West Lincoln
Your Future Naturally

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COMMITTEE OF ADJUSTMENT
June 24th, 2020 COMMITTEE AGENDA

MEETING DATE: Wednesday, June 24th, 2020
ZOOM Meeting – Contact acooper@westlincoln.ca before 4pm on June 24th for an invitation if you would like to participate.
7:00 p.m.

1. CHAIR:
The Chair will call to Order the evening's proceedings.

2. DISCLOSURE OF PECUNIARY INTEREST AND/OR CONFLICT OF INTEREST:

3. REQUEST FOR WITHDRAWAL AND/OR ADJOURNMENT:
There are none.

4. APPLICATIONS:
a) **B02/2020WL – Davis/Niagara Pallets (Upper Canada Consultants – Agent)**
The applicants are proposing to sever a ±5330 sq.m. parcel of land from 2930 South Grimsby Road 8 and merge it on title with 2906 South Grimsby Road 8. This is to help facilitate an approved site plan for 2906 South Grimsby Road 8.

5. NEW BUSINESS

6. ADJOURNMENT:
That, this Committee does now adjourn at the hour of _____ P.M.

REPORT
TOWNSHIP
COMMITTEE OF ADJUSTMENT

DATE: June 24th, 2020

REPORT NO: PD-059-20

SUBJECT: **Recommendation Report**
Pamela, Gary & Gale Davis (Agent – Upper Canada Consultants)
Application for Minor Boundary Adjustment
File No. B02/2020WL

CONTACT: Brian Treble, Director of Planning and Building
Gerrit Boerema, Planner II

OVERVIEW:

- **An application has been made by Upper Canada Consultants on behalf of Pamela, Gary & Gale Davis for consent to convey 0.5ha (1.3 acres) (Part 1) from 2930 South Grimsby Road 8 (Part 2) and merge on title with 2906 South Grimsby Road 8 (Part 3) to the benefit of Top O' the Hill Farms (Niagara Pallets) (see attachment 1).**
- **The subject lands (Part 1 & 2) currently contain a single detached dwelling unit and actively farmed agricultural land.**
- **This minor boundary adjustment has been requested to help facilitate the expansion of Niagara Pallets.**
- **The land to be severed and merged are part of the Hamlet Boundary of Regional Road 12 Hamlet as well as the existing Niagara Pallet property.**
- **This application has been reviewed against the related Provincial, Regional and Local policies and can be recommended for approval, with conditions.**

RECOMMENDATION:

That, report PD-059-20 regarding an application for a Minor Boundary Adjustment made by Upper Canada Consultants on behalf of Pamela, Gary & Gale Davis and Top O' the Hill Farms (Niagara Pallets), BE APPROVED, subject to the following conditions:

1. That this approval applies to the transaction as applied for.

2. That the applicant provides the Secretary-Treasurer with a copy of the transfer documents for the conveyance of the subject parcel, or a legal description of the subject parcel to be registered, together with a copy of the deposited reference plan, if applicable, for use in the issuance of the Certificate of Consent.

3. The applicant's solicitor shall provide the Secretary-Treasurer with an undertaking confirming that the Property Identification Numbers (PINS) of the subject parcel and the land with which the subject parcel will be merged with will

be consolidated (consolidation of PIN's). A conveyance of land or parcel to the Township or Region to effect merger may be required.

4. That an approved Zoning by-law amendment be obtained to rezone the lands to be severed and merged to an appropriate zone.

5. That, the existing site plan agreement be amended to include the additional lands to be severed and merged.
    a. That, a 2m high fence be erected on the north and west lot lines of the property.

6. That the applicants obtain an NPCA work permit to re-align the watercourse and that the approved work permit be provided to the Regional Planning and Development Services and the Township of West Lincoln.

7. That a Restoration Planting Plan be prepared and submitted to Regional Planning and Development Services for review and approval, to identify and illustrate the location of additional native trees, shrubs and/or groundcover to be planted within the Fish Habitat buffer, as appropriate.

8. That the owner submits a signed Legal Undertaking to Regional Planning and Development Services wherein the owner agrees to implement the mitigation measures and recommendations found in Section 5.1 of the EIS (prepared by Beacon Environmental, dated February 2020) and that these be included within the site plan agreement, including but not limited to:
    a. That the channel for the realigned portion of the Headwater Drainage Features will be designed to replicate the seasonal flow conveyance of the existing features.
    b. That detailed sedimentation and erosion control plans be prepared for review and approval by the Region. All sediment and erosion control measures shall be maintained in good condition for the duration of construction until all disturbed surfaces have been stabilized. Muddy water shall not be allowed to leave the site.
    c. That clearing/grading of the meadow habitat should not be undertaking from mid-April through to the end of August, to avoid impacts to nesting birds.
    d. That no construction materials or equipment is to be located, even on a temporary basis, within the buffers of Fish Habitat.
    e. Implementation of the approved Restoration Planting Plan.

9. That the owner dedicates a 0.74 metre road widening to the Regional Municipality of Niagara along the frontage of Regional Road 20 (Highway 20), to the satisfaction of the Niagara Region Planning & Development Services Department. All costs for providing the necessary survey plan and all related documents are the responsibility of the applicant.

10. That a final certification fee, payable to the Township of West Lincoln, be submitted to the Secretary-Treasurer.

11. All municipal requirements be met to the satisfaction of the municipality including servicing connections if required, cash-in-lieu of parkland dedication, property maintenance, compliance with Zoning By-law provisions for structures, and any related requirements, financial or otherwise.

12. That all conditions of consent be fulfilled within one (1) year of the notice of decision, failing which the application shall be deemed to be refused.

ALIGNMENT TO STRATEGIC PLAN

- **Theme**
  - Support for Business and Employment Opportunities for Residents
  - Strategic, Responsible Growth

BACKGROUND:

The subject lands are municipally known as 2930 South Grimsby Road 8, legally described as Concession 8, Part of lot 16, in the Township of West Lincoln. Approximately 0.5ha (1.3 acres) is proposed to be severed from 2930 South Grimsby Road 8 (Part 1) and merged on title with 2906 South Grimsby Road 8 to the benefit of Niagara Pallets (see attachment 1). The intent of this minor boundary adjustment is to help facilitate an expansion of the Niagara Pallets business at 2906 South Grimsby Road 8. The additional lands are required for truck parking and a stormwater management/ fire pond.

This minor boundary adjustment is also tied to a temporary use by-law that was approved earlier this year for 4981 Regional Road 20. The temporary use by-law allows for a portion of the business to continue operating on 4981 Regional Road 20 until February 28th, 2022. The temporary use by-law was approved to provide the applicants with enough time to relocate the remainder of their business to 2906 South Grimsby Road 8, which is appropriately zoned for their operations. This minor boundary adjustment is one of the required steps by Niagara Pallets in order to relocate the remainder of this business to 2906 South Grimsby Road 8.

The piece of land to be severed and merged is shaped irregular in shape to ensure the retention of an existing agricultural access along Regional Road 20 for continued use by the applicant. There is an existing watercourse on 2930 South Grimsby Road 8 located on the land to be severed and merged with the Niagara Pallet's property. This watercourse is to be realigned to stay with the remnant parcel to keep the whole of the feature with the 2930 South Grimsby Road property.

CURRENT SITUATION:

Provincial Policy Statement (PPS)

The Provincial Policy Statement (PPS) guides Planning policy for the Province. All

planning decisions must conform to the policies in the PPS. This application is for a minor boundary adjustment and will not result in the creation of a new lot.

The subject property is within the Regional Road 12 Hamlet of West Lincoln. The PPS states that rural settlement areas are to be the focus of growth and development and that their vitality and regeneration shall be promoted (1.1.4.2). The PPS also states that healthy, integrated and viable rural settlement areas should be supported by promoting diversification of the economic base and employment opportunities through goods and services (1.1.4.1.f).

The purpose of this minor boundary adjustment is to help facilitate the expansion of Niagara Pallets within the hamlet boundary of Regional Road 12. This expansion focuses growth and development within a rural settlement area of Smithville and promotes employment opportunities for the area. The expansion will provide more employment opportunities through the growth of the company.

For these reasons, Planning Staff is of the opinion that this application meets the intent of the PPS.

A Place to Grow (P2G)
Applications filed after June 16, 2006 must conform to the Growth Plan for the Greater Golden Horseshoe, 2017. Section 1.2.3 of the P2G provides direction on how to read the Growth Plan, specifically noting that: *This Plan must also be read in conjunction with other provincial plans as defined in the Planning Act that may apply within the same geography.*

The P2G encourages municipalities to plan for a variety of economic opportunities within rural settlements to serve the needs of rural residents and area businesses (2.2.9.1). The subject lands that are to be severed and merged with the abutting commercial business are located within the Regional Road 12 Hamlet of West Lincoln.

As the expansion is an economic opportunity located within a rural settlement area, the proposed minor boundary adjustment application is considered to be in conformity with the P2G policy.

Greenbelt Plan
Applications must conform with the Greenbelt Plan if they fall within the mapping provided for the Greenbelt Plan. Since the subject lands are outside the area designated in the Greenbelt Plan, the PPS is the only provincial policy that applies in this situation.

Regional Official Plan (ROP)
The ROP designates the subject property as Hamlet Area. The ROP provides growth management policies for Hamlets for a number of areas including economic opportunities that support the hamlet, agricultural and rural communities in the Niagara Region (4.H.A). The proposed minor boundary adjustment application will help facilitate the growth and development of the benefitting lands (Niagara Pallets), which will help support the

economic opportunities available to the surrounding communities in the Niagara Region.

The parcel to be severed and merged has a watercourse that is designated as a Natural Heritage Feature. The pre-consultation meeting held for this application required an Environmental Impact Study (EIS) to be submitted. The EIS and the following addendum submitted in May have indicated that the watercourse is not a Fish Habitat (see attachment 2 and 3) but Niagara Region Environmental Staff are still of the opinion that the watercourse is a fish habitat.

The Niagara Region's comments on this application can be found in attachment 4 and discussed in further detail in the Agency Comments section of this report.

Township Official Plan (OP)

The Township's Official Plan designates the lands to be severed and merged as Hamlet Settlement Area. The Township's Hamlet Settlement Area designation permits for residential and associated commercial, institutional, recreational and open space land uses within existing and established hamlet settlement areas of the Township (7.1). Some of the objectives for the Township's hamlets are to 1) recognize and encourage further development that provides both residential accommodation and a service function to the larger agricultural and rural community and 2) ensure compatibility between competing uses within each Hamlet community (7.2.2.a & b).

Commercial uses are permitted in the Hamlet Settlement Area but are required to ensure compatibility with adjacent residential uses. There is one immediately adjacent residential use located to the north of Niagara Pallets and multiple residential units to the west, south and south west or the property. These residential uses are separated from the business by Regional Road 20 and 2930 S. G. Rd 8.

It would appear from the Township's 2018 aerial imagery that there is a fence separating the business from the residential property immediately to the north along the length of the shared property line. Staff have inquired with the property owner of Niagara Pallets, who has indicated that there is a fence along the shared property line that is 8ft high. Staff are proposing a condition that the fence be extended the entire length of the north property line and that a 2m fence be erected on the west lot line to ensure the business does not accidentally spill onto the surrounding agricultural property.

The residential uses located to the south and south west of the benefitting business are separated from it by Regional Road 20. These properties do appear separated enough that they should not experience any adverse impacts resulting from the expanded business as Regional Road 20 separates them from Niagara Pallets. Technical issues such as lighting can and will be dealt with at the site plan stage.

The land to be severed and merged will need to undergo and receive approval of a site plan amendment application in order to address technical issues such as lighting and stormwater management. A condition has been added to this consent application to

reflect this requirement.

The minor boundary adjustment is located within the limits of the Hamlet Settlement Area, which permits commercial uses provided that there are no compatibility issues with surrounding residential uses. Provided a 2m fence is existing or installed on the shared property line between the business and the property to the north, Planning Staff are of the opinion that the minor boundary adjustment to benefit Niagara Pallets will not create any compatibility issues with neighbouring residential uses. As such, Planning Staff are of the opinion that this consent application meets the intent of the Township's Official Plan.

Township Zoning By-law (ZBL)
The Township's ZBL zones the lands to be severed and merged as (D) for Development. The benefitting lands are zoned (C3) for Service Commercial. The applicants will need to apply for a Zoning Bylaw Amendment following this severance application to ensure the land to be severed and merged is zoned appropriately for the developer's intended use.

Where a severance occurs along a hamlet line, the retained agricultural lands are required to be rezoned to Agricultural Purposes Only (APO). As a portion of the subject lands has access onto Regional Road 20 and there is an existing dwelling on the retained lands, the APO zoning will not be required. However, since the property is deficient in lot size, a site specific exception will be required to recognize the deficiency. There was a rezoning application for the property in 2013 which changed the location of the lot frontage to S.G. Rd 8 and recognized its deficiency. At the time of the rezoning application in 2013, the minimum required lot area was 16 ha, whereas now it is 40ha. The property (2930 S.G. Rd 8) is currently ±20ha in size, which is deficient by ±20ha and will need to be recognized in the rezoning application.

Submitting a complete Zoning Bylaw Amendment application has been added as a condition of consent approval to ensure the above noted zoning deficiencies and required changes are addressed.

FINANCIAL IMPLICATIONS
There are no financial implications associated with this application.

PLANNING JUSTIFICATION LETTER
A Letter of Planning Opinion was submitted with the application by the applicant's agent, Craig Rohe from Upper Canada Consultants. The author of the Letter provides an analysis of the application and comes to the conclusion that the application is appropriate and in conformity with Provincial, Regional and Local land use policies and should be approved (attachment 4).

AGENCY COMMENTS
Agencies were given notice on April 14th, 2020 by way of regular mail or e-mail. Notice was also posted on the property a minimum of 14 days before the hearing and on the

Township's website.

The Township's Septic Inspector has no objection to the application as proposed.

The Niagara Peninsula Conservation Authority state that they have no issues with the proposed realignment provided that the applicants obtain an approved NPCA permit before a final certificate is issued for the minor boundary adjustment. The NPCA has indicated that they will require the following drawings to be submitted for the review of the permit:

- Engineered drawings of the realigned channel with representative cross-section to ensure the channel capacity has been maintained to convey equivalent flow volumes
- A re-seeding plan to ensure that channels have suitable vegetation to control flows at re-alignment discharge rates
- A sediment and erosion control plan to minimize the erosion to downstream habitat
- A minimum 5 metre setback from the realigned channel to the limit of the future development area to mitigate encroachment into the channel buffer. This could be accomplished with a small fence or tree/shrub plantings. It doesn't have to be extensive but should clearly delineate the limits of the expansion area.

The Niagara Region has submitted comments that they do not object to the consent application from a Provincial or Regional perspective, subject to the satisfaction of the following conditions:

1. That Part 1 merge in title with Part 3, municipally known as 2906 South Grimsby Road 8.
2. That a Niagara Peninsula Conservation Authority Work Permit for the creek realignment be provided to the Regional Planning and Development Services.
3. That a Restoration Planting Plan be prepared and submitted to Regional Planning and Development Services for review and approval, to identify and illustrate the location of additional native trees, shrubs and/or groundcover to be planted within the Fish Habitat buffer, as appropriate.
4. That the owner submits a signed Legal Undertaking to Regional Planning and Development Services wherein the owner agrees to implement the mitigation measures and recommendations found in Section 5.1 of the EIS (prepared by Beacon Environmental, dated February 2020) including but not limited to:
    a. That the channel for the realigned portion of the Headwater Drainage Features will be designed to replicate the seasonal flow conveyance of the existing features.
    b. That detailed sedimentation and erosion control plans be prepared for review and approval by the Region. All sediment and erosion control measures shall be maintained in good condition for the duration of construction until all disturbed surfaces have been stabilized. Muddy water shall not be allowed to leave the site.
    c. That clearing/grading of the meadow habitat should not be undertaking from mid-April through to the end of August, to avoid impacts to nesting birds.

d. That no construction materials or equipment is to be located, even on a temporary basis, within the buffers of Fish Habitat.
e. Implementation of the approved Restoration Planting Plan.

5. That the owner dedicates a 0.74 metre road widening to the Regional Municipality of Niagara along the frontage of Regional Road 20 (Highway 20), to the satisfaction of the Niagara Region Planning & Development Services Department. All costs for providing the necessary survey plan and all related documents are the responsibility of the applicant.

These have been added as conditions to this application.

Full Agency comments can be found in attachment 5 of this report.

PUBLIC COMMENTS

Public Notice was given on June 2nd, 2020 by way of regular mail to all property owners within a 120m radius of the property. Notice was also posted on the property a minimum of 14 days before the hearing and on the Township's website. As of June 19th, 2020 no comments have been received from the public.

CONCLUSION

Township staff has reviewed the application against the policies of Section 51(24) of the Planning Act, as well as Provincial, Regional and Township policies and find that the application generally meets the intent of all applicable policies. Township Staff supports the approval of the proposed minor boundary adjustment as depicted on the survey sketch attached with this report (see attachment 1), with the conditions as listed in the recommendation.

