	Little Brown Myotis	Myotis species	NoID	Silver- haired Bat	Tri- colore d Bat	Grand Total
Detector 37	1-Jun	3			1			1			5
	3-Jun	6			2						8
	4-Jun	2			1			1			4
	5-Jun	5		1	1				2		9
	6-Jun	1						1	1		3
	8-Jun	4						1	2		7
	9-Jun	1						2	1		4
	10-Jun	1							2		3
	11-Jun	8				1		3	2		14
	12-Jun	3			5			1	2		11
	13-Jun	2									2
Detector 37 Total		36		1	10	1		10	12		70
Detector 38	1-Jun				1						1
	2-Jun							1			1
	3-Jun	13						3			16
	4-Jun	3						1	3		7
	5-Jun	5						2	1		8
	6-Jun	15						2			17
	8-Jun	14			1			3			18
	9-Jun	2						2			4
	10-Jun	2			1			2			5
	11-Jun	3			1			2			6
	12-Jun	8			2			2			12
Detector 38 Total		65			6			20	4		95
Detector 39	1-Jun	48			1			7	3		59

Count of ID	Date	Big Brown Bat	Big Brown Bat/Silver-haired Bat	Eastern Red Bat	Hoary Bat	Little Brown Myotis	Myotis species	NoID	Silver-haired Bat	Tri-colored Bat	Grand Total
Detector											
	2-Jun	3			3			7	1		14
	3-Jun	13			7			7			27
	4-Jun	9			5			6			20
	5-Jun	5			3			5	2		15
	6-Jun	4						3			7
	7-Jun				1						1
	8-Jun	8		2	2			3	3		18
	9-Jun	19			4			12	2		37
	10-Jun	28			8			36	4		76
	11-Jun	12			5			14	1		32
	12-Jun	61			17			29	2		109
	13-Jun	5			2			2			9
Detector 39 Total		215		2	58			131	18		424
Detector 40	1-Jun	6									6
	3-Jun	114				23		31	1		169
	5-Jun	17						19	3		39
	6-Jun	7	1					3	1		12
	7-Jun	46	1					7			54
	8-Jun	44						65	9		118
	9-Jun	6						1			7
	10-Jun	3						1			4
	11-Jun	2						3			5
	12-Jun	2								1	3
	13-Jun	1									1
Detector 40 Total		248	2			23		130	14	1	418
Detector 41	31-May							1			1
	1-Jun	643		1			1	38	6		689

Count of ID Detector	Date	Big Brown Bat	Big Brown Bat/Silver-haired Bat	Eastern Red Bat	Hoary Bat	Little Brown Myotis	Myotis species	NoID	Silver- haired Bat	Tri- colore d Bat	Grand Total
	2-Jun	13		6	1			12	1		33
	3-Jun	111		7	2			38	3		161
	4-Jun	24			3			16	7		50
	5-Jun	41			4			32	5		82
	6-Jun	62			1			18	3		84
	7-Jun	25	2					2			29
	8-Jun	97						19	2		118
	9-Jun	78						7	2		87
	10-Jun	176		4	9			25	4		218
	11-Jun	166		14	3			76	16		275
	12-Jun	590		6	25			168	31		820
	13-Jun	115		2	3			35	2		157
Detector 41 Total		2141	2	40	51		1	487	82		2804
Grand Total		2705	4	43	125	24	1	778	130	1	3811