ATTACHMENTS

1. Survey sketch
2. Environmental Impact Study
3. Environmental Impact Study Addendum
4. Letter of Planning Opinion
5. Agency Comments

Prepared by:

Brian Treble, RPP, MCIP
Director of Planning and Building

Gerrit Boerema
Planner II

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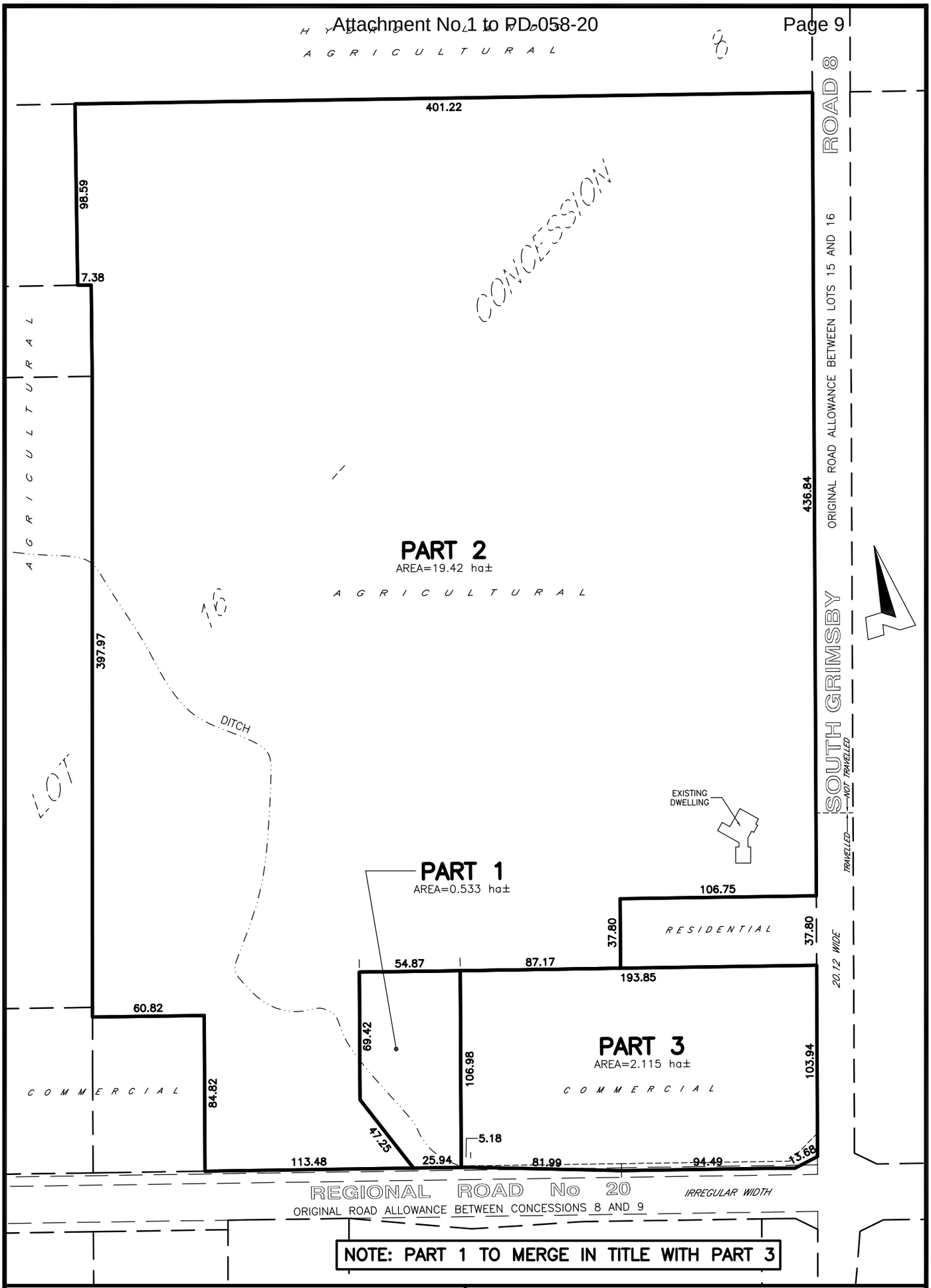

SKETCH

PREPARED FOR SEVERANCE APPLICATION

PART OF LOT 16, CONCESSION 8

GEOGRAPHIC TOWNSHIP OF SOUTH GRIMSBY

IN THE

TOWNSHIP OF WEST LINCOLN

REGIONAL MUNICIPALITY OF NIAGARA

SCALE 1 : 2500 (METRIC)

NOTE: THIS SKETCH IS PREPARED FROM COMPILED AND CALCULATED INFORMATION, NOT FROM AN ACTUAL SURVEY.
ALL MEASUREMENTS ARE +/− MEASUREMENTS.
DO NOT SCALE FROM THIS DRAWING.

CAUTION: THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

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DATE FEBRUARY 25, 2020 FILE No 89-455-3 (89455-3_SEV)

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

Environmental Impact Study Niagara Pallet

Lot Addition and Site Plan Approval, West Lincoln, Regional Municipality of Niagara

Prepared For:

Niagara Pallet Ltd.

Prepared By:

Beacon Environmental Limited

Date: *Project:*

February 2020 **219140**

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Appendix 1. Agency Consultation
Appendix 2. List of Vascular Plants for Subject Lands
Appendix 3. Stable Top of Valley Slope
Appendix 4. Proposed Lot Addition

1. Introduction

Beacon Environmental Limited (Beacon) was retained by Niagara Pallet Limited (the Proponent) to undertake an Environmental Impact Study (EIS) for a Boundary Adjustment and Site Plan Amendment for a proposed expansion of the facility located at 2906 South Grimsby Road 8, Smithville, Regional Municipality of Niagara, hereinafter referred to as the subject lands (**Figure 1**).

The subject lands lie at the intersection of South Grimsby Road 8 and Highway 20. The Town of Smithville lies 3 km to the east along Highway 20. The property is surrounded by active agricultural fields (**Photograph 1**). Watercourses and ditching associated with the subject lands and adjacent lands drain to Twenty Mile Creek, which located 160 m directly to the south of the subject lands.

The proposed expansion of the facility will require a site plan amendment and realignment of watercourses that are regulated by the Niagara Peninsula Conservation Authority (NPCA) and therefore an EIS is required.

This EIS has been prepared following the requirements of the Regional Municipality of Niagara Environmental Impact Study Guidelines (2018). For the subject lands, and adjacent lands, a background review, detailed field investigations, and assessment of natural heritage features and functions were undertaken by Beacon Environmental in the 2019 field season. The site plan of the proposed expansion presented in this EIS has been prepared by Upper Canada Consultants (UCC).

Photograph 1. Niagara Pallet and Proposed Expansion Area Along the North ROW of Highway 20 Looking East

Site Location	Figure 1
Lot Addition and Site Plan Approval, West Lincoln, Regional Municipality of Niagara	
BEACON ENVIRONMENTAL	Project: 219140 Last Revised: February 2020
Client: Niagara Pallet	Prepared by: DU Checked by: RH
N 1:10,000	Inset Map:1:50,000

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1.1 Planning and Regulation Setting

1.1.1 Provincial Policy Statement (2014)

Section 2.0 of the PPS provides direction to regional and local municipalities regarding planning policies specifically for the protection and management of natural heritage features and resources.

Section 2.1 of the PPS describes eight natural heritage features and provides planning policies for each. The *Natural Heritage Reference Manual* (OMNR 2010) is a technical document used to help assess the natural heritage features listed below:

a) Significant wetlands;
b) Significant coastal wetlands;
c) Significant habitat of endangered and threatened species;
d) Fish habitat;
e) Significant woodlands;
f) Significant valleylands;
g) Significant Areas of Natural and Scientific Interest (ANSIs); and
h) Significant wildlife habitat.

Each of these features are afforded varying levels of protection as detailed in Sections 2.1.4 through 2.1.8. The natural heritage development policies of the current Official Plans of the Niagara Region and Township of West Lincoln are in conformity with Section 2.1 Natural Heritage of the PPS, therefore, conformity with the policies of these official plans ensures conformity with the PPS.

1.1.2 Niagara Region Official Plan (2014)

The Natural Heritage polices of the Niagara Region are detailed in Section 7- Environment of the Official Plan and natural heritage features are identified on Schedule C - Core Natural Heritage. Core Natural Heritage features include Environmental Protection Area (EPA), Environmental Conservation Area (ECA), Fish Habitat and their adjacent lands, and Potential Natural Heritage Corridor.

A review of Schedule C-Core Natural Heritage shows that no EPA, ECA or Potential Natural Heritage Corridor are identified within the subject lands, or the adjacent lands. The watercourse that traverses the subject land is identified as Fish Habitat. The floodplain corridor associated with Twenty Mile Creek, 160 m to the south of the subject lands, is identified as ECA. However, the subject lands lie outside of the ECA 50 m adjacent lands as specified in Table 7-1.

Policy 7.B.1.15 states that development within fish habitat and the adjacent lands may be permitted provided there is no net loss of the productive capacity of the fish habitat. Priority will be given to avoiding harmful alteration or destruction of fish habitat by redesigning or relocating the proposal or mitigating its impacts. A naturally vegetated buffer zone, a minimum 30 metres in width as measured from the stable top of bank, generally shall be required adjacent to Critical Fish Habitat as defined by Ministry of Natural Resources and Forestry (MNRF). A minimum 15 metre buffer from the stable top of bank shall be required adjacent to Important or Marginal Fish Habitat as defined by that Ministry. A narrower buffer may be considered where the EIS has demonstrated that it will not harm fish or fish habitat, but in no case shall the buffer adjacent to Critical Fish Habitat be less than 15 metres.

1.1.3 Township of West Lincoln Official Plan (2018)

Development polices with respect to natural heritage are detailed in Section 10. Natural Environment Area. The Core Natural Heritage System is identified in Section 10.7 and natural heritage features follow those of the Niagara Region and include EPA, ECA, Corridor and Fish Habitat and are shown on Schedules C-1, C-2, C3 and C4. The Core Natural Heritage System is shown on Schedule 'C-1', which provides the framework for natural heritage planning and development review in the Township.

A review of Schedule C-1 shows that no EPA, ECA or Potential Natural Heritage Corridor are identified within the subject lands, or adjacent lands. The watercourse that traverses the subject land is identified as Fish Habitat. The floodplain corridor associated with Twenty Mile Creek, 160 m to the south of the subject lands is identified as ECA. However, the subject lands outside of the ECA 50 m adjacent lands as specified in Table 10-1.

Policy 10.7.2 (O) states that within Fish Habitat as identified on Schedule 'C-1' and 'C-4', or adjacent lands as specified in Table 10-1, development and site alteration may be permitted if it will result in no net loss of the productive capacity of fish habitat as determined by the Department of Fisheries and Oceans or its' designate. The proponent shall be required to prepare an Environmental Impact Study to the satisfaction of the Region of Niagara.

Policy 10.7.2 (g) states that the boundaries of Core Natural Areas, Potential Natural Heritage Corridors and Fish Habitat are shown on Schedules 'C-1' to 'C-4'. They may be defined more precisely through Watershed or Environmental Planning Studies, Environmental Impact studies, or other studies prepared to the satisfaction of the Township and may be mapped in more detail in secondary plans and zoning by-laws. A significant modification, such as a change in the classification of a Core Natural Area, or a significant change in the spatial extent or boundaries of a feature, requires an amendment to this Plan unless otherwise provided for in this Plan. Only minor boundary adjustments to Environmental Protection Areas will be permitted without Amendment to this Plan.

1.1.4 Niagara Peninsula Conservation Authority – Ontario Regulation 155/06 (2006)

Wetlands, watercourses and valleylands and their adjacent lands are regulated within the jurisdiction of the NPCA pursuant to Ontario Regulation 155/06. Under the Regulation the NPCA has regulatory power to prevent or restrict development within defined regulated areas. For the permitting and enforcement associated with *Ontario Regulation 155/06* the NPCA Policy Document: Policies for the Administration of Ontario Regulation 155/06 and the Planning Act 2018, provides direction as detailed below.

Valleylands

Section 6 details development policies with respect to valleylands. The policies for erosion hazards associated with apparent valleys apply where the bank height is equal to or greater than 3 metres in height (approximately 10 feet), the slope is steeper than 3 (horizontal) to 1 (vertical) and includes adjacent lands. The physical top of slope is defined as the evident transition point between the plateau lands and the face of the slope. Where the physical top of slope is required to be established, site inspections with the applicant and Authority staff are to be undertaken. The physical top of slope and the stable top of slope may be coincident. However, in some cases, due to specific on-site conditions (such as slope inclination, proximity of the watercourse to the toe of slope, soil conditions, erosion, etc.)

the stable top of slope may not be located at the physical top of slope, but rather may be located landward from the physical top of slope. The stable top of slope is to be established by a professional geotechnical engineer. For new development along a valley's table lands, a setback of 7.5 m is required from either of the stable top of slope or the physical top of slope.

Wetlands

Section 8 provides policies for proposed development within and adjacent to wetlands. For wetlands the regulated areas include the wetland area and 120 m of the adjacent lands for provincially significant wetlands and wetland areas greater than 2 ha in size, and 30 m for wetland areas less that 2 ha in size. Generally, no new development is permitted within 30 m of a wetland. However, reductions to the setback limit will be considered based on a site-specific evaluation by NPCA staff to determine whether a reduction is warranted, depending on scale, nature and proximity of the proposed development. Policy 8.2.3.4 does not support lot creation within wetlands. Policy 8.2.2.8 identifies that NPCA will consider compensation for the alteration/removal of non-provincially significant wetlands.

Watercourse

Section 9 provides policies for development where a watercourse can be impacted. For the application of the Regulation, a watercourse is defined as an identifiable depression in the ground in which a flow of water regularly or continuously occurs. In general, interference with a watercourse shall not be permitted. However, Section 9.2.3.2 Criteria for Assessing Watercourse Alterations states that the NPCA will consider alterations to a watercourse provided that the following specific criteria are met:

a. The need for the watercourse alteration has been demonstrated to the satisfaction of the NPCA;
b. The proposed works are in accordance with NPCA standards;
c. 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;
d. The works are designed to ensure that the storage capacity of the flood plain is maintained;
e. The works will not adversely affect the ecological and hydrological function of the watercourse and riparian zone;
f. Adequate erosion protection measures are utilized when required;
g. Sediment control measures are incorporated during the construction phase to the satisfaction of the NPCA; or
h. They are considered minor works as defined by the NPCA.

Section 9.2.5.1 states that, where development and site alteration is proposed adjacent to a watercourse, the NPCA shall require the establishment of a natural buffer of between 15 metres (49 feet) and 10 metres (33feet) based on the following:

a. A 15 metre natural buffer for watercourses containing 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);

b. A 10-metre natural buffer 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; and
c. Other considerations which may impact pollution or the conservation of land.

2. EIS Scope and Assessment Methodology

2.1 Scope of EIS

Following a site visit by Niagara Region staff, the Region provided the Scope of EIS to Niagara Pallet and UCC in March 2019. Based on this scope Beacon provided the Region with a Terms of References (ToR) to complete the EIS. All correspondence and the EIS ToR are provided in **Appendix 1**.

2.2 Background Review

For this EIS a background review of the following documents was undertaken:

- Township of West Lincoln Official Plan (Consolidated Version October 2018);
- Section 7-Environment of the Official Plan for the Niagara Planning Area (Consolidated Official Plan for August 2015);
- Schedule C Regional Municipality of Niagara Core Natural Heritage (Consolidated Official Plan for August 2015);
- NPCA Policy Document: Policies for the Administration of Ontario Regulation 155/06 and the Planning Act, 2018; and
- Niagara Region Environmental Impact Study Guidelines, Version 2, January 2018.

2.3 Field Surveys

Beacon terrestrial and aquatic ecologists conducted site surveys of the subject lands and adjacent lands from March though September 2019. These surveys documented watercourse conditions, flora, fauna and vegetation communities. Field survey dates are provided in **Table 1**. Foot surveys were undertaken for all areas of the subject lands.

Table 1. 2019 Field Survey Dates for the Subject Lands

Survey	Dates
Watercourses	March 27, June 27 and August 8
Breeding Bird Surveys	May 22, June 6, June 17.
Amphibian Breeding Surveys	March 27, May 22, June 6, June 17.
Floral Survey/ELC Assessment	May 22, June 6, June 17, September 15

2.3.1 Amphibian Surveys

March 2019 field surveys identified that no ephemeral ponds or wetlands are associated with the subject lands or the immediate adjacent lands, therefore no detailed spring amphibian breeding surveys were undertaken. A small stormwater pond associated with the existing facility was survey while conducting other site surveys.

2.3.2 Bat Habitat Surveys

March 2019 field surveys identified that no wooded areas with trees that could provide snags, cracks and holes that would provide suitable habitat for the establishment of bat maternity or roosts sites for endangered species of bats was present. Therefore, no leaf off survey was undertaken following Phase II Identification of Suitable Maternity Roost Trees of the MNRF Guelph District Bat Habitat Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF 2017).

2.3.3 Ecological Land Classification and Floristic Inventory

Vegetation communities 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 photographs and for each vegetation community, information on dominant species cover, community structure, level of disturbance, presence of indicator species, vascular plant species and other notable features was recorded.

The floristic inventory was undertaken during all field surveys and completed for three seasons. Specific emphasises was placed on determining the presence of species at risk. Both native and non-native species that were encountered were recorded.

2.3.4 Breeding Bird Surveys

Surveys for breeding birds took place in May and June 2019 in the early morning on days with low winds (1 or less on the Beaufort scale), temperatures within 5°C of normal and no precipitation. For the survey a random walk foot survey was conducted for the subject lands. The subject lands represent a small survey area and could be walked such that all singing birds could be heard or observed and recorded.

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.

With respect to night surveys to detect calls for the threatened Whip-poor-will (*Antrostomus vociferous*) and special concern Common Nighthawk (*Chordeiles minor*), the March 2019 survey of the subject lands identified that breeding habitat for these species is not associated with the subject lands and therefore no specific night surveys during the breeding season were undertaken.

2.3.5 Aquatic Environment and Fish Habitat Surveys

In March 2019 the subject lands were surveyed, and watercourses associated with the subject lands and adjacent lands were identified. These shallow watercourses were visually surveyed through spring and summer for the presence of fish, no fish sampling was undertaken. In addition, the section of Twenty Mile Creek located 160 m to the south of subject lands was visually surveyed.

2.3.6 Headwater Drainage Feature Assessment

The data for Headwater Drainage Features (HDF) were collected according to the *Ontario Stream Assessment Protocol Headwater Drainage Feature Module* (Stanfield *et al*. 2013), scoped for data relevance and adapted to a reach-based approach. The features were classified according to the *Evaluation, Classification and Management of Headwater Drainage Features Guidelines* (TRCA and CVC 2014). Aerial photograph interpretation formed the basis for the HDF assessment. The guidelines use an integrated approach for the evaluation of key attributes of drainage features including flow and feature form (combined under the term hydrology), riparian vegetation, fish and fish habitat and terrestrial habitat. The evaluation divides headwater drainage features into segments, with breaks between segments occurring where key attributes change. Each segment is assigned a rating of its functional significance of 'important', 'valued', 'contributing' or 'limited'. The functional significance of all attributes of each segment is then considered to determine the recommended management option for each segment. These evaluations can lead to one of six possible management recommendations – Protection, Conservation, Mitigation, Recharge Protection, Maintain or Replicate Terrestrial Linkage and No Management. The management recommendations are taken directly from the TRCA HDF Assessment protocol and are summarized as follows:

Protection – Important Functions: i.e. swamps with amphibian breeding habitat; perennial headwater drainage features; seeps and springs; Species at Risk (SAR) habitat; permanent fish habitat with woody riparian cover.

Conservation – Valued Functions: i.e. seasonal fish habitat; with woody riparian cover; marshes with amphibian breeding habitat; or general amphibian habitat with woody riparian cover.

Mitigation – Contributing Functions: i.e. contributing fish habitat with meadow vegetation or limited cover.

Recharge Protection – Recharge Functions: i.e. features with no flow with sandy or gravelly soils.

Maintain or Replicate Terrestrial Linkage – Terrestrial Functions: i.e. features with no flow with woody riparian vegetation and connects two other natural features identified for protection.

No Management Required – Limited Functions: i.e. features with no or minimal flow; cropped land or no riparian vegetation; no fish or fish habitat; and no amphibian habitat.

2.3.7 Feature Staking

No staking or surveying of the limits of natural heritage features was required.

2.3.8 Assigned Beacon Staff

Project Manager Mr. Ron Huizer, B.Sc.
Principal, Senior Ecologist/EA Specialist
Mr. Ron Huizer conducted all field investigations and is the author of this EIS report. Mr. Huizer is a Senior Ecologist/EA Specialist with over 25 years' experience undertaking field assessment of terrestrial and aquatic environments. His experience includes undertaking detailed bio-inventories of flora and fauna and environmental impact assessments as both project manager and as part of a multi-disciplinary team. He is a recognized wetlands expert in Ontario and has been a technical advisor to the MNRF WETT Committee and been retained by the Ministry of Municipal Affairs and Housing on a number of occasions as an expert witness for wetland-development issues before the Ontario Municipal Board. Ron has completed numerous Environment Impact Studies (EIS) that address protection of Natural Heritage in support of plan of subdivision developments throughout south Ontario. He has completed Class EAs for a variety of projects following several EA processes, including: the Canadian Environmental Assessment Act (CEAA), both screenings and comprehensive studies; Municipal Class EA for Water and Road Projects; and Ministry of Transportation's Provincial Highways Class EAs for Provincial Transportation Facilities.

Ms. Lindsey Waterworth, B. Sc.
Senior Aquatic Ecologist
Ms. Waterworth has over ten years of experience in environmental consulting as an Aquatic Ecologist and has extensive experience in aquatic habitat assessments and aquatic Species at Risk (SAR). Lindsey is skilled in a variety of survey and monitoring methods and has special expertise in habitat assessment for fish and mussels. Lindsey has applied the DFO project impact self assessment protocol to numerous projects and has prepared DFO project review request where potential impacts are identified. Lindsey is a RAQs qualified Fisheries Assessment Specialist.

Joel Davey, B.B.R.M., CAN-CISEC
Aquatic Ecologist/Environmental Inspector
Joel is an aquatic ecologist with over six years of experience in the private environmental sector, providing expertise on a wide range of projects. Joel holds accreditation with the Canadian Certification of Inspector of Erosion and Sediment Control (CAN-CISEC) program, MTO/DFO/OMNRF Fisheries Protocol, OMNRF Class 1 Electrofishing, and the Ontario Stream Assessment Protocol (OSAP). He is knowledgeable in the identification of Ontario's freshwater fish and aquatic Species-at-Risk (SAR). Joel has experience conducting field reconnaissance following the Headwater Drainage Feature Assessment (HDFA) protocol as approved by the Toronto Region and Conservation Authority (TRCA).

3. Description and Assessment of Existing Environment

The following provides a description and assessment of the natural heritage features and functions that are found within the boundaries of the subject lands. This assessment is based on detailed field surveys that were undertaken by Beacon ecologists through the spring and summer of 2019. **Figure 2** presents the features that are detailed in the following sections of the report.

3.1 Aquatic Resources and Fish Habitat

Aquatic resources within the subject lands are within the Twenty Mile Creek watershed, a system which extends across several municipalities including the City of Hamilton, the Town of Lincoln, the Township of West Lincoln and the Town of Grimsby (NPCA 2006). Twenty Mile Creek arises in the former municipality of Glanbrook, approximately 22 km upstream of the subject property, and outlets at the south shore of Lake Ontario at Jordan Station, approximately 20 km downstream of the subject property.

Aquatic resources within the subject lands consist of a mix of agricultural swales, roadside ditches and commercial storm drain swales with a northwest-southeast drainage gradient. The watercourse that flows through the proposed expansion area has its origins 1.2 km upstream of the subject lands and is conveyed to the site via a culvert under Grimsby Road (County Road 12) 575 m upstream of the subject lands (**Photograph 2**). South of Grimsby Road the shallow watercourse flow through active agricultural fields onto the subject lands (**Photograph 3**).

Photograph 2. Watercourse Upstream of Subject Lands at the Grimsby Road (County Road 12) Culvert Looking Downstream to the Subject Lands (March 2019)

Existing Conditions

Figure 2

Lot Addition and Site Plan Approval,
West Lincoln
Regional Municipality of Niagara

Legend

- Subject Property
- Reach Break
- Watercourse (MNRF 2019)

BEACON ENVIRONMENTAL

Project: 219140
Last Revised: February 2020

Client: Niagara Pallet

Prepared by: DU
Checked by: RH

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Photograph3. Watercourse Upstream of Subject Lands at the Boundary of the Proposed Expansion Area Looking Upstream from the Subject Lands (March 2019)

The watercourse exits the subject lands via a concrete box culvert under Highway 20 (**Photograph 4**) and discharges to Twenty Mile Creek 160 m downstream of the highway (**Photograph 5**). Surveys of this watercourse from March through August did not observe fish and given the shallow and ephemeral flows it is assessed to not provided seasonal or permanent fish habitat.

Photograph 4. Watercourse Culvert Crossing at Highway 20 Looking Downstream Form Highway to Twenty Mile Creek (March 2019)

Photograph 5. Watercourse Confluence with Twenty Mile Creek Downstream of Subject Lands (March 2019)

3.1.1 Headwater Drainage Feature Assessment

The following details the assessment of the watercourses that are associated with the subject lands following the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (TRCA and CVC 2014). **Figure 2** presents the location of the individual reaches discussed below. Field data is provided in **Appendix 2**.

Reach TM-1

Reach TM-1 is located at the western-most portion of the property and gathers water from agricultural fields northwest of the subject property lands. This reach originates offsite of the subject property 1.2 km upstream. Reach TM-1 ends just upstream of the agricultural culvert crossing located immediately to the west of the subject property. This reach exists exclusively within cropped lands (**Photographs 7 & 8**). The watercourse has a maximum bank full width that varies between 1.5 to 2.5 m and during the peak flows in March has a wetted width between 0.5 and 1 m and wetted depth that varies between 2 to 5 cm.

This reach provides valued hydrologic function as flowing water was present during the March and June site visits with minimal standing water observed in August. This reach was affected by agricultural modifiers, however, during the 2019 monitoring year the adjacent cropped area was used for nurse crops such as clover and alfalfa with no observations of tilling or disking. No perennial or seasonal fish habitat is offered by the reach but allochthonous material and nutrients is supplied to downstream aquatic habitats.

Photograph 7. Reach TM-1 March 27, 2019

Photograph 8. Reach TM-1 August 8, 2019

Reach TM-2

Reach TM-2 is approximately 20 m in length and starts downstream of Reach TM-1 at the exit of the agricultural culvert and flows downstream to its with confluence with TM-5. Hydrological observations

were similar to TM-1 for this reach (**Photographs 9 & 10**). The riparian area for this reach was identified as cultural meadow vegetation community. This reach likely supplies nutrients and material to downstream reaches.

Photograph 9. Reach TM-2 March 27, 2019

Photograph 10. Reach TM-2 March 27, 2019

Reach TM-3

Reach TM-3 is approximately 5 m in length originating from the confluence of reaches TM-2 and TM-5. Flowing water was observed within this reach in March and June and standing water observed along its length during the August site visit (**Photographs 11 & 12**). The channel has wetted bank width of 0.75 to 0.9 m and March wetted depth of 28 to 45 cm. This reach may be affected from nutrient inputs as a result of upstream agriculture and industrial inputs. TM-3 exhibits manicured lawn riparian vegetation. A pool with standing water at the culvert had the potential to provide refuge for small fish, but no fish where observed throughout the monitoring season.

Photograph 11. Reach TM-3 March 27, 2019

Photograph 12. Reach TM-3 August 8, 2019

Reach TM-4

Reach TM-4 is a 1.0-meter-wide dug ditch that runs between the north boundary of an onsite Stormwater Management (SWM) facility located at the northwest corner of the subject property and active agricultural fields to the north (**Photographs 13 & 14**). This reach was dry during all site visits; however, evidence of sheet flow drainage was observed from agricultural fields located to the north draining to this reach indicating potential flow collection during significant storm events or at the onset of spring freshet. No direct or contributing fish or terrestrial habitat is provided by this reach.

Photograph 13. Reach TM-4 June 27, 2019

Photograph14. Reach TM-4 August 8, 2019

Reach TM-5

Reach TM-5 is a 1.3 m wide dug ditch that extends from the confluence between reach TM-4 and the SWM facility outlet located at the northwest corner of the subject property (**Photographs 15 & 16**). In addition to gathering flows from the SWM facility TM-5 also gathers drainage from the commercial parking lot. Standing water was present within this reach throughout the monitoring season. Contributions from this reach to fish and terrestrial habitat is minimal.

Photograph 15. Reach TM-5 March 27, 2019

Photograph 1. Reach TM-5 August 8, 2019

Reach TM-6

Reach TM-6 consists of a short portion of the Highway 20 roadside ditch line which confluences with TM-2 and TM-5 (**Photographs 17 & 18**). TM-6 is approximately 45 m in length and exists within a cultural meadow riparian area. Minimal contributions are provided to downstream fish and terrestrial habitat.

Photograph 2 Reach TM-6 March 27, 2019

Photograph 3. Reach TM-6 August 8, 2019

3.2 Vegetation Communities

The vegetation communities on the subject lands were assessed following the ELC for Southern Ontario (Lee et al 1998) and are shown on **Figure 2**.

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 pine plantations or the naturalization of a fallow agricultural field.

3.2.1 Natural Communities

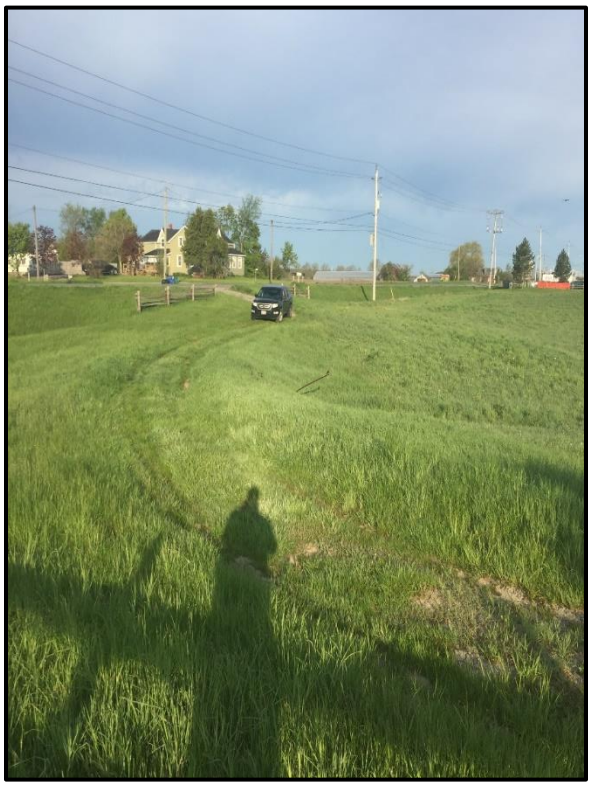
No natural terrestrial or wetland communities are associated with the subject lands or adjacent lands.

3.2.2 Cultural Communities

Cultural Meadow (CUM1)

The proposed expansion area in 2019 supported agricultural pasture/hay field comprised of grasses and weeds (**Photographs 19, 20, 21**). Following the ELC it has been assessed to represent cultural meadow; however, the field is in a rotation and in the past has been ploughed and planted with corn and soya and will be again in the future.

Photograph 19. Pasture/Hay Field Within and Surrounding the Subject Lands Looking North from Highway 20 (June 2019)



Photograph 20. Pasture/Hay Field Within the Proposed Expansion Area Looking West Along Highway 20 (June 2019)

Photograph 21. Pasture/Hay Field Within the Proposed Expansion Area Looking East Along Highway 20 (June 2019)

3.2.3 Rare Vegetation Communities

The subject land supports agricultural field and no natural vegetation communities that are considered to be rare for the province (NHIC S1, S2, S3) or the Niagara Region (NPCA 2010) occur.

3.3 Flora

A total of seventy-three (73) species of vascular of plants were recorded and are listed in **Appendix 3**. No unique or rare plant communities such as prairie elements, savannah, alvar or fen species were found to occur. Most plant species recorded represent field weed and grasses that occur in the cultural meadow that dominates the subject lands. Of the species present, forty-four (44) are non-native species, representing 60% of the plant community. In the Niagara Region, vegetation communities typically support a floristic composition that is 65% native species and 35% non-native/introduced species (Oldham 1995). For the subject lands the very high occurrence of non-native species can be attributed use of lands as pasture/hayfield. No species with a Coefficient of Conservatism of 7 or greater was found to occur (with a total range of low 0 to a high of 10 - Oldham 1995).

3.3.1 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 as having the potential to occur. **Table 2** presents the species that could potential occur.

Table 2. Potential Endangered and Threatened Species of Plants for the Subject Lands

Species	Status
American Chestnut (*Castanea dentate*)	Endangered
Butternut (*Juglans cinera*)	Endangered
Cucumber Tree (*Magnolia acuminate*)	Endangered
Spotted Wintergreen *(Chimaphila maculate*)	Endangered
Red Mulberry (*Morus rubra*)	Endangered
Cherry Birch (*Betula lenta*)	Endangered
Eastern Flowering Dogwood (*Cornus florida*)	Endangered
Round-leaved Greenbrier (*Smilax rotundifolia*)	Threatened
White Wood Aster (*Eurybia divaricate*)	Threatened

None of the above species were found occur during the surveys conducted by Beacon.

3.3.2 Special Concern and Provincially or Regionally Rare Species

None of the plant species recorded for the subject lands and adjacent lands along Highway 20 are listed as Special Concern. No provincially rare (NHIC S rank of S1, S2, S3) species were found to occur. No species that are considered rare in the Niagara Region were found occur (Oldham 2010).

3.4 Birds

Eight (8) bird species were recorded and are considered to be breeding within or directly adjacent to the subject lands and are presented in **Table 3**. All are common to open field and agricultural rural environments.

Table 3. Birds Documented for the Subject Lands and Adjacent Lands

Common Name	Scientific Name
Killdeer	Charadrius vociferous
Eastern Kingbird	*Tyrannus tyrannus*
European Starling	*Sturnus vulgaris*
Song Sparrow	*Melospiza melodia*
Chipping Sparrow Song Sparrow	Spizella passerine
Savannah Sparrow	Passerculus sandwichensis
House Finch	Haemorhous mexicanus
House Sparrow	Passer domesticus

3.4.1 Endangered and Threatened Species

Based on species breeding range in Niagara and habitat present on or adjacent to the subject lands, three species listed as endangered (END) or Threatened under the *Endangered Species Act* (2007) was assessed to have the potential to occur and are discussed below.

Barn Swallow (Hirundo rustica (THR))

Barn Swallows are listed as threatened and often live in close association with humans, building their cup-shaped mud nests almost exclusively on human-made structures such as open barns, sheds, ledges and under bridges and in culverts (COSSARO 2011a). Feeding flights of adult Barn Swallow over the field within subject lands were noted during the bird surveys, however, no nests were found to occur on the buildings associated with the Niagara Pallet facility.

Bobolink (Dolichonyx oryzivorus) (THR)

Historically, the Bobolink would have been associated with tall-grass prairie habitat, but now nests primarily in large hayfields and pastures due to the plant cover present at the start of the nesting season. Micro-habitat requirements include moderate litter depth, high grass-to-legume ratios, and a high proportion of forb cover (e.g., clover) (COSSARO 2010). Though the cultural meadow habitat of the subject lands were intensively surveyed, no adults were observed or heard calling.

Eastern Meadowlark (Sturnella magna) (THR)

The Eastern Meadowlark belongs to the group of grassland bird species and historically would have been associated with tall-grass prairie habitat, but now nests primarily in large hayfields and pastures (COSSARO 2011b). Though the cultural meadow habitat of the subject lands were intensively surveyed, no adults were observed or heard calling.

3.4.2 Species of Special Concern and Provincially or Regionally Rare Species

Based on the breeding range and required breeding habitat, only one species listed as Special Concern was assessed to have the potential to occur, the Grasshopper Sparrow (*Ammodramus savannarum*). This sparrow is a grasslands/open meadow specialist and does breed sporadically within the Niagara area. Though the cultural meadow habitat of the subject lands were intensively surveyed, no adults were observed or heard calling.

No bird species that are considered to be rare for the province by the MNRF (NHIC S rank S1, S2, S3) or rare for the Niagara Region (NPCA 2010) were recorded.

3.5 Reptiles and Amphibians

3.5.1 Amphibians

No naturally occurring amphibian breeding habitat is found to occur within or adjacent to the subject lands. A small stormwater pond is associated with the existing Niagara Pallet facility (**Photograph 22**) and a number of Northern Leopard Frog (*Rana pipiens*) were observed along the banks of the pond and are considered to use the pond as a breeding site. No other species were noted.

Photograph 22. Small Stormwater Pond of the Niagara Pallet Facility that is used as Amphibian Breeding Pond

3.5.2 Reptiles

No snakes were observed during the surveys; however, two species can be considered to have the potential to occur, the Common Garter Snake (*Thamnophis sirtalis*) and the Little Dekay's Brownsnake (*Storeria dekayi*,). No bedrock crevices or stone/lumber piles that could provide hibernacula for snakes were noted to occur within the subject lands.

No habitat for turtles is associated with the subject lands.

3.6 Mammals

Due to site conditions typical rural mammal species are associated with the subject lands. During the field investigations species encountered (visually or scat or tracks) included Coyote (*Canis latrans*), Raccoon (*Procyon lotor*), Meadow Vole (*Microtus pennsylvanicus*) and White-tailed Deer (*Odocoileus virginianus*). Other species that are expected to occur include Striped Skunk (*Mephitis mephitis*) and Red Fox (*Vulpes vulpes*). All species are well adapted to rural landscapes and are common to abundant in the Niagara Region and Township of West Lincoln (Dobbyn 1994, NPCA 2010).

3.7 Significant Wildlife Habitat

Under the PPS the identification of Significant Wildlife Habitat (SWH) is the responsibility of regional and local planning authorities. Schedule C of the Niagara Region Official Plan does not specifically identify areas that are considered to represent SWH. In addition, Section 7 Environment of the Niagara Region Official Plan does not provided criteria for the identification of SWH. Similarly, the Township of West Lincoln Official Plan does not identify or provide criteria for SWH.

The MNRF has identified generic categories and criteria that **could potentially** be used by a planning authority to identify SWH (MNRF 2015). **Table 4** presents an assessment of potential SWH for the subject lands based on the MNRF generic categories. The subject lands represent agricultural field and does not support any SWH features or functions.