Appendix D

Assessment of Habitat for Threatened or Endangered Species and Wildlife Habitat

Appendix D

SAR Screening – Welland Area

Species	ESA Status	General habitat description	Assessment for Adjacent Lands
Amphibians - No SAR in the Welland Area			
Birds			
Barn Swallow	Threatened	Prefers farmland; lake/river shorelines; wooded clearings; urban populated areas; rocky cliffs; and wetlands. They nest inside or outside buildings; under bridges and in road culverts; on rock faces and in caves etc.	No structures that could provide suitable nesting habitat are present within the drain corridor.
Bobolink/Eastern Meadowlark	Threatened	Generally, prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands	No suitable habitat is present.
Chimney Swift	Threatened	Historically found in deciduous and coniferous, usually wet forest types, all with a well developed, dense shrub layer; now most are found in urban areas in large uncapped chimneys	No suitable nesting habitat is present.
Common Nighthawk	Special Concern	Generally prefer open, vegetation free habitats, including dunes, beaches, recently harvested forests, burnt-over areas, logged areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and river banks. This species also inhabits mixed and coniferous forests. Can also be found in urban areas (nest on flat rooftops)	Not detected during night survey.
Yellow-breasted Chat	Endangered	Generally prefer dense thickets around wood edges, riparian areas, and in overgrown clearings	No suitable habitat is present.
Fish – No Fish Habitat is Present			
Insects			
Monarch Butterfly	Special Concern	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	No suitable habitat is present within the drain corridor.
Rusty-patch Bumblebee	Endangered	Generally inhabits a range of diverse habitats including mixed farmland, sand dunes, marshes, urban and wooded areas. It usually nests underground in abandoned rodent burrows	No suitable habitat is present within the drain corridor.
West Virginia White Butterfly	Special Concern	Generally prefer moist, deciduous woodlands. The larvae feed only on the leaves of the two-leaved toothwort (Cardamine diphylla), which is a small, spring-blooming plant of the forest floor.	The host plant, Two-leaved Toothwort, is not present within the drain corridor.
Mammals			
Eastern small-footed Myotis	Endangered	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius.	No overwintering habitat is present.

Species	ESA Status	General habitat description	Assessment for Adjacent Lands
Little Brown Myotis Northern Myotis Tri-colour Bat		Maternal Roosts: primarily under loose rocks on exposed rock outcrops, crevices and cliffs, and occasionally in buildings, under bridges and highway overpasses and under tree bark.	Roosting or maternity habitat is present in only one small woodland within the drain corridor.
Molluscs – No Aquatic Habitat is Present			
Plants			
Broad Beech Fern	Special Concern	Generally inhabits shady areas of beech and maple forests where the soil is moist or wet	No suitable habitat is present.
Butternut	Endangered	Generally grows in rich, moist, and well-drained soils often found along streams. It may also be found on well-drained gravel sites, especially those made up of limestone. It is also found, though seldomly, on dry, rocky and sterile soils. In Ontario, the Butternut generally grows alone or in small groups in deciduous forests as well as in hedgerows.	General habitat is present in woodland.
Eastern Flowering Dogwood	Endangered	Generally grows in deciduous and mixed forests, in the drier areas of its habitat, although it is occasionally found in slightly moist environments; Also grows around edges and hedgerows	General habitat is present in woodland.
Round-leaved Greenbrier	Threatened	Generally grows in open moist to wet woodlands, often growing on sandy soils . Habitat is variable.	General habitat is not present.
Swamp Rose Mallow	Special Concern	Generally grows in open, coastal marshes, but it is also sometimes found in open wet woods, thickets and drainage ditches	No suitable habitat is present.
White Wood Aster	Threatened	Generally grows in open, dry, deciduous forests. It has been suggested that it may benefit from some disturbance, as it often grows along trails in woodlands.	Low potential in woodland.
Reptiles			
Blanding's Turtle	Threatened	Generally occur in freshwater lakes, Permanent or temporary pools, slow flowing streams, marshes and swamps. They prefer shallow water that is rich in nutrients, organic soil and dense vegetation. Adults are generally found in open or partially vegetated sites, and juveniles prefer areas that contain thick aquatic vegetation including sphagnum, water lilies and algae.	Habitat is not present.
Common Five-lined Skink	Endangered	Generally occur near dunes, fields, and deciduous forests. This species is generally associated with relatively open environments.	Habitat is not present.
Eastern Ribbonsnake	Special Concern	Generally occur along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides	General habitat is present.

Species	ESA Status	General habitat description	Assessment for Adjacent Lands
		cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting	
Massassauga Rattlesnake	Threatened	Generally occur in habitats ranging from tall grass prairie to cedar bogs to shorelines. All habitats require canopies that are not too open, but they also require access to spots where they can get warm enough to effectively digest their food and reproduce. Sufficient moisture is also required for them to survive the winter, so they are often associated with wetlands or small, wet depressions in the terrain. (Wainfleet Bog)	Not known to occur in the local area. Population restricted to Wainfleet Bog area.
Milksnake	Special Concern	Generally occur in rural areas, where it is most frequently reported in and around buildings, especially old structures. It is also found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. They must also be in proximity of water, and suitable locations for basking and egg-laying.	General habitat is present.
Snapping Turtle	Special Concern	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravelly or sandy areas along streams. Snapping Turtles often take advantage of manmade structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Habitat is not present.