Table 4. Assessment of Significant Wildlife Habitat for the Subject Lands

Wildlife Habitat Category	Presence or Absence on Subject Lands Based on MNRF Criteria for Ecoregion 7E	
	Absent	Present
1. Seasonal Concentration Areas for Wildlife Species		
• Waterfowl Stopover and Staging Areas (Terrestrial)	X	
• Waterfowl Stopover and Staging Areas (Aquatic)	X	
• Shorebird Migratory Stopover Area	X	
• Raptor Wintering Area	X	
• Bat Hibernacula	X	

Wildlife Habitat Category	Presence or Absence on Subject Lands Based on MNRF Criteria for Ecoregion 7E	
	Absent	**Present**
• Bat Maternity Colonies	X	
• Bat Migratory Stopover Area	X	
• Turtle Wintering Areas	X	
• Reptile Hibernaculum	X	
• Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	X	
• Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	X	
• Colonially-Nesting Bird Breeding Habitat (Ground)	X	
• Migratory Butterfly Stopover Areas	X	
• Land bird Migratory Stopover Areas	X	
• Deer Yarding Areas	X	
• Deer Winter Congregation Areas	X	
2. Rare Vegetation Communities		
• Cliffs and Talus Slopes	X	
• Sand Barren	X	
• Sand Barren	X	
• Alvar	X	
• Old Growth Forest	X	
• Tallgrass Prairie	X	
• Savannah	X	
• Provincially Rare S1, S2 and S3 vegetation communities	X	
• Regionally or Locally Rare vegetation communities	X	
1.2.2 Specialized Habitats of Wildlife considered SWH		
• Waterfowl Nesting Area	X	
• Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	X	
• Woodland Raptor Nesting Habitat	X	
• Turtle Nesting Areas	X	
• Seeps and Springs	X	
• Amphibian Breeding Habitat (Woodland)	X	
• Amphibian Breeding Habitat (Wetlands).	X	
• Woodland Area-Sensitive Bird Breeding Habitat	X	
1.3. Habitats of Species of Conservation Concern considered SWH		
• Marsh Bird Breeding Habitat	X	

Wildlife Habitat Category	Presence or Absence on Subject Lands Based on MNRF Criteria for Ecoregion 7E	
	Absent	**Present**
• Open Country Bird Breeding Habitat	X	
• Shrub/Early Successional Bird Breeding Habitat	X	
• Terrestrial Crayfish	X	
• Special Concern and Rare Wildlife Species	X	
1.4.1 Animal Movement Corridors		
• Amphibian Movement Corridors	X	
• Bird and Mammal Movement Corridor	X	

3.8 Significant Woodland

No woodland as defined in the Regional Official Plan is associated with the subject lands.

3.9 Significant Valleylands

Generally Significant Valleylands are defined as distinctive landforms that have a degree of naturalness, importance of ecological functions, potential for restoration, or historical and cultural values. No valley (slope greater than 3 m in height) is associated with subject lands.

3.10 Provincially Significant Wetlands or ANSIs

No Provincially Significant Wetlands (PSW) are identified by the MNRF to occur within the subject lands, or within 120 m of the subject lands. Also, no Areas of Natural Scientific Interest (ANSI) at the provincially or regional level are identified by the MNRF to occur within or adjacent to the subject lands.

3.11 Niagara Region and Township of West Lincoln EPA and ECA

The Niagara Region Schedule C – Core Natural Heritage and Schedule C1 – Core Natural Heritage System Overall do not show EPA or ECA to occur within or directly adjacent to the subject lands. This EIS has not identified a feature or function that would support an EPA or ECA designation.

4. Proposed Boundary and Site Plan Amendment

The need for this analysis has been triggered by an application for lot adjustment between 2906 South Grimsby Road 8 (Niagara Pallet) and 2930 South Grimsby Road 8 (Agricultural parcel) (**Figure 3 and Appendix 4**)

A headwater watercourse currently crosses through the lands to be transferred to facilitate the expansion and development of the adjacent Niagara Pallet Facility. The portion of land that is subject to the lot addition is proposed to be used for truck parking and partially for the stormwater management pond. In order to facilitate the use of the lands in this manner, the existing feature must be realigned and will stay wholly with 2930 Grimsby Road 8. The realigned channel will be designed to replicate the flow conveyance function of the existing features.

5. Environmental Impact Assessment and Mitigation

The following section details the potential impacts of the proposed development to the natural heritage features and functions associated with the subject lands. Mitigation measures are identified that will reduce the potential impacts.

5.1 Assessment of Potential Impacts

5.1.1 Direct Impacts

As shown on **Figure 3**, the proposed development will be resulting in the realignment of headwater watercourses that currently flows through the subject lands. No seasonal or permanent fish habitat will be directly impacted by the realignment of the watercourse. The primary function of the watercourses are to convey water flows and allochthonous material and nutrients downstream to aquatic habitats associated within Twenty Mile Creek.

No other direct impacts to natural heritage features or functions are identified for the proposed expansion of the facility.

5.1.2 Mitigation for Direct Impacts

With respect to management of existing functions through the realignment of the existing headwater watercourses Table 5 below provides an assessment following the Evaluation*, Classification and Management of Headwater Drainage Features Guidelines* (TRCA and CVC 2014).

Development Plan

Figure 3

Lot Addition and Site Plan Approval,
West Lincoln,
Regional Municipality of Niagara

Legend

- Subject Property
- Proposed Development
- Existing Headwater Drainage Feature Alignment
- Proposed Headwater Realignment

BEACON ENVIRONMENTAL

Project: 219140
Last Revised: February 2020

Client: Niagara Pallet

Prepared by: BD
Checked by: LW

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Table 5 Assessment of Management Requirements for Alterations To Watercourses Within the Subject Lands

Drainage Feature	Step 1		Step 2	Step 3	Step 4	HDF Management Assessment
	Hydrology	Modifiers	Riparian	Fish Habitat	Terrestrial Habitat	
TM -1	Valued Functions	Agricultural	Contributing Functions	Contributing Functions	Contributing Functions	Mitigation
TM -2	Valued Functions	Agricultural	Valued Functions	Contributing Functions	Contributing Functions	Mitigation
TM -3	Valued Functions	Nutrient Inputs	Contributing Functions	Valued Function	Valued Function	Maintain Recharge
TM -4	Limited Function	Agricultural	Limited Function	Contributing Functions	Limited Functions	No Management Required
TM -5	Valued Function	Drainage Ditch/Nutrient Input	Limited Function	Contributing Functions	Limited Functions	Mitigation
TM -6	Contributing Function	Roadside Ditch	Valued Function	Contributing Functions	Limited Functions	Mitigation

As the headwater watercourses support ephemeral flows, with sections that occur in agriculture fields or represent ditching, they have limited hydrological function. Riparian habitat is limited to narrow bands of meadow vegetation along the watercourse corridors, and there is some seasonal allochthonous material and nutrients transport to downstream aquatic habitats. No fish habitat is present, but the watercourses convey seasonal flows to downstream fish habitat. The watercourses support very limited terrestrial functions. Based on the HDF Assessment protocol mitigation is an appropriate management recommendation is to be considered for these features based the assessment of conditions and functions of the headwater watercourses. To mitigate any potential direct effects the channel for the realigned portions of the headwater watercourses will be designed to replicate the seasonal flow conveyance function of the existing features

5.2 Potential Indirect Impacts

Based on the proposed development and site conditions only two indirect impacts have the potential to occur:

- Impacts on wildlife during site clearing; and
- Downstream erosion and sedimentation impact on Twenty Mile Creek during construction.

These potential impacts can be mitigated by standard construction mitigation measures which are detailed below.

Sediment and Erosion Control

During construction for protection against erosion and sediment transport downstream into Twenty Mile Creek an Erosion and Sediment Control Plan is required which is to be approved by the NPCA. The plan should be developed based on the Erosion & Sediment Control Guidelines for Urban Construction (2006) for the Greater Golden Horseshoe Area Conservation Authorities.

Timing of Site Clearing

For the protection of nesting migratory birds as required by the federal *Migratory Bird Convention Act* and other wildlife, the clearing/grading of the meadow habitat **should *not be undertaken*** from mid-April through to the end of August.

5.3 Assessment of Residual Impacts to Natural Heritage

No fish habitat occurs within the subject lands and the existing headwater watercourses provide seasonal flow conveyance to Twenty Mile Creek downstream of the subject lands. Mitigation measures have been identified to address downstream short- and long-term sediment transport and erosion in Twenty Mile Creek. Additionally, the channel realignments will be designed in a manner that ensures seasonal flow conveyance function is maintained. This is in accordance with the management recommendation identified through the application of the HDF Assessment Guidelines (TRCA and CVC2014). Based on these factors, no significant residual negative impact to fish habitat will occur.

The proposed development will result in the removal of cultural meadow, which in the past, and in the future, has been under cultivation for cash crops. The cultural meadow was assessed to provide general low function habitat for common species of flora and fauna that occur in the Township of West Lincoln. The removal of this small (< 1ha) cultural community will not result in a significant residual negative impact to the local populations of common species of flora and fauna.

5.4 Cumulative Impacts

The assessment of cumulative impacts as a result of continued development of the rural areas of the Township of West Lincoln or the Niagara Region is outside the scope of this EIS.

The proposed expansion will not result in the loss of natural heritage features or impair the function of the natural heritage system of the Township of West Lincoln or the Niagara Region. In addition, the expansion will not directly support future development of other lands.

6. Policy Conformity

6.1 Provincial Policy Statement

The development policies of the current Official Plans of the Niagara Region and Town of Lincoln are in conformity with Section 2.1 Natural Heritage of the Provincial Policy Statement (PPS, 2014), which is directed at province wide protection and management of natural heritage resources. Therefore, conformity with these Official Plans ensures conformity with the PPS.

6.2 Niagara Region and Town of Lincoln Natural Heritage Policies

6.2.1 Environmental Protection Area (EPA)

No EPA is identified to occur within or adjacent the subject lands, and therefore the proposed expansion is in conformity with the Township's and Niagara Region's Natural Heritage Policies for EPA.

6.2.2 Environmental Conservation Area (ECA)

No ECA is identified to occur within or adjacent the subject lands, and therefore the proposed expansion is in conformity with the Township's and Niagara Region's Natural Heritage Policies for ECA.

6.2.3 Fish Habitat

No fish habitat has been identified to occur within or directly adjacent to the subject lands. With respect to indirect impacts to Twenty Mile Creek that lies downstream, this EIS has identified the need for the development of an Erosion and Sediment Control Plan to mitigate off site down stream impacts to fish and fish habitat and develop a channel design to ensure seasonal flow conveyance downstream to Twenty Mile Creek.

Based on the above, the proposed expansion is in conformity with the Region's and Township's policies for the protection of fish habitat and the regulations of the federal *Fisheries Act*.

6.2.4 Movement Corridor

No movement corridor at the landscape level is identified to occur within or adjacent the subject lands. The realignment of the watercourse will ensure that any movement that currently occurs along the watercourse will be maintained.

Based on the above the proposed expansion is in conformity with the Township's and Niagara Region's Natural Heritage Policies for ECA.

6.2.5 Endangered and Threatened Species

No species of flora or fauna that are regulated under the Ontario *Endangered Species Act* (ESA 2007) have been identified to occur within or adjacent to the subject lands, therefore habitat protection regulations of the *Act* do not apply.

Based on the above the proposed expansion is in conformity with the Region's and Township's policies for the protection habitat for endangered and threatened species and the regulations of the *Endangered Species Act*.

6.3 Niagara Peninsula Conservation Authority

With respect to NPCA regulations and development policies pursuant to *Ontario Regulation 155/06*, no regulated areas for shorelines, wetlands or valleyland occur within or adjacent to the subject lands. The watercourse that will be realigned is regulated by the NPCA and will require a work permit prior to works.

As detailed in Section 9.2.3.2 Criteria for Assessing Watercourse Alterations in the NPCA Policy Document for the administration of Ontario Regulation 155/06 the NPCA will consider alterations to a watercourse provided that specific criteria are met. With respect to natural heritage features and functions Criteria (e) states: the works will not adversely affect the ecological and hydrological function of the watercourse and riparian zone. No natural heritage features are associated with the section of watercourse that will be realigned. In addition, a Headwater Drainage Features assessment has been undertaken for the watercourse which has determined that the watercourse supports low ecological and hydrological functions, and the impact on this these functions can be mitigated through the design of the realignment and implementation of a comprehensive erosion and sediment control plan during construction. This report should be provided to the NPCA in support of the work permit application.

Based on the above the proposed expansion is in conformity with the NPCA planning polices pursuant to the regulations *Ontario Regulation 155/06*.

7. Summary

This EIS has determined that with the implementation of identified mitigation measures no significant residual negative impact to the natural features or functions of the Natural Heritage System of the Niagara Region or the Township of West Lincoln will occur as a result of the proposed expansion of the Niagara Pallet facility. This study has demonstrated that the proposed expansion is in conformity with the Official Plans and Natural Heritage System policies of the Township of West Lincoln and the Niagara Region as well as the Province's Natural Heritage Polices under the Provincial Policy Statement (PPS 2014). The EIS has identified the need for a Niagara Peninsula Conservation Authority review of permit requirements pursuant to *Ontario Regulation 155/06* for the proposed realignment of a watercourse that is required for the proposed expansion.

This EIS concludes that with the implementation of the recommended construction mitigation measures and channel design the proposed expansion of the Niagara Pallet facility is supported with respect to maintaining the natural heritage system of the Town of Lincoln, the Niagara Region and the Province.

Report prepared by:
Beacon Environmental

Ron Huizer, B. Sc.
Principal, Senior Ecologist

Report reviewed by:
Beacon Environmental

Lindsey Waterworth, B.Sc.
Senior Ecologist

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Appendix 1

Agency Consultation

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

March 25, 2019 BEL 219140

Adèle Labbé, BSc., MPlan
Senior Environmental Planner *via email: Adele.Labbe@niagararegion.ca*
Planning and Development Services, Niagara Region
1815 Sir Isaac Brock Way, P.O. Box 1042
Thorold, ON L2V 4T7

Re: EIS Scope to Complete an Environmental Impact Study for Fish Habitat
Niagara Pallet Boundary Adjustment - Watercourse Evaluation
2906 South Grimsby Road 8, Smithville

Dear Ms. Labbé:

As requested, I am providing you with a scope of work to complete an Environmental Impact Study (EIS) for the proposed watercourse realignment and boundary adjustment at 2906 South Grimsby Road 8, Smithville. Based on your recent site visit to the property, I have reviewed the comments provided by the Niagara Region regarding the scope of the assessment and our work plan will generally follow what the Region has requested. As noted by the Region, the primary focus of the EIS is to determine impacts on fish habitat, pursuant to the Niagara Region Planning Policy 7.B.1.15, and the *Federal Fisheries Act,* administered by the Department of Fisheries and Oceans (DFO).

The scope of work for the Fish Habitat EIS is provided below.

1. Field Assessment

Two site surveys will be conducted, one in late March-early April and one in late May-early June 2019. The watercourse will be assessed following the rapid assessment version of the "Evaluation, Classification and Management of Headwater Drainage Features Guidelines" (2014 HDFA protocol). The first survey will document spring flow conditions and the watercourse will be walked to visually determine the presence of fish, potential fish habitat and general conditions within the boundary adjustment area. In addition, the upstream conditions of the 0.5 km length of watercourse through the farm field to the crossing at Grimsby Road will be undertaken, as well as the section of the watercourse located down stream of Highway 20 to its confluence with the river. The second site survey will document water flow within the boundary adjustment area, or most likely the absence of water flow, and a general assessment of the conditions of the watercourse and the boundary adjustment area, including the potential presence of Species at Risk.

2. Reporting

The EIS report will detail the study methods and existing conditions with respect to fish habitat, and applicable natural heritage policies and regulations will be identified. Following the HDFA protocol the watercourse(s) will be assessed with respect to the following classifications, Hydrology, Riparian, and Fish Habitat, and Management Level Recommendations will be determined. Also, requirements for a DFO Project Review will be assessed. Digital mapping of the natural heritage features on the subject

property will be provided in GIS format over which the proposed watercourse realignment and boundary adjustment area be overlaid. In addition, the report will identify design and construction mitigation measures for the relocation of the watercourse. Following completion, the final report will be provided to the Region for review and agency circulation.

3. Tasks Not Include in the Work Plan

At this time no detailed fish sampling of the watercourse(s) or detailed bio inventory of the boundary adjustment area will be undertaken. It is anticipated that no direct fish habitat will be associated with the watercourse and that no Application for DFO Request for Project Review will be required. Should this need for DFO project review be identified as required by the review agencies, then that would be considered an additional scope of work. Similarly, it is not anticipated that there will be any specific Species at Risk surveys required or permit requirements pursuant the Ontario *Endangered Species Act*. Should this need be identified as required, then that would be considered an additional scope of work. Finally, the purpose of this study is to conduct an EIS for potential impacts to fish habitat and at this time our scope does not include the completion of a Tree Preservation Plan or detailed natural channel design or landscape plans for the design of the watercourse relocation.

I trust this meets your present needs. Should you have any questions, please do not hesitate to contact me via e-mail or Cell at (416) 729-0544.

Yours truly,
Beacon Environmental

Ron Huizer, B. Sc. (Honours)
Principal

Ron Huizer

From: Labbe, Adele <Adele.Labbe@niagararegion.ca>
Sent: March 25, 2019 10:26 AM
To: Ron Huizer; Cara Lampman
Cc: 'fred@niagarapallet.ca'; 'Jennifer Vida'; Gerrit Boerema
Subject: RE: 2906 South Grimsby Road 8, Smithville - Niagara Pallet Boundary Adjustment - Watercourse/Fish Habitat Evaluation
Attachments: EIS Scope Niagara Pallet South Grimsby 8 Road.pdf

Good morning Ron,

Thank you for your submission, yes this is what the Region is looking for. We had also requested ELC, recognizing that the site is mostly agricultural so the ELC would be really easy! Our mapping illustrates a small water feature in the area and the ELC would clarify whether a feature is present or not. I could not view this during my site visit due to snow cover. I suspect it is ploughed through and likely not a feature. I've inserted a screen capture of my mapping so that you can see what I mean. Please clarify whether there is a feature in this area and if so provide the ELC code for it to community class.

I've included Cara Lampman from the NPCA so that the NPCA may provide input to the scope of work to suit their needs. Cara, please note this work (attached workplan) is being done in support of the consent application. Should the proponent move forward with their business expansion and proposed relocation of the feature, an additional scope of work will be required in support of site plan.

I've also cc'd Gerrit from the Township to keep him informed.