Significant Wildlife Habitat Screening – EcoRegion 7E

Significant Wildlife Habitat Type	Habitat Description	Habitat Assessment March 2022
Seasonal Concentration Areas of Animals		
Waterfowl Stopover and Staging Areas (Terrestrial)	Fields with sheet water or fields utilized by Tundra Swans during Spring (mid March to May). Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless used by Tundra Swans in the Long Point, Rondeau, Lk. St. Clair, Grand Bend and Pt. Pelee areas.	No Suitable habitat was not observed.
Waterfowl Stopover and Staging Areas (Aquatic)	Ponds, marshes, lakes, bays, costal inlets and watercourses that are used as stopover areas during migration. These habitats typically have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water).	No Suitable habitat was not observed.
Shorebird Migratory Stopover Area	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH	No Suitable habitat was not observed.
Raptor Winter Area	A combination of fields and woodlands that provide roosting, foraging and resting habitat for wintering raptors. These sites need to be larger than 20 ha in size, of which at least 15 ha needs to be comprised of idle/fallow or lightly grazed field/meadow.	No Suitable habitat was not observed.
Bat Hibernacula	Hibernacula may be found in caves, mine shafts, underground foundations and karsts.	No Suitable habitat was not observed.
Bat Maternity Colonies	Maternity colonies can be found in tree cavities, vegetation and buildings. Deciduous and mixed forest communities with greater than 10 ha of large diameter (> 25 cm dbh) wildlife trees.	Low Potential Suitable habitat in woodlands.
Turtle Winter Areas	Over-wintering sites for turtles are typically in the same area as their core habitat. Waterbodies have to be deep enough to not freeze and have soft mud substrates.	No Suitable habitat was not observed.
Snake Hibernaculum	Snakes hibernate in sites located below frost lines in burrows, rock crevices and other natural locations. Rock piles, slopes, stones fences, and crumbling foundations can also be used by hibernating snakes. Areas of broken and fissures rocks can also provide access to sites below the frost line.	No Suitable habitat was not observed.

Significant Wildlife Habitat Type	Habitat Description	Habitat Assessment March 2022
Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)	Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area.	No Suitable habitat was not observed.
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	Nests in live or dead standing trees in wetlands, lakes, islands and peninsulas. Shrubs and occasionally emergent vegetation may also be used.	No Suitable habitat was not observed.
Colonially - Nesting Bird Breeding Habitat (Ground)	Nesting colonies of gulls and terns occur on rocky islands or peninsulas within a lake or larger river	No Suitable habitat was not observed.
Migratory Butterfly Stopover Areas	Cultural meadow, savannah and thicket communities that are within 5 km of Lake Ontario, at least 10 ha in size and contain a combination of field and forest habitat	No Suitable habitat was not observed.
Landbird Migratory Stopover Areas	Woodlots >5 ha in size and within 5 km of Lake Erie and Lake Ontario. If woodlands are rare in an area of shoreline, woodland fragments 2-5 ha can be considered for this habitat. If multiple woodlands are located along the shoreline those Woodlands <2 km from Lake Erie and Lake Ontario are more significant.	No Suitable habitat was not observed.
Deer Yarding Areas	Deer yarding areas or winter concentration within a mixed or coniferous forest and swamp communities.	No Suitable habitat was not observed.
Deer Winter congregation Areas	Deer movement in winter months within eco-region 7E are not constrained by snow depth, however they still congregate in suitable woodlands. These woodlands will typically be larger than 100 ha in size, however woodlands smaller than 100 ha may be considered significant based on MNR assessments.	No Suitable habitat is not associated with the subject lands.
Rare Vegetation Communities		
Cliffs and Talus Slops	A cliff is a vertical to near vertical bedrock that is greater than 3 m in height. A talus slope is rock rubble at the base of a cliff made up of coarse rocky debris.	No Suitable habitat is not associated with the subject lands.
Sand Barren	Sand barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little to no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah.	No Suitable habitat is not associated with the subject lands.
Alvar	Alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil.	No Alvar was not observed for the subject lands.