Thank you,
Adèle

From: Ron Huizer <rhuizer@beaconenviro.com>
Sent: Monday, March 25, 2019 9:17 AM
To: Labbe, Adele <Adele.Labbe@niagararegion.ca>
Cc: 'fred@niagarapallet.ca' <fred@niagarapallet.ca>; 'Jennifer Vida' <JVida@ucc.com>
Subject: 2906 South Grimsby Road 8, Smithville - Niagara Pallet Boundary Adjustment - Watercourse/Fish Habitat Evaluation

Hi Adele, attached is the proposed scope of work for the EIS for Niagara Pallet. I have reviewed the info you provided in e-mails to the client and Jennifer at UCC.

We plan to conduct the first site survey this Wednesday.

Just flip me an e-mail that it is ok.

Ron Huizer

Subject: FW: Niagara Pallet Boundary Adjustment - Watercourse Evaluation

From: Labbe, Adele [mailto:Adele.Labbe@niagararegion.ca]
Sent: Tuesday, March 5, 2019 3:07 PM
To: Jennifer Vida; Jason Schooley
Cc: Fred Vrugteveen; Dirk Vrugteveen; Cara Lampman; Alexa Cooper; Gerrit Boerema
Subject: RE: Niagara Pallet Boundary Adjustment - Watercourse Evaluation

Hello Jennifer and Jason,

Further to the site visit held yesterday please find below some additional scoping information to supplement the Region's EIS Guidelines (attached) and help inform a Terms of Reference for the site on Grimsby Road 8. Do not hesitate to have your environmental consultant contact me directly should they have any questions. Note that the window for field studies will open as soon as the end of March.

2906 South Grimsby Road Field work scope:

- Rapid/Standard Survey Type following the "Evaluation, Classification and Management of Headwater Drainage Features Guidelines January 2014 by TRCA and CVC (no need to do electrofishing, no need for amphibian breeding surveys, no need for OWES)
- Ecological Land Classification
- General Fish Habitat Characterization, including consideration of barriers to movement.

These field surveys should form the basis of the field program and will easily be able to deal with whether the feature is found to be ephemeral or intermittent. The EIS should also include a desktop/edge of property assessment for the tributary where it extends offsite. A Terms of Reference needs to be developed and submitted to the Town, Region and NPCA for comment with an indication of what the study will cover including background work, the development concept, field program, constraints analysis, impact analysis, mapping, integration with other disciplines and conclusions/recommendations.

The EIS will need to be completed as a part of the consent to ensure the desired plan is possible. If the study finds that relocation of tributary is possible, the detailed design (i.e., natural channel design) could be done as part of the site plan process.

Thank you,
Adèle

From: Gerrit Boerema <gboerema@westlincoln.ca>
Sent: Monday, March 4, 2019 1:15 PM
To: Jennifer Vida <JVida@ucc.com>; Jason Schooley <JSchooley@ucc.com>
Cc: Fred Vrugteveen <fred@niagarapallet.ca>; Dirk Vrugteveen <Dirk@niagarapallet.ca>; Labbe, Adele <Adele.Labbe@niagararegion.ca>; Cara Lampman <clampman@npca.ca>; Alexa Cooper <acooper@westlincoln.ca>
Subject: Niagara Pallet Boundary Adjustment - Watercourse Evaluation

Hi Jennifer and Jason,

The Conservation Authority, Region of Niagara and Township met onsite with the property owners and with Fred and Dirk this morning to do an onsite evaluation of the watercourse.

The Region has concluded that it is a watercourse and an EIS will be needed as part of the severance application for its relocation. The Region can provide some scoping on the EIS and will review the terms of reference prepared by the environmental consultants.

Let us know if you have any questions.

Gerrit,

West Lincoln
Your Future Naturally

Gerrit Boerema

Planner II

Tel: 905-957-3346 ext.5133
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Amphibian	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
Jefferson Salamander *Ambystoma jeffersonianum*	END	Species Protection and Habitat Regulation	Inhabits deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Active: March – October Hibernates: October – March Breeding: Late March - Mid April	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Unisexual Ambystoma - Jefferson-dominated *Ambystoma laterale - jeffersonianum*	END	Species Protection and General Habitat Protection	Inhabits deciduous and mixed deciduous forests with suitable breeding areas which generally consist of ephemeral (temporary) bodies of water that are fed by spring runoff, groundwater, or springs.	Active: March – October Hibernates: October – March Breeding: Late March - Mid April	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Bird	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
Bank Swallow *Riparia riparia*	THR	Species Protection and General Habitat Protection	It nests in a wide variety of naturally and anthropogenically created vertical banks, which often erode and change over time including aggregate pits and the shores of large lakes and rivers.	Migrate South before Winter	Follow Breeding Bird Survey Protocol. Colony and Roost information should be recorded and submitted using Bird Studies Canada's Ontario Bank Swallow Project data forms (2010).
Barn Swallow *Hirundo rustica*	THR	Species Protection and General Habitat Protection	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.	Migrate South before Winter	Follow Breeding Bird Survey Protocol
Black Tern *Chlidonias niger*	SC	N/A	Generally prefer freshwater marshes and wetlands; nest either on floating material in a marsh or on the ground very close to water	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Bobolink *Dolichonyx oryzivorus*	THR	Species Protection and General Habitat Protection	Generally prefers open grasslands and hay fields. In migration and in winter uses freshwater marshes and grasslands	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol

Chimney Swift *Chaetura pelagica*	THR	Species Protection and General Habitat Protection	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	Nesting - Late April to Mid-May Migrate South in September or Early October	Chimney Swift Monitoring Protocol. Bird Studies Canada, March 2009
Common Nighthawk *Chordeiles minor*	SC	N/A	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 roof-tops).	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Eastern Meadowlark *Sturnella magna*	THR	Species Protection and General Habitat Protection	Generally prefers grassy pastures, meadows and hay fields. Nests are always on the ground and usually hidden in or under grass clumps.	Migrate South for the Winter	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol
Eastern Whip-poor-will *Caprimlugus vociferus*	THR	Species Protection and General Habitat Protection	Generally prefer semi-open deciduous forests or patchy forests with clearings; areas with little ground cover are also preferred; In winter they occupy primarily mixed woods near open areas.	Nesting: May - July	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Eastern Wood-Pewee *Contopus virens*	SC	N/A	Associated with deciduous and mixed forests. Within mature and intermediate age stands it prefers areas with little understory vegetation as well as forest clearings and edges.	Migrate South for the Winter	Follow Breeding Bird Survey Protocol
Louisiana Waterthrush *Seiurus motacilla*	THR	Species Protection and General Habitat Protection	Generally inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps	Migrate South for the Winter	Follow Breeding Bird Survey Protocol or Marsh Monitoring Protocol

Northern Bobwhite *Colinus virginianus*	END	Species Protection and General Habitat Protection	Generally inhabits a variety of edge and grassland type - habitats including non-intensively farmed agricultural lands.	Active Year Round	Follow Breeding Bird Survey Protocol
Red-Headed Woodpecker *Melanerpes erythrocephalus*	SC	N/A	Generally prefer open oak and beech forests, grasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemeteries, as well as along beaver ponds and brooks	Active from May to September	Follow Breeding Bird Survey Protocol
Short-eared Owl *Asio flammeus*	SC	N/A	Generally prefers a wide variety of open habitats, including grasslands, peat bogs, marshes, sand-sage concentrations, old pastures and agricultural fields	Active Year Round	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Wood Thrush *Hylocichla mustelina*	SC	N/A	Nests mainly in second-growth and mature deciduous and mixed forests, with saplings and well-developed understory layers. Prefers large forest mosaics, but may also nest in small forest fragments.	Migrate South for the Winter Arrive in Ontario in mid to late spring	Follow Breeding Bird Survey Protocol
Insect	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
Monarch Butterfly *Danaus plexippus*	SC	N/A	Exist primarily wherever milkweed and wildflowers exist; abandoned farmland, along roadsides, and other open spaces	Usually migrate south in late September and October	Watch for adults along roadsides and in open fields. Caterpillars feed on milkweeds: Common milkweed grows in open disturbed habitats (fields, roadsides, etc) and swamp milkweed grows in wet habitats (along streams, lakes, marshes) Adults can be spotted from a distance; caterpillars must be looked for carefully on the host plant.
Rusty-patched Bumble Bee *Bombus affinis*	END	Species Protection and General Habitat Protection	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	Active from early Spring to late Fall	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol

West Virginia White *Pieris virginiensis*	SC	N/A	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.	Adult butterfly emerges from pupa in late March; flies only in April and May	Watch for adults within moist, deciduous woodlands Caterpillars feed on the two-leaved toothwort: Toothwort grows in damp, open, rich hardwood woodlands and blooms from April to June. Adults can be spotted from a distance; caterpillars must be searched for carefully by checking host plant

Mammal	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
Eastern Small-footed Myotis *Myotis leibii*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius 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.	Hibernates in caves and mines during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Gray Fox *Urocyon cinereoargenteus*	THR	Species Protection and General Habitat Protection	Generally prefers deciduous forests, marshes, swampy areas, and urban areas	Active Year Round	Opportunistically or by examining tracks in winter and summer
Little Brown Myotis *Myotis lucifugus*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often associated with buildings (attics, barns etc.). Occasionally found in trees (25-44 cm dbh).	Hibernates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Northern Myotis *Myotis septentrionalis*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Often asssociated with cavities of large diameter trees (25-44 cm dbh). Occasionally found in structures (attics, barns etc.)	Hibernates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol

Tri-colored Bat *Perimyotis subflavus*	END	Species Protection and General Habitat Protection	Overwintering habitat: Caves and mines that remain above 0 degrees Celsius Maternal Roosts: Can be in trees or dead clusters of leaves or arboreal lichens on trees. May also use barns or similar structures.	Alternates during winter	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol

Plant	SARO	Protection	Habitat Information	Timing Windows	Survey Protocol
American Chestnut *Castanea dentata*	END	Species Protection and General Habitat Protection	Found in deciduous forest communities; this tree prefers arid forests with acid and sandy soils.	Flowers occur in Late Spring and Early Summer	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Perform detailed floristic inventory Look for distinictive fruits on the ground
Butternut *Juglans cinerea*	END	Species Protection and General Habitat Protection	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	Flowers from April to June. Fruits reach maturity during the month of September or October	Walk slowly and systematically in grid fashion through suitable habitat pausing every 30 meters for a detailed scan of trees within sight. Areas with dense foliage or many saplings will require a more intensive survey to detect sapling butternut. Use Butternut Health Assessment Protocol if planning on removing trees.
Cherry Birch *Betula lenta*	END	Species Protection and General Habitat Protection	Generally grows in moist, well-drained soils, but it is also found on coarse-textured or rocky shallow soils.	Flowering occurs in the spring, before the leaves appear	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Cucumber Tree *Magnolia acuminata*	END	Species Protection and General Habitat Protection	Generally grows in rich, well-drained soils in deciduous forest habitats	Flowering occurs in late May Fruits appear in Late Summer	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species

Eastern Flowering Dogwood *Cornus florida*	END	Species Protection and Habitat Regulation	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	Flowering occurs in mid-May, just as the leaves begin to develop. Fruit turns red at the end of summer.	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species Easiest to detect during Spring when in flower Also look for distinctive bark
Red Mulberry *Morus rubra*	END	Species Protection and General Habitat Protection	Generally grows in moist forest habitats. In Ontario, these include slopes and ravines of the Niagara Escarpment, and sand spits and bottom lands; Can grow in open areas such as hydro corridors	Flowering occurs when leaves emerge in late spring. Fruit emerges in Mid-July.	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from the similar White Mulberry Distinguishing Red Mulberry and the hybrid Red and White Mulberry will require the collection of leaves for generic testing, which requires a 17(2)(b) permit
Shumard Oak *Quercus shumardii*	SC	N/A	Generally grows in deciduous forests, where the soils are poorly drained clay and clay loam. Requires full sunlight.	Acorns germinate easily in the spring	Walk slowly and systematically in grid fashion, pausing to scan for plants every 5 meters Use a plant field guide to distinguish from similar species
Reptile	**SARO**	**Protection**	**Habitat Information**	**Timing Windows**	**Survey Protocol**
Blanding's Turtle *Emydoidea blandingii*	THR	Species Protection and General Habitat Protection	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. They dig their nest in a variety of loose substrates, including sand, organic soil, gravel and cobblestone. Overwintering occurs in permanent pools that average about one metre in depth, or in slow-flowing streams.	Eggs are laid in June, with hatchlings emerging in late September and early October.	Contact MNR Guelph District Management Biologist to obtain a copy of the protocol

Eastern Ribbonsnake *Thamnophis sauritus*	SC	N/A	Generally found along the edges of shallow ponds, streams, marshes, swamps, or bogs bordered by dense vegetation that provides cover. Abundant exposure to sunlight is also required, and adjacent upland areas may be used for nesting.	Hibernate: October - April Mating: Early Spring Hatching: Early Fall (September)	Contact MNRF Guelph District Management Biologist to obtain a copy of the protocol
Snapping Turtle *Chelydra serpentina*	SC	N/A	Generally inhabit shallow waters where they can hide under the soft mud and leaf litter. Nesting sites usually occur on gravely or sandy areas along streams. Snapping Turtles often take advantage of man-made structures for nest sites, including roads (especially gravel shoulders), dams and aggregate pits.	Nesting: Late May and June Hibernate: October - April	Scan offshore rocks and logs for basking turtles (10am-2pm) Snorkel in desired aquatic habitat Nesting Season: Search known or preferred nesting habitat areas for females

Appendix 2

Headwater Drainage Feature Assessment

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D & R.H.

Site Code: 1 Watercourse: Drainage Feature to 20-Mile Creek

Segment Limits: Upstream WP# 578; Downstream WP# 579

Direction of Assessment: ☐ Upstream ☑ Downstream

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☑ Minimal Flow (4)

Feature Type: ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☑ Swale (7) ☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☐ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.5	2.0	2.5	m	Channel (Bankfull) Depth:	0.2	0.15	0.15 m
Wetted Width:	0.5	1.0	1.0	m	Wetted Depth:	0.05	0.02	_____ m
Feature Width:	_____	_____	_____	m				

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☑ Distance by Time (3) ☐ Estimated (4)

Volume:	_____	_____	_____	Time: _____ _____ _____
HH (mm):	_____	_____	_____	WW: _____ _____ _____
Distance:	0.3m	0.3m	_____	Time: 2.89s 2.69s _____
Discharge (l/s):				

Sediment Transport

Adjacent: ☑ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Valley: ☑ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition: ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
578	1, 2			U/S confluence, d/s @ WP 578
	3, 4			Mid-reach looking d/s
	5, 7			Looking d/s
	6			Instream conditions
	8			Looking upstream from d/s culvert.

Additional Notes: Agricultural swale with minimal flow. Riparian areas consisted of ag. field (cropped), no furrows present, previous crop looked to be ~~alphalfa~~ alfalfa. Feature ended in culvert underneath existing ag. crossing. Some algae growth in channel.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D / R.H.

Site Code: 2 Watercourse: Drainage to 20-Mile Creek.

Segment Limits: Upstream WP# 580; Downstream WP# 581

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☐ Downstream

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☐ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☑ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type: ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☑ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1) ☑ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7) (Meadow first, Lawn beyond)
	Right Bank	☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1) ☑ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7) Lawn, then commercial space
	Right Bank	☑ None (1) ☑ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7) Roadway as well

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☑	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☑ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.2	1.0	1.3	m	Channel (Bankfull) Depth:	0.45	0.4	0.2 m
Wetted Width:	0.4	0.5	0.4	m	Wetted Depth:	0.8	0.19	0.06 m
Feature Width:				m				

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____

HH (mm): _____ WW: _____

Distance: _____ Time: _____

Discharge (l/s): _____

Sediment Transport

Adjacent	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition: ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	9-11			Looking d/s.
	12			Looking u/s @ existing ag. culvert

Additional Notes: Heavily vegetated swale between ag. field area and confluence with commercial area drainage. This segment was possibly restrictive to fish movement due to heavy sinuosity and vegetation.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D/R.H

Site Code: 3 Watercourse: Drainage to 20-Mile Creek.

Segment Limits: Upstream WP# 581; Downstream WP# 582

Direction of Assessment: ☐ Upstream ☑ Downstream

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☐ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☑ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type: ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☑ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (commercial space)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Roadway)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ Elevation (cm): _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.1	1.2	_____ m	Channel (Bankfull) Depth:	0.8	0.45 _____ m
Wetted Width:	0.75	0.9	_____ m	Wetted Depth:	0.45	0.28 _____ m
Feature Width:	_____	_____	_____ m			

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

No flow.

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____

HH (mm): _____ WW: _____

Distance: _____ Time: _____

Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☑ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition: ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	13, 14			Looking d/s towards culvert running under Hwy 20.
	15-17			Looking into Hwy 20 culvert.

Additional Notes: Deepened swale located between confluence with tiled drain (U/S) and rodd culvert (D/S, runs underneath Hwy 20). Tile drain outletting from commercial area. Some undercutting of banks. No observable flow. Flow inside culvert was minimal, likely fish barrier during drier conditions.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D / R.H

Site Code: 4 Watercourse: Drainage Feature

Segment Limits: Upstream WP# 583; Downstream WP# 584

Direction of Assessment: ☐ Upstream ☑ Downstream

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☑ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type: ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☑ Swale (7) ☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Storm pond area)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Commercial Space)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☑	☐	☐	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.2 m	Channel (Bankfull) Depth:	0.35 m		
Wetted Width:	0 m	Wetted Depth:	0 m		
Feature Width:	_____ m				

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) Volume: _____ Time: _____ ☐ Hydraulic Head (2) HH (mm): _____ WW: _____ ☐ Distance by Time (3) Distance: _____ Time: _____ ☐ Estimated (4) Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☑ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition: ☐ None (1) ☐ Minimal: < 5 mm (2) ☑ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	18			Looking east towards residential property
	19,20			Looking west into swale.
	21,22			Small SWM Pond area.