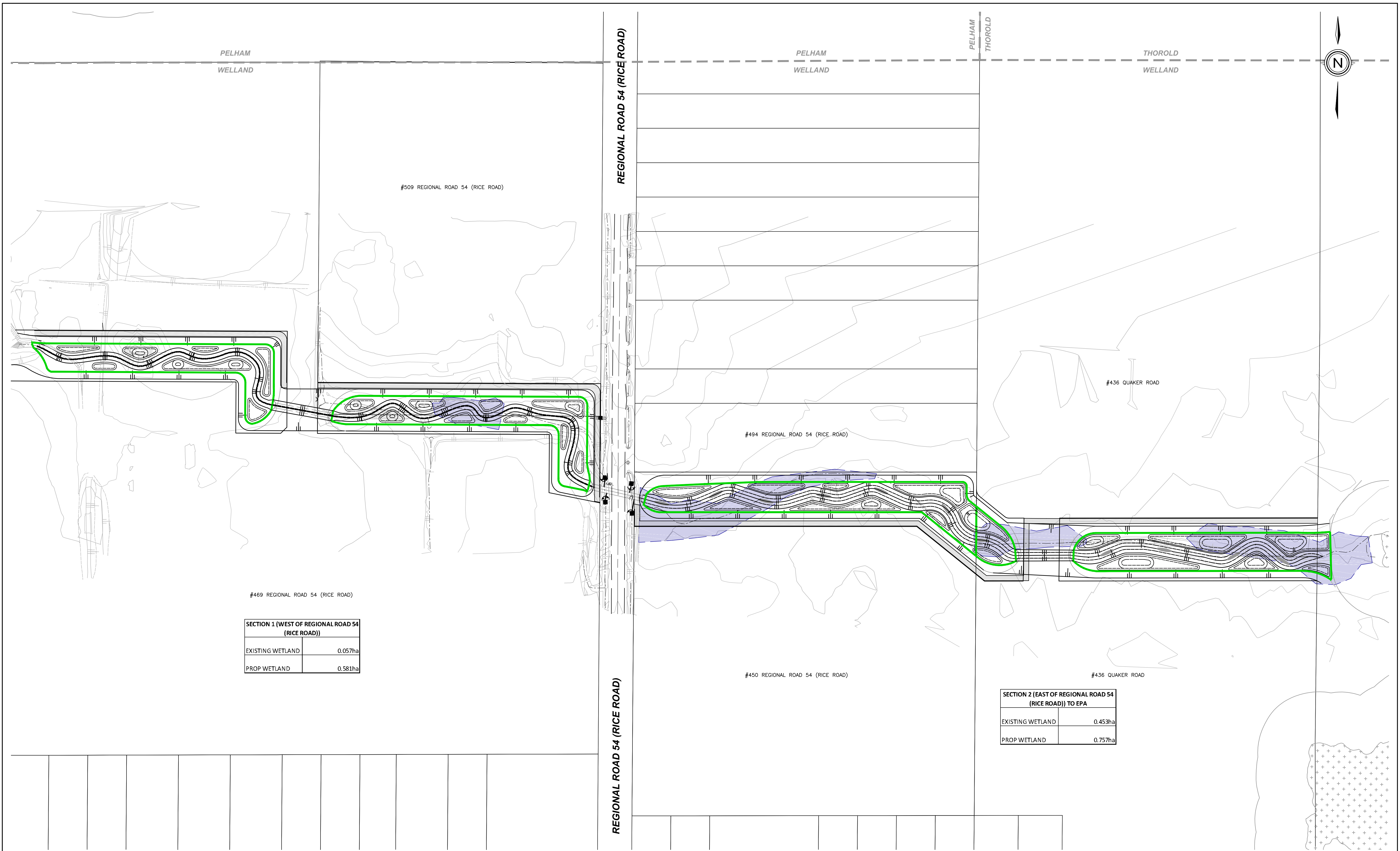
Significant Wildlife Habitat Type	Habitat Description	Habitat Assessment March 2022
Old Growth Forest	Old growth forests are characterized by heavy mortality or turnover of over story trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris. Stands must be 30 ha or greater in size with a minimum of 10 ha of interior habitat (interior habitat determined with a 100 m buffer).	No Old growth forest was not observed.
Savannah	Savannah is a tallgrass prairie habitat that has tree cover between 20 - 60%.	No Savannah was not observed for the subject lands.
Tallgrass Prairie	Tallgrass Prairie has ground cover that is dominated by prairie grasses. An open tallgrass prairie has less than 25% tree cover.	No Tallgrass Prairie was not observed for the subject lands.
Other Rare Vegetation Communities	Rare vegetation communities may include beaches, fens, forests, marsh, barrens, dunes and swamps, as identified in Appendix M of the Significant Wildlife Habitat Technical Guide.	No Rare vegetation communities were not observed for the subject lands.
Specialized Habitat for Wildlife		
Waterfowl Nesting Area	Waterfowl nesting areas are upland areas adjacent to marsh, shallow aquatic and swamp habitat. In order to be considered significant these features must extend 120 m from of a wetland in order to deter predators	No Suitable habitat is not associated with the subject lands.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	Nests for these species are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands or on structures over water. Osprey nests are usually at the top of a tree, while Bald Eagle nets are typically in super canopy trees.	No No Bald Eagle or Osprey nests were observed within the subject lands.
Woodland Raptor Nesting Habitat	Woodland raptor habitat can be found in all natural or conifer plantation woodland/forest stands that are greater than 30 ha in size with more than 10 ha of interior forest habitat (interior habitat determined with a 200 m buffer).	Low Potential Suitable habitat in woodlands.
Turtle Nesting Areas	Ideal nesting habitat for turtles are close to water and away from roads and sites that are less prone to loos of eggs by predation. These areas are often associated with exposed mineral soil (sand or gravel) areas within 100 m of a marsh, shallow aquatic, bog or fen habitat.	No Suitable habitat was not observed for the subject lands.
Seeps and Springs	Seeps/springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats.	No Seeps/springs were not observed within the subject lands