Additional Notes: Swale draining west along the northern boundary of existing property, downstream end located where small stormwater pond outlets. Swale was dry during site visit.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D/R.H

Site Code: 5 Watercourse: Drainage feature

Segment Limits: Upstream WP# 584; Downstream WP# 581

Direction of Assessment: ☐ Upstream ☑ Downstream

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☐ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☑ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type: ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☑ Tiled Feature (5) ☐ Wetland (6) ☑ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2) (with rip/rap)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2) (commercial space)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2) (commercial space)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☑	☐
Sub-Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.2	1.35	_____	m	Channel (Bankfull) Depth:	0.3	0.3	_____	m
Wetted Width:	0	0.3	_____	m	Wetted Depth:	0	0.03	_____	m
Feature Width:	_____	_____	_____	m					

Entrenchment (Left Bank): ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank): ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____ HH (mm): _____ WW: _____ Distance: _____ Time: _____ Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☑ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	☐ Sheet Erosion (6)	☐ Instream Bank Erosion (7)	☐ Other (8)
Valley	☐ None (1)	☑ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	☐ Sheet Erosion (6)	☐ Instream Bank Erosion (7)	☐ Other (8)

Sediment Deposition: ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

*Outlet for tile drain WP 585

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment: No fish habitat present

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	23			Outlet area for SWM Pond.
	24, 25			Looking d/s into rip-rap channel
	26, 27			Looking @ tile outlet area (looking d/s)

Additional Notes: Partially rip-rap lined swale with tile drain installed underneath swale invert. Tile drain flowing (min. flow), whitish residue noticed along outlet area of tile drain.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 2019-03-27 Project #: 219140 Recorder/Crew: J.D / R.H

Site Code: 6 Watercourse:

Segment Limits: Upstream WP# 586; Downstream WP# 581

Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence: ☑ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition: ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5) ☐ Standing Water (2) ☑ Minimal Flow (4)

Feature Type: ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☑ Swale (7) ☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8) ☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Roadway)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Roadway)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☑ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	0.4			m	Channel (Bankfull) Depth:	0.17			m
Wetted Width:	0.2			m	Wetted Depth:	~~0.2~~ 0.04			m
Feature Width:				m					

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____ HH (mm): _____ WW: _____ Distance: _____ Time: _____ Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☑ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition: ☑ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 2019-03-27 Project #: 219140 Site Assessment: ☑ Site Visit 1 ☐ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment: No fish habitat observed

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	28, 29			Looking d/s.

Additional Notes: Roadside ditch between existing agricultural driveway and existing drainage feature. Very minor flow, not measurable.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D.

Site Code: 1 Watercourse: Drainage Feature to 20-Mile Creek

Segment Limits: Upstream WP# 578 (From Rd. 1); Downstream WP# 579 " "

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☐ Dry (1) ☑ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☑ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.5	2.0	2.5	m	Channel (Bankfull) Depth:	0.2	0.15	0.15 m
Wetted Width:	0.5	0.55	0.66	m	Wetted Depth:	0.1	0.06	0.06 m
Feature Width:				m				

Pools → width, lot of channel dry.

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9 ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____

HH (mm): _____ WW: _____

Distance: _____ Time: _____

Discharge (l/s): _____

Sediment Transport

Adjacent	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☐ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☒ Other: Sheen

Fish Collection ☑ Absent ☐ Present Comment: No fish habitat present.

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	1			Oily sheen observed along Segment 1
	2, 3			Flowering vegetation
	4-17			Conditions along Segment 1, walking d/s

Additional Notes:
A series of pools was observed along the length of the segment. No flow observed and pools were not contiguous. Remaining portions of segment exhibited no standing H_2O, but bed soils were moist. One small pool showed a oily sheen on its surface.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D.

Site Code: 2 Watercourse: Drainage Feature to 20-Mile Creek

Segment Limits: Upstream WP# 580 (From Rd. 1); Downstream WP# 581 (" ")

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☑ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ Elevation (cm): _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (2-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☑	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.2	1.0	1.3	m
Wetted Width:	0.53	Ø	Ø	m
Feature Width:				m
Channel (Bankfull) Depth:	0.45	0.4	0.2	m
Wetted Depth:	0.08	Ø	Ø	m

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9 ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ HH (mm): _____ Distance: _____ Discharge (l/s): _____

Time: _____ WW: _____ Time: _____

Sediment Transport

Adjacent	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☑ Absent ☐ Present Comment: No fish habitat present.

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	18			Pooled conditions
	20			Dry conditions.

Additional Notes: Pooling located immediately d/s of the culvert, other portions of segment were dry.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D.

Site Code: 3 Watercourse: Drainage Feature to 20-Mile Creek

Segment Limits: Upstream WP# 581 (From Rd. 1); Downstream WP# 582 (From Rd. 1)

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☐ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☑ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	1.1	1.2	_____ m	Channel (Bankfull) Depth:	0.8	0.45	_____ m
Wetted Width:	0.6	0.66	_____ m	Wetted Depth:	0.35	0.32	_____ m
Feature Width:	_____	_____	_____ m				

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9 ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____ HH (mm): _____ WW: _____ Distance: _____ Time: _____ Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☑ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☑ Absent ☐ Present Comment: Intermittent channel - potential fish habitat unlikely

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	19			General conditions, looking d/s
	22			General conditions, looking U/S
	23			General conditions, looking d/s.

Additional Notes:

- Considerable water immediately u/s of the culvert that runs under Hwy 20, flow minimal, almost stagnant. Some flow from tile drain located to the north.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D

Site Code: 4 Watercourse: Drainage Ditch

Segment Limits: Upstream WP# 583 (From Rd. 1); Downstream WP# 584 (" ")

Direction of Assessment: ☐ Upstream ☑ Downstream

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Flow Influence: ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition: ☑ Dry (1) ☐ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type: ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☑ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7) (Storm Pond facility)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)
10 - 30 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7) (commercial space)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6)	☐ Wetland (7)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☑	☐	☐	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions: Bankfull Width: 1.2 m; Channel (Bankfull) Depth: 0.35 m; Wetted Width: N/A m; Wetted Depth: N/A m; Feature Width: _____ m

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)
Volume: _____ HH (mm): _____ Distance: _____ Discharge (l/s): _____
Time: _____ WW: _____ Time: _____

Sediment Transport

Adjacent	☐ None (1)	☑ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	☐ Sheet Erosion (6)
	☐ Instream Bank Erosion (7)	☐ Other (8)				
Valley	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	☐ Sheet Erosion (6)
	☐ Instream Bank Erosion (7)	☐ Other (8)				

Sediment Deposition: ☐ None (1) ☐ Minimal: < 5 mm (2) ☑ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment: No fish habitat present

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	24-26			General conditions
	30			General conditions

Additional Notes: This segment, u/s of the storm pond connection was dry.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D.

Site Code: 5 Watercourse: Commercial drainage to 20-Mile Creek.

Segment Limits: Upstream WP# 584 (From Rd. 1); Downstream WP# 581 (" ")

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☐ Dry (1) ☑ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☑ Tiled Feature (5) ☐ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☑ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2) (w/ rip-rap)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (commercial space)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (commercial space)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☑	☐
Sub-Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

	Bankfull Width:	1.2	1.35	____ m	Channel (Bankfull) Depth: 0.3 / 0.3 / ____ m
Pool Dimensions →	Wetted Width:	0.041	0.77	0.18 m	Wetted Depth: 0.02 / 0.10 / 0.05 m
	Feature Width:	____	____	____ m	

Entrenchment (Left Bank) ☐ < 40 m ☐ > 40 m ☐ Measure ____ m (Right Bank) ☐ < 40 m ☐ > 40 m ☐ Measure ____ m

Width Measure Codes ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9 ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ _____ _____ Time: _____ _____ _____

HH (mm): _____ _____ _____ WW: _____ _____ _____

Distance: _____ _____ _____ Time: _____ _____ _____

Discharge (l/s):

Sediment Transport

Adjacent: ☐ None (1) ☑ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Valley: ☐ None (1) ☑ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5) ☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition ☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment: No potential fish habitat present.

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	31-41			General conditions.

Additional Notes: Some minor pooling around u/s extent adjacent to SWM Pond outfall. More stagnant pooling mid-way along channel – pooling whitish, appears to be influenced by adjacent commercial works. Minimal drainage from tile outlet @ southern extent of segment.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)

Date: 27-Jun-2019 Project #: 219140 Recorder/Crew: J.D.

Site Code: 6 Watercourse: Drainage ditch to 20-Mile Creek

Segment Limits: Upstream WP# 586 (From Rd. 1); Downstream WP# 581 (" ")

Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Direction of Assessment: ☐ Upstream ☑ Downstream

Flow Influence: ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition: ☐ Dry (1) ☑ Standing Water (2) ☐ Interstitial Flow (3) ☐ Minimal Flow (4) ☐ Substantial Flow (5)

Feature Type: ☐ Defined Natural Channel (1) ☐ Channelized or Constrained (2) ☐ Multi-thread (3) ☐ No Defined Feature (4) ☐ Tiled Feature (5) ☐ Wetland (6) ☐ Swale (7) ☐ Roadside Ditch (8) ☐ Pond (9)

Feature Vegetation: ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☑ Meadow (4) ☐ Scrubland (5) ☐ Forest (6) ☐ Wetland (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☐ None (1)	☑ Lawn (2) (Roadway - Hwy 20)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7)
	Right Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Forest (6) ☐ Wetland (7) (Roadway)

Channel Gradient (S4.M7): ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ LiDAR (5) ☐ Other (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐

Feature Roughness: ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Channel Dimensions

Bankfull Width:	0.4 m	Channel (Bankfull) Depth:	0.17 m		
Wetted Width:	0.1 m	Wetted Depth:	0.03 m		
Feature Width:	_____ m				

Entrenchment (Left Bank): ☐ < 40 m ☐ > 40 m ☐ Measure _____ m (Right Bank): ☐ < 40 m ☐ > 40 m ☐ Measure _____ m

Width Measure Codes: ☐ Can't Measure (1) ☐ One Crossover (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Surface Flow Measurement S4.M9: ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Volume: _____ Time: _____ HH (mm): _____ WW: _____ Distance: _____ Time: _____ Discharge (l/s): _____

Sediment Transport

Adjacent	☐ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☑ Instream Bank Erosion (7)		☐ Other (8)	
Valley	☑ None (1)	☐ Rill (2)	☐ Rill and Gully (3)	☐ Gully (4)	☐ Outlet Scour (5)	
	☐ Sheet Erosion (6)		☐ Instream Bank Erosion (7)		☐ Other (8)	

Sediment Deposition: ☑ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Checked by: _____

BEACON ENVIRONMENTAL

Headwater Drainage Feature Assessment
2014 Guidelines (with OSAP S4.M10)
Point Data, Photo Log and Comments

Date: 27-Jun-2019 Project #: 219140 Site Assessment: ☐ Site Visit 1 ☑ Site Visit 2 ☐ Site Visit 3

Groundwater Indicators ☑ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment: No fish habitat present.

POINT DATA

WP#	Photo #	Code	Category	Description
1	1, 2	F	2	Historic evidence of beaver dam
	43-46			General conditions.

Additional Notes:

Standing H_2O located immediately d/s of ag. crossing culvert. Rest of ditchline was dry.

Segment Break Trigger ☐ Feature Type ☐ Feature Modifier ☐ Flow Condition ☐ Feature Vegetation ☐ Riparian Vegetation ☐ Other: _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage Area - Measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (Tile or Other) - Record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (Tile or Other) - Record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver Dam - Measure perched height and jumping height
G	Manmade Dam - Measure perched height and jumping height
H	Other barrier to fish movement
I	Potential Comtamination Source Storm (sewers outlet or industrial discharge pipe).
J	Channel Hardening - Indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - Note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition Point - flow condition changes from dry to standing water, independent of segment break
M	Flow transition Point - flow condition changes from standing water to flowing water, independent of segment break
N	Flow transition Point - flow condition changes from dry to flowing water, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential Nutrient Source
Q	Dredging of Channel
R	Offline Pond
S	Other

Checked by:_____

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219140 Recorder/Crew: J.D

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 1

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☑ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☑ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☑ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☑ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)	Hydraulic head (mm)	Volume (L)	Distance (m)	Time (s)
N/A (Dry)	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3

Sediment Transport

Adjacent ☑ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☑ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☑ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment Pg. 2 of 2

Date: 2019-08-16 Project #: 219140 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☑ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: One small isolate pool of standing H_2O observed. No flow.

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category: Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219140 Recorder/Crew: J.D

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 2

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☐ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☑ Standing Water (2) (Few Pools) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (2-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☑	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☑ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4) No flow

Wetted Width (m)	Wetted Depth (mm) 1 2 3	Hydraulic head (mm) 1 2 3	Volume (L) 1 2 3	Distance (m) 1 2 3	Time (s) 1 2 3
0.20	0.02m				

Sediment Transport

Adjacent ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment Pg. 2 of 2

Date: 2019-08-16 Project #: 219140 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☑ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other:

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: Small isolated pools near middle of reach. % H_2O temp: 21.5°C

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage area - measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver dam - measure perched height and jumping height
G	Manmade dam - measure perched height and jumping height
H	Other barrier to fish movement
I	Potential contamination source (storm sewer outlet or industrial discharge pipe).
J	Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M	Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N	Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential nutrient source
Q	Dredging of channel
R	Offline pond
S	Other

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219140 Recorder/Crew: J.D

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 3

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☑ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☑ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☑ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser-Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm) : _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☐	☐

Feature Roughness ☑ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Wetted Width (m)	Wetted Depth (mm) 1 2 3	Hydraulic head (mm) 1 2 3	Volume (L) 1 2 3	Distance (m) 1 2 3	Time (s) 1 2 3
0.66	0.38 m				

Sediment Transport

Adjacent ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☑ Instream Bank Erosion (7) ☐ Other (8)

Feature ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☑ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment Pg. 2 of 2

Date: 2019-08-16 Project #: 21940 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☑ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☑ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: Standing H2O along reach, stream temp: 26.5°C

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B Seepage area - measure or estimate length of bank where seepage occurs
C Watercress - estimate total surface area occupied
D Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F Beaver dam - measure perched height and jumping height
G Manmade dam - measure perched height and jumping height
H Other barrier to fish movement
I Potential contamination source (storm sewer outlet or industrial discharge pipe).
J Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O Fish observed during non-fish sampling activities
P Potential nutrient source
Q Dredging of channel
R Offline pond
S Other

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219140 Recorder/Crew: J.D

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 4

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☑ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☑ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☑ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☑	☐	☐	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☑ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Wetted Width (m)			Wetted Depth (mm)			Hydraulic head (mm)			Volume (L)			Distance (m)			Time (s)		
1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
No flow (dry)																	

Sediment Transport

Adjacent ☐ None (1) ☑ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☐ None (1) ☐ Minimal: < 5 mm (2) ☑ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Pg. 2 of 2

Date: 2019-08-16 Project #: 219140 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☑ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☑ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: No flow. Dry soils.

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3) No Evidence (4) Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage area - measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver dam - measure perched height and jumping height
G	Manmade dam - measure perched height and jumping height
H	Other barrier to fish movement
I	Potential contamination source (storm sewer outlet or industrial discharge pipe).
J	Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M	Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N	Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential nutrient source
Q	Dredging of channel
R	Offline pond
S	Other

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219146 Recorder/Crew: J.D.

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 5

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☑ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☐ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☑ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☑ Lawn (2) ☑ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☐	☐	☐	☐	☑	☐
Sub-Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☐ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)			Hydraulic head (mm)			Volume (L)			Distance (m)			Time (s)		
Pools Isolated ~~drainage~~ from Pallet factory	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
No Flow															

Sediment Transport

Adjacent ☐ None (1) ☑ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Feature ☐ None (1) ☑ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☐ None (1) ☑ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment Pg. 2 of 2

Date: 2019-08-16 Project #: 219140 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☒ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: 2 isolated sections of standing water (~ 0.3m width and 0.05-0.1m in depth). Standing H_2O was milky-white in colour.

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category: Ongoing and Active (1) | Historic Evidence (2) | Reported but No Evidence (3) | No Evidence (4) | Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage area - measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver dam - measure perched height and jumping height
G	Manmade dam - measure perched height and jumping height
H	Other barrier to fish movement
I	Potential contamination source (storm sewer outlet or industrial discharge pipe).
J	Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M	Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N	Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential nutrient source
Q	Dredging of channel
R	Offline pond
S	Other

Headwater Drainage Feature Assessment

Date: 2019-08-16 Project #: 219140 Recorder/Crew: J.D

Stream Name: 20-Mile Creek Stream Code: N/A Site Code: 6

Site Limits: Upstream WP# N/A Field Assessment: ☐ Sample 1 Unconnected HDF:

Downstream WP# N/A ☐ Sample 2 ☐ Not connected

Direction of Assessment: ☐ Upstream ☐ Downstream ☑ Sample 3 to downstream network

Flow Influence ☐ Freshet (1) ☐ Spate (2) ☑ Baseflow (3)

Flow Condition ☑ Dry (1) ☐ Interstitial Flow (3) ☐ Substantial Flow (5)
☐ Standing Water (2) ☐ Minimal Flow (4)

Feature Type ☐ Defined Natural Channel (1) ☐ No Defined Feature (4) ☐ Swale (7)
☐ Channelized or Constrained (2) ☐ Tiled Feature (5) ☐ Roadside Ditch (8)
☐ Multi-thread (3) ☐ Wetland (6) ☐ Pond (9)

Feature Vegetation ☐ None (1) ☐ Lawn (2) ☐ Cropped (3) ☐ Meadow (4) ☐ Scrubland (5) ☐ Wetland(6) ☐ Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
1.5 - 10 m	Left Bank	☐ None (1)	☐ Lawn (2)	☐ Cropped (3)	☑ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☐ None (1)	☑ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
10 - 30 m	Left Bank	☐ None (1)	☐ Lawn (2)	☑ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)
	Right Bank	☑ None (1)	☐ Lawn (2)	☐ Cropped (3)	☐ Meadow (4)	☐ Scrubland (5)	☐ Wetland (6)	☐ Forest (7)

Channel Gradient (S4.M7) ☐ Visual (1) ☐ Clinometer (2) ☐ Laser Level (3) ☐ Survey Level (4) ☐ Other (5) ☐ LiDAR (6)

Distance (m): _____ _____ _____ Elevation (cm): _____ _____ _____ Gradient (%): _____

	Clay (Hard Pan)	Silt	Sand (0.06-2 mm)	Gravel (22-66 mm)	Cobble (67-249 mm)	Boulder (250 mm)	Bedrock
Dominant Substrate (S2.M3)	☐	☑	☐	☐	☐	☐	☐
Sub-Dominant Substrate (S2.M3)	☐	☐	☑	☐	☐	☐	☐

Feature Roughness ☐ < 10% Minimal (1) ☐ 10 - 40% Moderate (2) ☑ 40 - 60% High (3) ☐ > 60% Extreme (4)

Width Measurement ☐ Can't Measure (1) ☐ Bankfull (2) ☐ Mean Width (3) ☐ Estimated (4) ☐ GIS (5) ☐ Measure/GIS (6)

Channel Dimensions Feature Width (m): _____ Bankfull Depth (mm) _____

Entrenchment Total: ☐ > 40 m ☐ < 40 m Left Bank _____ m Right Bank _____ m Total width _____ m

Surface Flow Method ☐ Perched Culvert (1) ☐ Hydraulic Head (2) ☐ Distance by Time (3) ☐ Estimated (4)

Wetted Width (m)	Wetted Depth (mm)			Hydraulic head (mm)			Volume (L)			Distance (m)			Time (s)		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Dry															

Sediment Transport

Adjacent ☐ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☑ Instream Bank Erosion (7) ☐ Other (8)

Feature ☑ None (1) ☐ Rill (2) ☐ Rill and Gully (3) ☐ Gully (4) ☐ Outlet Scour (5)
☐ Sheet Erosion (6) ☐ Instream Bank Erosion (7) ☐ Other (8)

Sediment Deposition Measures (mm): _____ _____ _____ _____ _____

☑ None (1) ☐ Minimal: < 5 mm (2) ☐ Moderate: 5-30 mm (3) ☐ Substantial: 31-80 mm (4) ☐ Extensive: > 80 mm (5)

Unconstrained Headwater Drainage Feature Assessment

Pg. 2 of 2

Date: 2019-08-16 Project #: 219140 Field Assessment: ☐ Sample # 1 ☐ Sample # 2 ☑ Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# Perched Height (mm): Jumping Height (mm):
WP# Perched Height (mm): Jumping Height (mm):

Groundwater Indicators ☐ None ☐ Watercress ☐ Seepage ☐ Bubbling ☐ Stained ☐ Other: _____

Fish Collection ☐ Absent ☐ Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes: Dry. No flow, dry soils.

Site Break ☐ Feature Type ☐ Feature Modifier ☐ Flow Conditions ☐ Feature Vegetation ☐ Riparian Vegetation

Trigger ☐ Other: Comments _____

Point Data Category: Ongoing and Active (1); Historic Evidence (2); Reported but No Evidence (3); No Evidence (4); Unknown (5)

POINT DATA KEY:

A	Spring/upwelling - estimate <0.5 l/sec or >0.5 l/sec; measure temp
B	Seepage area - measure or estimate length of bank where seepage occurs
C	Watercress - estimate total surface area occupied
D	Outlet (tile or other) - record flow status as per feature flow. Estimate volume <0.5 l/sec or >0.5 l/sec. Measure temperature.
E	Inlet (tile or other) - record flow status as per feature flow. Estimate volume to be <0.5 l/sec or >0.5 l/sec.
F	Beaver dam - measure perched height and jumping height
G	Manmade dam - measure perched height and jumping height
H	Other barrier to fish movement
I	Potential contamination source (storm sewer outlet or industrial discharge pipe).
J	Channel hardening - indicated by rip-rap, armour stone, or gabion baskets.
K	Culvert - note type, size and whether or not perched. If perched record perched height and jumping height.
L	Flow transition point D/S - flow condition changes from dry to standing water, independent of segment break
M	Flow transition point M/S- flow condition changes from minimal to substantial surface flow, independent of segment break
N	Flow transition point D-S/IF- flow condition changes from dry/standing water to interstitial flow, independent of segment break
O	Fish observed during non-fish sampling activities
P	Potential nutrient source
Q	Dredging of channel
R	Offline pond
S	Other

Appendix 3

List of Vascular Plants for Subject Lands

Appendix 3

List of Vascular Plants for the Subject Lands

Scientific Name	English Name	Srank
Equisetum arvense	Field Horsetail	S5
Picea glauca	White Spruce	S5
Juniperus virginiana	Eastern Red Cedar	S5
Typha angustifolia	Narrow-leaved Cattail	S5
Agrostis gigantea	Black Bentgrass	SE5
Agrostis stolonifera	Spreading Bentgrass	S5
Bromus ciliatus	Fringed Brome	S5
Bromus inermis	Awnless Brome	SE5
Bromus tectorum	Cheat Grass	SE5
Digitaria ischaemum	Smooth Crabgrass	SE5
Digitaria sanguinalis	Hairy Crabgrass	SE5
Elymus canadensis	Nodding Wild-rye	S4S5
Elymus repens	Rye Grass	SE5
Elymus virginicus	Virginia Wild Rye	S5
Festuca arundinacea	Kentucky Fescue	SE5
Festuca pratensis	Meadow Fescue	SE5
Hordeum jubatum	Foxtail Barley	SE5
Muhlenbergia mexicana	Mexican Muhly	S5
Panicum capillare	Old Witch Panic-grass	S5
Phleum pratense	Meadow Timothy	SE5
Poa compressa	Canada Bluegrass	S5
Poa pratensis ssp. pratensis	Kentucky Bluegrass	S5
Carex bebbii	Bebb's Sedge	S5
Carex brunnescens	Brownish Sedge	S5
Carex granularis	Meadow Sedge	S5
Carex hystericina	Porcupine Sedge	S5
Carex projecta	Necklace Sedge	S5
Juncus effusus	Soft Rush	S5
Juncus tenuis	Path Rush	S5
Polygonum convolvulus	Black Bindweed	SE5
Polygonum lapathifolium	Dock-leaf Smartweed	S5
Rumex crispus	Curly Dock	SE5
Chenopodium album var. album	Lamb's Quarters	SE5
Amaranthus powellii	Green Amaranth	SE5
Cerastium fontanum	Mouse-ear Chickweed	SE5
Silene vulgaris	Maiden's Tears	SE5
Barbarea vulgaris	Yellow Rocket	SE5
Brassica juncea	Chinese Mustard	SE5
Brassica nigra	Black Mustard	SE5
Lepidium campestre	Field Pepper-grass	SE5
Lepidium virginicum	Poor-man's Pepper-grass	S5
Sinapis arvensis	Corn Mustard	SE5

Scientific Name	English Name	Srank
Fragaria virginiana	Virginia Strawberry	S5
Potentilla norvegica	Norwegian Cinquefoil	S5
Potentilla recta	Sulphur Cinquefoil	SE5
Lotus corniculatus	Birds-foot Trefoil	SE5
Medicago lupulina	Black Medic	SE5
Medicago sativa ssp. falcata	Yellow Alfalfa	SE4
Melilotus alba	White Sweet Clover	SE5
Trifolium hybridum	Alsike Clover	SE5
Trifolium pratense	Red Clover	SE5
Trifolium repens	White Clover	SE5
Vicia cracca	Tufted Vetch	SE5
Oenothera biennis	Common Evening-primrose	S5
Daucus carota	Wild Carrot	SE5
Asclepias syriaca	Kansas Milkweed	S5
Echium vulgare	Common Viper's-bugloss	SE5
Leonurus cardiaca	Common Mother-wort	SE5
Linaria vulgaris	Butter-and-eggs	SE5
Verbascum thapsus	Great Mullein	SE5
Plantago lanceolata	English Plantain	SE5
Plantago major	Nipple-seed Plantain	SE5
Dipsacus fullonum	Fuller's Teasel	SE5
Achillea millefolium ssp. lanulosa	Seaside Yarrow	S5
Ambrosia artemisiifolia	Annual Ragweed	S5
Arctium lappa	Greater Burdock	SE5
Cichorium intybus	Chicory	SE5
Cirsium vulgare	Bull Thistle	SE5
Matricaria matricarioides	Pineapple-weed Chamomile	SE5
Solidago canadensis	Canada Goldenrod	S5
Sonchus oleraceus	Common Sowthistle	SE5
Taraxacum officinale	Brown-seed Dandelion	SE5
Tragopogon dubius	Meadow Goat's-beard	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)

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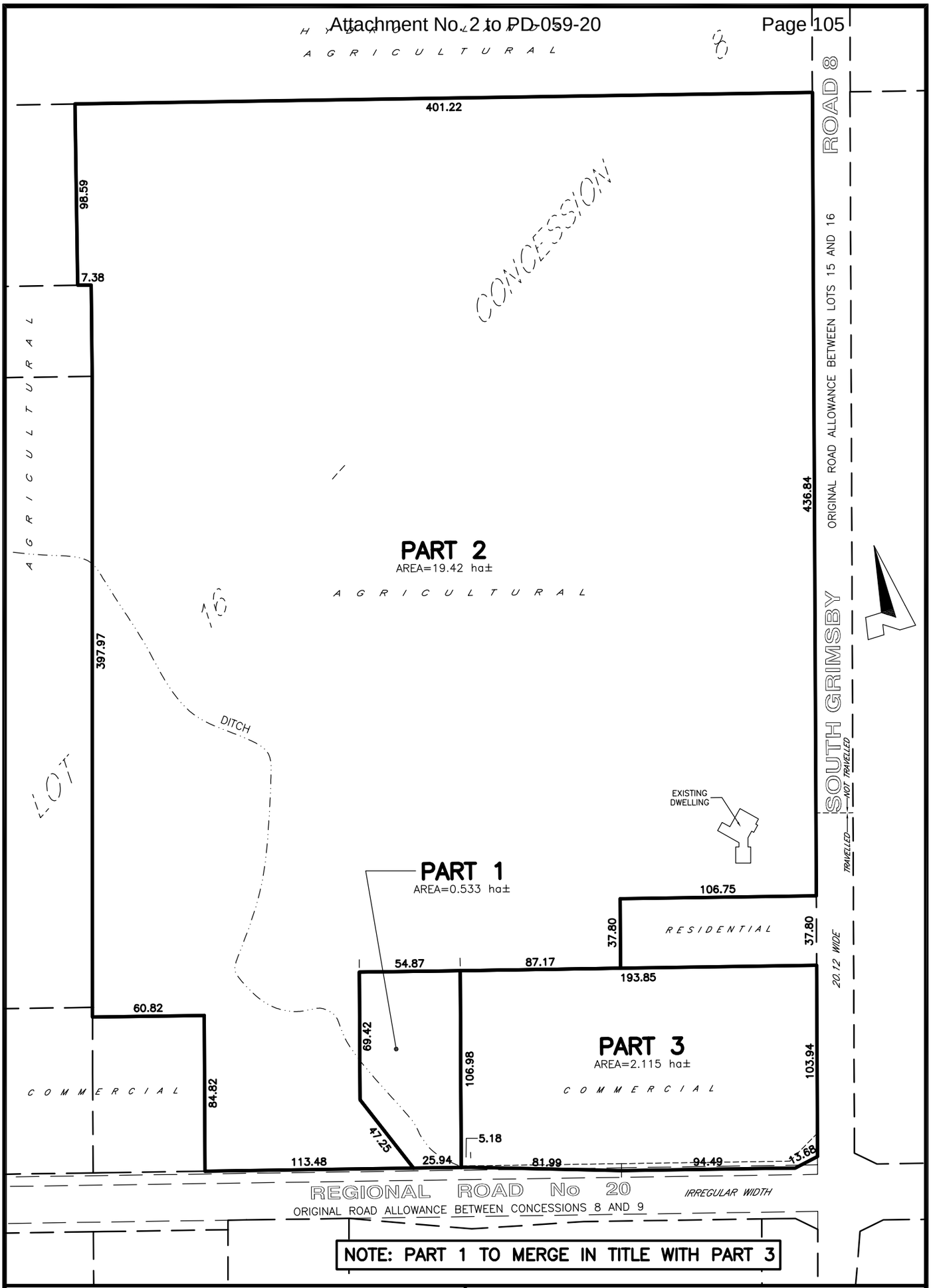
Appendix 4

Proposed Lot Addition



SKETCH

PREPARED FOR SEVERANCE APPLICATION

PART OF LOT 16, CONCESSION 8

GEOGRAPHIC TOWNSHIP OF SOUTH GRIMSBY

IN THE

TOWNSHIP OF WEST LINCOLN

REGIONAL MUNICIPALITY OF NIAGARA

SCALE 1 : 2500 (METRIC)

NOTE: THIS SKETCH IS PREPARED FROM COMPILED AND CALCULATED INFORMATION, NOT FROM AN ACTUAL SURVEY.
ALL MEASUREMENTS ARE +/− MEASUREMENTS.
DO NOT SCALE FROM THIS DRAWING.

CAUTION: THIS IS NOT A PLAN OF SURVEY AND SHALL NOT BE USED EXCEPT FOR THE PURPOSE INDICATED IN THE TITLE BLOCK.

"THIS IS NOT AN ORIGINAL COPY UNLESS EMBOSSED WITH SEAL"

DONALD G. CHAMBERS, B. Sc., O.L.S.

CHAMBERS AND ASSOCIATES SURVEYING LTD

12 THOROLD ROAD EAST
WELLAND ONTARIO
L3C 3T2

(905) 735-7841 / 735-7844
FAX (905) 735-7333
www.casl-surveying.com

DATE FEBRUARY 25, 2020 FILE No 89-455-3 (89455-3_SEV)

BEACON ENVIRONMENTAL

GUIDING SOLUTIONS IN THE NATURAL ENVIRONMENT

May 13, 2020 BEL 219140

Mr. Fred Vrugteveen
Niagara Pallet
2906 South Grimsby Road 8
Smithville, ON L0R 2A0

via email: fred@niagarapallet.ca

Re: Addendum to Environmental Impact Study Niagara Pallet, Lot Addition and Site Plan Approval, West Lincoln, Regional Municipality of Niagara

Dear Mr. Vruteveen:

Beacon Environmental Limited (Beacon) was retained by Niagara Pallet to prepare an Environmental Impact Study (EIS) (February 2020) for a Boundary Adjustment and Site Plan Amendment for a proposed expansion of the facility located at 2906 South Grimsby Road 8, Smithville, Regional Municipality of Niagara, hereinafter referred to as the subject lands. This Addendum has been prepared to provide responses to comments received from Niagara Region (*via* email from Lori Karlewicz).

The following are the Niagara Region comments in *italics* followed by Beacon's response:

> 1) *Staff support the approach and recommendations of the Headwater Drainage Feature (HDF) Assessment. Assigning "mitigation" to the HDF Assessment meets or exceeds the guidance provided in TRCA/CVC HDF Guideline document. However, staff require clarification on why the watercourse has not been identified as providing Fish Habitat. The HDFs flow directly to 20 Mile Creek (Type 1 Critical Fish Habitat), just south of the subject properties and the EIS indicates that "no perennial or seasonal fish habitat is offered by the reach(s) but allochthonous material and nutrients [are] supplied to downstream aquatic habitats". Though staff agree that these HDFs are not direct fish habitat, the EIS indicates that they do provide indirect fish habitat and therefore must be considered Type 2 or Type 3 Fish Habitat.*

The function of the HDF were assessed through the application of the TRCA/CVC HDF Guideline document and were determined to provide a contributing function for fish habitat. As defined in the HDF Guidelines a contributing function includes "*transport of allochthonous materials (detritus, insects, etc.) to downstream fish-bearing reaches provides sources of food*". The Ministry of Natural Resources and Forestry NRVIS definitions for fish habitat types for the Niagara Region are as follows: "*Type 1 is Critical indicating sensitive species and or habitat are present. Type 2 is Important indicating below potential but still have present of sensitive species and or habitat during certain times of the year. Type 3 is Marginal indicating common species may be present but no sensitive species or habitat*". The definition indicates that fish are to be present for the classification to apply. Therefore, the reaches of the HDF on the subject lands were not assigned a fish habitat type designation in the EIS. Regardless, Beacon agrees with the Regions comment that this level of function of the HDF is representative of indirect fish habitat and this function will not be limited by the proposed realignment.

2) *A buffer should be identified for the HDF's. The EIS must show that lot lines do not extend into Core Natural Heritage Features of their identified buffers.*

The reaches of the HDF to be realigned are to be contained entirely within the property located at 2930 Grimsby Road 8, which is an active agricultural property. The realigned channel is setback from the proposed lot lines with distances that range from approximately 1 m to 14 m. The lot line is closest to the realigned channel at the location of the culvert crossing under Highway 20.

As the HDF provides contributing fish habitat functions and is being realigned from an active agricultural field, where no buffer currently exists, to an active agricultural field a buffer that ranges from approximately 1 - 5 m to the feature is proposed. This buffer will be achieved along the realigned portion of the HDF through the necessary grading and sloping to create the channel and will not extend beyond. This buffer width balances the need to not limit agricultural potential but still maintain the primary function of the feature, which is to convey water flows and allochthonous material and nutrients downstream to aquatic habitats associated within Twenty Mile Creek. It is Beacon's opinion that there will be no net loss of productive capacity through the implementation of the proposed realignment consistent with policy 7.B.1.15 of the Niagara Region Official Plan.

3) *Staff request clarification regarding the culvert that currently conveys flow beneath the farm lane, at the downstream end of HDF Reach TM-1. Will a new culvert crossing be constructed with a similar function on the proposed realignment?*

As confirmed by Mr. Craig Rohe (Upper Canada Consultants) on a conference call with Region staff on May 4, 2020 – the farm lane culvert will be relocated on the realigned channel to maintain access to the agricultural lands. The new culvert will maintain the flow conveyance function of the HDF.

Conclusion

Based on the information provided in the EIS and further details included in this Addendum Letter the proposed expansion is in conformity with the Official Plans and Natural Heritage System policies of the Township of West Lincoln and the Niagara Region as well as the Province's Natural Heritage Polices under the Provincial Policy Statement. The Niagara Peninsula Conservation Authority should review any permit requirements pursuant to *Ontario Regulation 155/06* for the proposed realignment of a watercourse that is required for the proposed expansion.

Should you have any questions or points for discussion, please do not hesitate to contact the undersigned at (705) 768-2995.

Prepared by:
Beacon Environmental

Lindsey Waterworth, B.Sc.
Senior Ecologist

Reviewed by:
Beacon Environmental

Ron Huizer, B. Sc.
Principal, Senior Ecologist

UPPER CANADA CONSULTANTS
ENGINEERS / PLANNERS

Upper Canada Planning & Engineering Ltd.
3-30 Hannover Drive
St. Catharines, ON L2W 1A3
T: 905-688-9400
F: 905-688-5274

February 28, 2020 UCC FILE NO. 1363

To: Alexa Cooper
Secretary- Treasurer
Township of West Lincoln
318 Canborough Street
P.O. Box 400
Smithville, ON L0R 2A0

Re: Letter of Planning Opinion
2906 & 2930 South Grimsby Road 8, West Lincoln

On behalf of our clients Pamela, Gary and Gale Davis, Upper Canada Consultants respectfully submits this Letter of Planning Opinion pertaining to the application for lot addition between 2906 & 2930 South Grimsby Road 8 in West Lincoln.

Proposed Development

Niagara Pallet is currently expanding its operations at 2906 South Grimsby Road 8 within the Regional Road 12 Hamlet in West Lincoln. To facilitate the penultimate design of the site, additional lands are required for truck parking and stormwater management. Niagara Pallet has arranged to acquire 0.533 hectares of lands from the adjacent property owned by our clients and known municipally as 2930 South Grimsby Road 8 to facilitate this expansion.

The subject lands are delineated as Part 1 on the submitted survey sketch prepared by Chambers and Associates (dated February 25, 2020) that is provided as **Appendix I** to this letter. The lot geometry is not squared as the retention of an existing agricultural access along Highway 20 is desired to be retained by the owner. An existing on site drainage feature is to be realigned to stay with the remnant parcel to ensure no fragmentation of the feature and the developability of Part 1.