Significant Wildlife Habitat Type	Habitat Description	Habitat Assessment March 2022
Amphibian Breeding Habitat (Woodland)	This type of habitat is associated with the presence of a wetland, lake or pond that is within or adjacent (within 120m) of a woodland. Woodlands with permanent ponds or those contain water until mid-July are more likely to be used as breeding habitat.	Yes Suitable habitat was observed for the subject lands.
Amphibian Breeding Habitat (Wetlands)	Wetlands and pools that are greater than 500 m ² and are isolated from woodlands (greater than 120 m)	No Suitable habitat is not associated with the subject lands.
Marsh Bird Breeding Habitat	This type of habitat occurs in wetlands with shallow water and emergent aquatic vegetation present	No Suitable habitat is not associated with the subject lands.
Woodland Area-Sensitive Bird Breeding Habitat	Habitats where interior forest breeding birds are breeding. These forests are typically larger mature forest stands or woodlands that are greater than 30 ha in size (interior habitat determined with a 200 m buffer).	Low Potential Suitable habitat in PSW and Woodlands.
Open Country Bird Breeding Habitat	This type of habitat occurs in larger grassland areas (including natural and cultural fields and meadows) that are greater than 30 ha in size. Grasslands that are being actively used for farming (i.e. row cropping, intensive hay, livestock pasturing in the last 5 years) typically do not provide ideal habitat for open country bird species.	No Suitable habitat is not associated with the subject lands.
Shrub/Early Successional Bird Breeding Habitat	This type of habitat occurs in large field areas succeeding to shrub and thicket habitats that are greater than 10 ha in size.	No Suitable habitat is not associated with the subject lands.
Terrestrial Crayfish	This type of habitat occurs in meadows and edge of shallow marshes.	No Suitable habitat is not associated with the subject lands.
Special Concern and Rare Wildlife Species	This type of habitat occurs wherever special concern and provincially rare (S1, S2, S3 and SH) plant and animal species occur.	To Be Determined
Animal Movement Corridors		

Significant Wildlife Habitat Type	Habitat Description	Habitat Assessment March 2022
Amphibian Movement Corridors	This habitat consists of movement corridors between breeding habitat and summer habitat. Corridors may be found in all ecosystems associated with water.	No Suitable habitat is not associated with the subject lands.

Appendix E

Proposed Drain Realignment Design



#469 REGIONAL ROAD 54 (RICE ROAD)

SECTION 1 (WEST OF REGIONAL ROAD 54 (RICE ROAD))	
EXISTING WETLAND	0.057ha
PROP WETLAND	0.581ha

#436 QUAKER ROAD

SECTION 2 (EAST OF REGIONAL ROAD 54 (RICE ROAD)) TO EPA

EXISTING WETLAND	0.453ha
PROP WETLAND	0.757ha

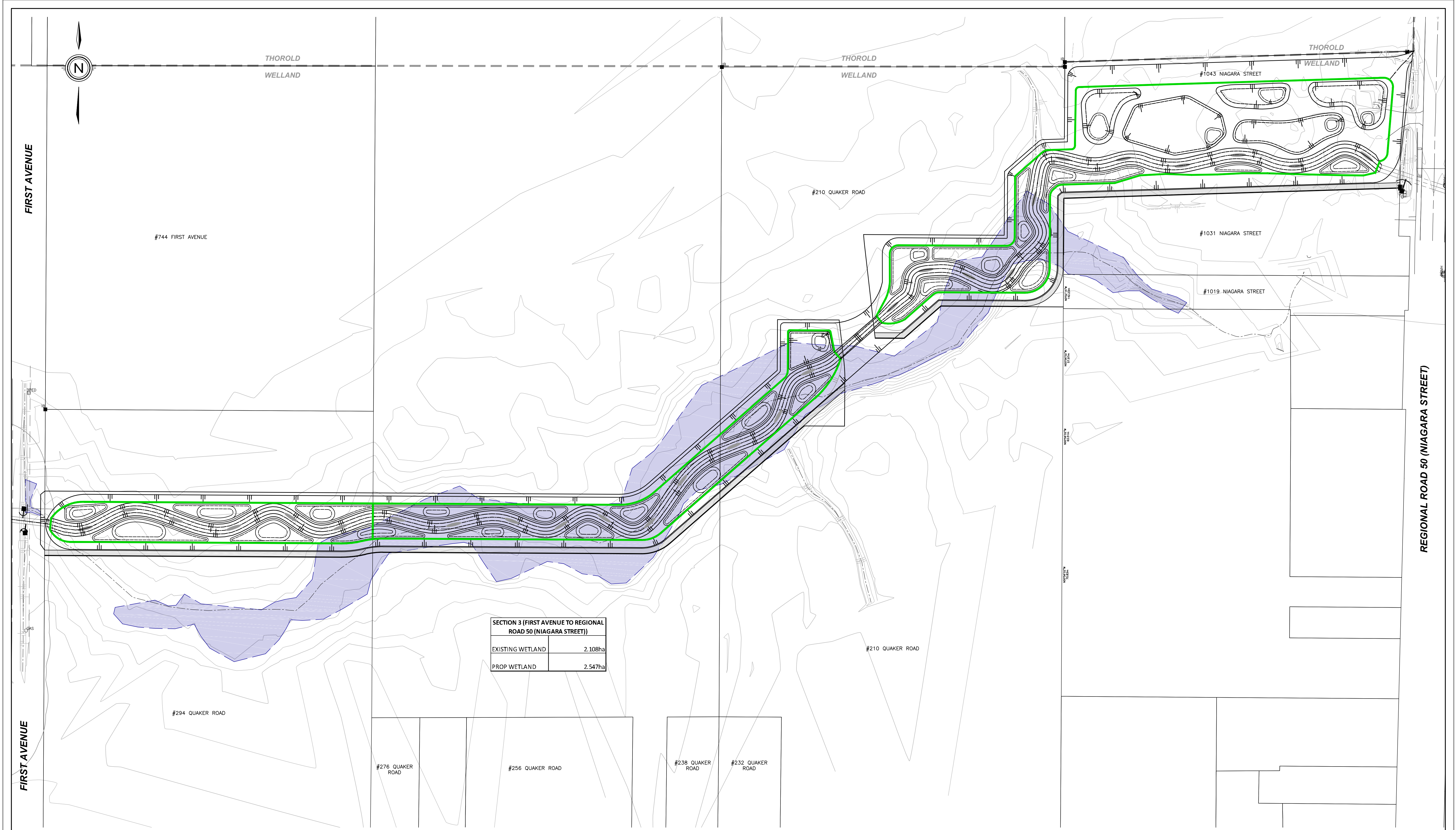
 PROPOSED WETLAND AREA PROVIDED (TOTAL AREA = 3.885ha)


 EXISTING WETLAND STAKED OUT JUNE 14 2023 (TOTAL AREA = 2.618ha)

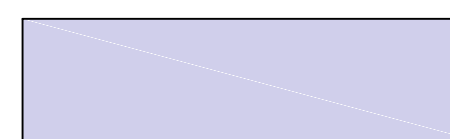


TOWPATH DRAIN RE-ALIGNMENT
WELLAND
WETLAND AREAS 1

CONSULTANT FILE No.	21243
DATE	2023-07-26
PRINTED	2023-07-27
SCALE	1:1000 m
REF No.	
DWG No.	21243-WETLAND1
REV	0



 PROPOSED WETLAND AREA PROVIDED (TOTAL AREA = 3.885ha)

 EXISTING WETLAND STAKED OUT JUNE 14 2023 (TOTAL AREA = 2.618ha)

 UPPER CANADA CONSULTANTS ENGINEERS / PLANNERS	 CITY OF Welland	TOWPATH DRAIN RE-ALIGNMENT WELLAND WETLAND AREAS 2	CONSULTANT FILE No. 21243
			DATE 2023-07-26
			PRINTED 2023-07-27
			SCALE 1:1000 m
			REF No.
			DWG No. 21243-WETLAND2
			REV 0