Future Applications

To facilitate the planned expansion of Niagara Pallet, a zoning by-law amendment and site plan approval will be required for Part 1. The acquisition of the land is the first step towards making those applications. It is Niagara Pallets intention to apply for the site plan approval and zoning amendment concurrently following the approval of this application.

Du to the length of time typically required to complete the Zoning and Site Plan approval it is not recommended that the approval of the Consent be conditional on the of approval for the Site Plan and Zoning Amendment. A condition requiring that the applications be applied for and deemed complete is recommended as a reasonable alternative to ensure that our client are able to complete the transaction with Niagara pallet in a timely manner and without a risk of lapsing.

Provincial Policy Statement 2014

The subject lands are located within a Settlement Area (Regional Road 12 Hamlet) in the Township of West Lincoln.

As directed by Section 1.1.3 of the Provincial Policy Statement (PPS), Settlement Areas are to be a focus of growth in Ontario communities. Section 1.1.4 of the PPS outlines the function of Rural Areas in Ontario, and includes rural settlement areas. Specifically the policies of Section 1.1.4 e) promote diversification of the economic base and employment opportunities through the provision of goods and services. Section 1.1.4.2 and 1.1.4.3 cumulatively direct development to rural settlement areas and require that new developments have consideration of rural characteristics, scale and the appropriateness of service levels.

Consistent with the above noted policies, the subject lands propose a lot addition within a rural settlement area to facilitate a minor expansion of an existing commercial use that supports the surrounding community. The lot addition therefore is considered to facilitate a form of development that is consistent with the policies of the PPS for settlement areas, including rural settlement areas.

Growth Plan for the Greater Golden Horseshoe 2019

As provided by the Growth Plan Policy though 2.2.9, municipalities are encouraged to plan for a variety of economic opportunities within rural settlement areas. As the Hamlet is the designated location for growth and development in the rural area of the municipality, the lot addition to facilitate the expansion of an existing commercial use is considered in conformity with the policy direction of the Growth Plan.

Niagara Region Official Plan

The subject lands are designated as “Hamlet” in the Niagara Region Official Plan.

Policy 4.H.1.1 of the Plan cites that “Hamlets are settlement areas that play an important housing, social, cultural, and economic role for the people within the hamlet community and in the surrounding Agricultural and Rural Areas. Hamlets shall provide for the range of housing, social, cultural and economic land uses within their boundaries.”

As proposed, the subject lands will be added to an existing commercial development that services the agricultural, commercial and industrial community in Niagara. The severance of the lands creates a purposeful function for them within a settlement area. The balance of the lands will remain in Agricultural production.

Through pre-consultation and Environmental Impact Study (EIS) was required by the Regional Municipality of Niagara to evaluate the potential impacts of realigning a headwater drainage feature that crosses the subject lands and eventually drains into Twenty Mile Creek. Based on the EIS completed by Beacon Environmental Ltd., it is concluded that the feature is not fish habitat and is appropriate to realign, subject to mitigation measures. Please see the completed EIS for more detailed information.

Township Official Plan and Zoning By-law

Official Plan

The subject lands are designated as "Hamlet Settlement Area" in the Township's Official Plan.

In accordance with Policy 7.2.1 of the Township Official Plan, the Hamlet Settlement Designation will be used predominantly for single detached development and other uses such as institutional, commercial or industrial that are necessary to serve the hamlet and the surrounding agricultural area. As proposed, Part 1 will be merged with the Niagara Pallet property and zoned to facilitate the expansion of an existing commercial use which currently serves the Hamlet and surrounding area.

Zoning By-law 2017-70

Part 1 is currently located wholly thin the Regional Road 12 Hamlet and is zoned Development (D) on Map B4 of Township Zoning By-law 2017-17. The remnant portion of 2930 South Grimsby Road 8 within the Hamlet will continue to be zoned "D", and the portion outside the Hamlet is zoned Agricultural (A).

The Niagara Pallet site at 2906 South Grimsby Road 8 is zoned as Service Commercial (C3). If approved, Part 1 will be subject to a future zoning amendment to extend the C3 commercial provisions and facilitate the planned expansion of Niagara Pallet. The expansion of an existing commercial use in a Hamlet is in alignment with policies of the Official Plan.

As a result of the lot addition, no lot zoning deficiencies will be created for either the retained or consolidated parcel.

Relation to 4981 Highway 20

Niagara Pallet is currently using a site at 4910 Highway 20 for the temporary storage of pallets while construction on 2906 Grimsby Road 8 takes place. This temporary storage is occurring on lands designated and zoned agricultural and is subject to a temporary use Zoning By-law Amendment (By-law 2020-16) that is valid until 2022.

Through the approval of By-law 2020-16, it is required that Niagara Pallet complete their expansion in the Regional Road 12 Hamlet so that the temporary use can cease within the set timeline and that the property be brought into alignment with applicable regional and local land use policies.

Approval of the proposed lot addition will allow for the development of the South Grimsby Road 8 site to move forward and for the eventual removal of materials and operations from 4981 Highway 20.

Planning Opinion

The proposed lot addition will facilitate an expansion of one of the Townships largest employers in a location that is appropriate for development (i.e. hamlet). The remnant parcel will continue to be used for agricultural production and the secondary farm access will be provided from Highway 20. Ensuring this access is retained is the reason for the "hitched" geometry of the Part 1.

The lot adjustment will not bring either lot out of conformity with the existing provisions, or those proposed for the Niagara Pallet site (i.e. C3)

An Environmental Impact Study was completed by Beacon Environmental Ltd. to evaluate the realignment of the drainage feature that crosses the subject lands. Based on the analysis completed, there will be no negative impact on the feature if realigned. This work will be subject to an NPCA Work Permit.

Based on the analysis provided herein this letter and the conclusions of the EIS completed by Beacon Environmental Limited, it is my professional planning opinion that the submitted application is appropriate and in conformity with Provincial, Regional and local land use policies and should be approved.

Respectfully submitted,

Craig A. Rohe, M.Pl., MCIP, RPP
Senior Planner
Upper Canada Consultants

Appendix I – Survey Sketch prepared by Chambers and Associates (dated February 25, 2020)

From: Lyle Killins
To: Alexa Cooper
Date: April 17, 2020 11:43:58 AM

Hi Alexa
The application as proposed appears sufficient to fulfill Part 8, Ontario Building Code requirement.
Thus, no objection to the application as presented.
We trust the preceding serves as required ,however, should additional information and/or clarification
be required please contact the undersigned at 905-957-7541.
Regards.
Lyle Killins

From: Jessica Abrahamse
To: Alexa Cooper
Cc: Boudens, Adam; Cara Lampman
Date: April 28, 2020 2:42:17 PM

Hi Alexa,

I understand that the applicant is now planning to apply for a permit from the NPCA to re-align the watercourse prior to applying for the consent. As such, I have staff comments as to what the NPCA will require:

There are no issues in principle with the proposed realignment as the channels provide only indirect fish habitat based on the flow contribution to downstream habitat.

Items and/or conditions for the permit should include:

- Engineered drawings of the realigned channel with representative cross-section to ensure the channel capacity has been maintained to convey equivalent flow volumes
- A re-seeding plan to ensure that channels have suitable vegetation to control flows at re-alignment discharge rates
- A sediment and erosion control plan to minimize the erosion to downstream habitat.
- A minimum 5 metre setback from the re-aligned channel to the limit of the future development area to mitigate encroachment into the channel buffer. This could be accomplished with a small fence or tree/shrub plantings. It doesn't have to be extensive but should clearly delineate the limits of the expansion area

Please let me know if you have any questions.

With Best Regards,
Jessica Abrahamse M.E.S.
Watershed Planner

250 Thorold Road West, 3rd Floor
Welland, On
L3C 3W2
(905) 788-3135 Ext. 235
jabrahamse@npca.ca
www.npca.ca
NPCA Mapping Tool

Niagara Region

Planning and Development Services
1815 Sir Isaac Brock Way, Thorold, ON L2V 4T7
905-980-6000 Toll-free:1-800-263-7215

Via Email Only

May 15, 2020

File No.: D.06.12.CS-20-0022

Alexa Cooper
Secretary-Treasurer, Committee of Adjustment
Township of West Lincoln
318 Canborough Street, PO Box 400
Smithville, ON L0R 2A0

Dear Ms. Cooper:

Re: Regional and Provincial Comments
Proposed Minor Boundary Adjustment
Township File No.: B02/2020WL
Owner: Pamela Teresa, Gary Raymond & Gale Davis
Agent: Craig Rohe (Upper Canada Consultants)
Address: 2906 & 2930 South Grimsby Road 8 (Niagara Pallets)
Township of West Lincoln

Regional Planning and Development Services staff has reviewed the above-noted consent application, which proposes a minor boundary adjustment to 2906 and 2930 South Grimsby Road 8. The boundary adjustment proposes to sever ±5,330 square metres of land from 2930 South Grimsby Road 8 (Part 1), and merge it in title with 2906 South Grimsby Road 8 (Part 3). This boundary adjustment will assist in facilitating build-out of an approved site plan for 2906 South Grimsby Road 8. A pre-consultation meeting for this proposal was held on February 21, 2019 at the Township of West Lincoln with the agent, owner of 2906 South Grimsby Road 8, and staff from the Township and Region in attendance. The following comments are provided from a Provincial and Regional perspective to assist the Township in considering this application.

Provincial and Regional Policies

The subject lands (Parts 1 and 3) are located within a settlement area according to the Provincial Policy Statement (PPS), and are designated Hamlet (Regional Road 12) in the Regional Official Plan (ROP). Hamlets are areas designated in local Official Plans for future development of a low-density nature without the provision of municipal water

and sewer services. Accordingly, development in the Hamlet area must be on lots that have an adequate water supply and are suitable for private waste disposal systems.

Niagara Pallet Operations

According to the Letter of Planning Opinion (dated February 28, 2020, prepared by Craig Rohe (Upper Canada Consultants)), the boundary adjustment is proposed "to facilitate the penultimate design of the site, [as] additional lands are required for truck parking and stormwater management." In order to facilitate the expansion and use of the business (Niagara Pallet) on 2906 South Grimsby Road 8, Regional staff understands that a boundary adjustment, zoning by-law amendment and site plan approval is required.

The expansion of Niagara Pallet at 2906 South Grimsby Road 8 is associated with a previously approved temporary use By-law (By-law No. 2020-16) for 4981 Regional Road 20. The lands along Regional Road 20 are currently utilized for temporary storage of pallets associated with the business, and the Township has approved continued operation/storage on that site until February 28, 2022. This temporary use By-law was approved with the understanding that a 2-year time period would be sufficient to complete all planning approvals and construction works required to expand Niagara Pallet at 2906 South Grimsby Road 8, including the subject boundary adjustment.

Boundary Adjustment

The proposed boundary adjustment, if approved, would result in increasing the size of 2906 South Grimsby Road to 2.65 hectares in area; and reducing the size of 2390 South Grimsby Road 8 to 19.42 hectares in area (from 19.95 hectares). Regional staff are satisfied that the boundary adjustment is minor and in alignment with Provincial and Regional policies, due to the amount of land to be added to 2906 South Grimsby Road 8, size of the existing Niagara Pallet Operation, designation of the lands, and consideration for realignment of the watercourse.

Natural Heritage

The properties located at 2906 and 2930 South Grimsby Road 8 contain and are adjacent to portions of the Region's Core Natural Heritage System (CNHS); specifically, the CNHS consists of Type 2 (Important) Fish Habitat. The Environmental Impact Study (EIS) and EIS Addendum submitted in support of the development application confirms this assessment.

Regional Environmental Planning staff have reviewed the EIS prepared by Beacon Environmental, dated February 2020, to verify that the findings, proposed mitigation measures and recommendations are sufficient to satisfy Regional and Provincial environmental policies. In addition, staff have reviewed the EIS Addendum submitted on May 13, 2020, which addresses preliminary concerns with the EIS.

Aquatic Habitat

The Ministry of Natural Resources and Forestry (MNRF) has classified the tributary of Twenty Mile Creek as Important (Type 2) Fish Habitat. Staff support the approach and recommendations of the Headwater Drainage Feature (HDF) Assessment. Assigning "mitigation" to the HDF Assessment meets or exceeds the guidance provided in TRCA/CVC HDF Guideline document. The EIS Addendum indicates that the HDFs provide indirect Fish Habitat and that this function will not be limited by the proposed development or realignment.

The EIS Addendum states that the realigned channel is set back from the proposed lot lines with distances that range from 1 metre (m) to 14 m. The lot line is closest to the realigned channel at the location of the culvert crossing under Highway 20. A buffer of 1 m to 5 m is proposed along the realigned portion of the HDF. The EIS Addendum further clarifies that the farm lane culvert will be relocated on the realigned channel to maintain access to the agricultural lands, and maintain flow conveyance function of the HDF.

Staff are satisfied that the proposed HDF realignment, proposed setback from lot lines and proposed buffer along the realignment are sufficient to ensure impacts to Type 2 Fish Habitat are mitigated, and that the primary function of the watercourse will be maintained.

Natural Heritage Review Summary

Regional Environmental Planning staff are satisfied that the EIS and EIS Addendum demonstrate that the development can be accommodated without negative impact to the natural features, provided that the mitigation measures outlined in Section 5.1 of the EIS are implemented, and provided that all required authorizations are received from applicable regulatory agencies. Recommended conditions of approval are included below.

Please note that the Niagara Peninsula Conservation Authority (NPCA) continues to be responsible for the review and comment on planning applications related to their regulated features. As such, NPCA should continue to be consulted with respect to their comments and permit requirements pursuant to Ontario Regulation 155/06.

Private Servicing

The Township of West Lincoln is responsible for their own private septic system review. As such, the Committee should look to the Township's comments with respect to the private septic system requirements.

Future Site Plan Approval

Regional staff understand that the expansion of the business at 2906 South Grimsby Road 8 will require future site plan approval. As mentioned at the pre-consultation meeting on February 21, 2019, items to be considered at the site plan stage include archaeological potential, stormwater management and site grading.

Should the expansion of the stormwater management pond result in intensive or extensive ground disturbance, as defined by the Ministry of Heritage, Sport, Tourism and Culture Industries, an archaeological assessment may be required. At site plan, Environmental Planning staff will recommend that a Grading Plan be provided, which demonstrates that existing overland flow patterns are maintained and that no grading within Fish Habitat and buffers will occur, with the exception of the realigned watercourse and its buffer. Regional staff request that sufficient information be submitted with the site plan to address these requirements identified at the pre-consultation meeting comments.

Regional Road Allowance

The subject property is situated along Regional Road 20 (Highway 20), and this section of road has a substandard road allowance. The designated road allowance width is 30.5 metres. Therefore, in accordance with the approved Regional Official Plan, the following widening is to be granted gratuitously to the Region:

- A 0.74 metre road allowance across the Regional Road 20 (Highway 20) frontage of the subject property (Part 1 on the submitted survey sketch). Please refer to Appendix 1.

This widening requirement is consistent with the previous widening request for 2906 South Grimsby Road 8 and will satisfy the Regional Official Plan requirement of 17.5 metres from the centreline of Regional Road 20. The actual width of the required widening must be confirmed by an Ontario Land Surveyor as this is only an approximation of the requirement.

The requested widening is to be conveyed free and clear of any mortgages, liens or other encumbrances, and is to be described by Reference Plan. The widening portion of the Plan will be the responsibility of the owner to order. The cost of providing this plan will be the full responsibility of the applicant. The applicant will arrange for the land surveyor to submit the preliminary undeposited survey plan along with all related documents to Regional Surveys staff for approval. Regional Surveys staff will advise the land surveyor of any required revisions to the plan. Once the plan is deposited and the transfer registered, the Region will clear the applicable condition.

<u>Regional Contact Information:</u>

Norma Price, Law Clerk, 905-980-6000 ext. 3339.

E-mail norma.price@niagararegion.ca
(Inquiries -specific to the transfer of property to the Region)

Normans Taurins, Manager, Surveys & Property Information, 905-980-6000 ext. 3325.
E-mail: normans.taurins@niagararegion.ca

Regional Permit Requirements

Prior to any construction taking place within the Regional Road Allowance, the applicant is required to obtain the necessary Regional Construction Encroachment and/or Entrance Permits from the Transportation Services Division, Public Works Department. Regional Road Permit applications can be made online through the Region's website using the following link:
http://niagararegion.ca/living/roads/permits/default.aspx

Protection of Survey Evidence

Survey evidence adjacent to Regional Road allowances is not to be damaged or removed during the development of the property.

Conclusion

Regional Planning and Development Services staff does not object to the consent application from a Provincial or Regional perspective, subject to the satisfaction of any local requirements and the following conditions:

1. That Part 1 merge in title with Part 3, municipally known as 2906 South Grimsby Road 8.
2. That a Niagara Peninsula Conservation Authority Work Permit for the creek realignment be provided to Regional Planning and Development Services.
3. That a Restoration Planting Plan be prepared and submitted to Regional Planning and Development Services for review and approval, to identify and illustrate the location of additional native trees, shrubs and/or groundcover to be planted within the Fish Habitat buffer, as appropriate.
4. That the owner submit a signed Legal Undertaking to Regional Planning and Development Services wherein the owner agrees to implement the mitigation measures and recommendations found in Section 5.1 of the EIS (prepared by Beacon Environmental, dated February 2020), including but not limited to:
    a. That the channel for the realigned portion of the Headwater Drainage Features will be designed to replicate the seasonal flow conveyance of the existing features.
    b. That detailed sedimentation and erosion control plans be prepared for review and approval by the Region. All sediment and erosion control measures shall be maintained in good condition for the duration of

construction until all disturbed surfaces have been stabilized. Muddy water shall not be allowed to leave the site.

c. That clearing/grading of the meadow habitat should not be undertaken from mid-April through to the end of August, to avoid impacts to nesting birds.
d. That no construction materials or equipment is to be located, even on a temporary basis, within the buffers of Fish Habitat.
e. Implementation of the approved Restoration Planting Plan.

5. That the owner dedicate a 0.74 metre road widening to the Regional Municipality of Niagara along the frontage of Regional Road 20 (Highway 20), to the satisfaction of the Niagara Region Planning & Development Services Department. All costs for providing the necessary survey plan and all related documents are the responsibility of the applicant.

If you have any questions or wish to discuss these comments, please contact the undersigned at extension 3352 or Lola Emberson, MCIP, RPP, Senior Development Planner, at extension 3518.

Please send notice of the Committee's decision on this application.

Best regards,

Aimee Alderman, MCIP, RPP
Development Planner

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Appendix 1

2906-2930 South Grimsby Road 8 – Road Widening Requirement