Headwater Drainage Feature Assessment

Tullamore Secondary Plan Area

Town of Caledon

Prepared for:
Riepma Consultants, Inc.

Prepared by:
Azimuth Environmental
Consulting, Inc.

March 2024

AEC 22-065

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Assessments & Approvals

March 20, 2024 AEC 22-065

Clarence Riepma
220 Kempenfelt Dr.
Barrie, Ontario,
L4M 1C4

Re: **Headwater Drainage Feature Assessment, Tullamore Secondary Plan Area, Town of Caledon**

Dear Mr. Riepma,

Azimuth Environmental Consulting, Inc. (Azimuth) was retained by Riepma Consultants, Inc. to complete a Headwater Drainage Feature (HDF) assessment for the property described above. It is our understanding that the HDF assessment is required to assist with approvals for a commercial site plan development.

A total of 10 HDFs were assessed during the field investigations. Five HDFs were observed to have water present during all three field investigation. Therefore, based on the CVC/TRCA HDF Guidelines (2014), these five HDFs are considered to have 'Important' hydrological functions and are to have a management recommendation of 'Protection'. The remaining five drainage features were all assigned a management recommendation of 'Mitigation' as these features had either 'Valued' or 'Contributing' hydrology, but none had fish habitat, terrestrial habitat, or riparian vegetation that would be characterize them as 'Conservation' or 'Protection'.

Should you have any questions or require additional information please do not hesitate to contact the undersigned.

Regards,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Roger Holmes, M.Sc.,
Senior Aquatic Ecologist/Environmental Site Inspector

Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 INTRODUCTION

Azimuth Environmental Consulting, Inc. (Azimuth) was retained by Riepma Consultants, Inc. to complete a Headwater Drainage Feature (HDF) assessment for the Tullamore Secondary Plan Area (Airport Road/Mayfield Road) in the Town of Caledon. It is our understanding that this HDF assessment was required to assist with approvals for a commercial site plan development.

1.1 Purpose of Headwater Drainage Feature Assessment

The purpose of this HDF assessment was to identify the function and value of drainage features within the larger context of the watershed. Concerns over HDFs have been raised by Conservation Authorities (CAs) due to rural and urban development/activities that can degrade or eliminate HDFs. Individual and cumulative impacts to HDFs can result in changes to water quality and quantity, recharge/infiltration, and the overall health of the local HDFs and downstream habitats of the larger watershed (Dodds and Oaks, 2008). HDFs are poorly understood and are typically underestimated due to their small size, which makes them vulnerable to impacts resulting from urban and rural development (Greenwood et al., 2012; Miltner and Rankin, 1998). Therefore, a HDF assessment is intended to understand the type and function of individual drainage features and is required to assist with approvals for a commercial-industrial development.

2.0 STUDY APPROACH AND METHODOLOGY

The following HDF assessment uses the Evaluation, Classification and Management of Headwater Drainage Features Guidelines (2014), which were developed by the Credit Valley Conservation (CVC) Authority and the Toronto and Region Conservation Authority (TRCA). These guidelines were developed out of necessity to understand the form and function of HDF's and to assist with maintaining healthy watersheds during the development of lands. The guidelines are broken down into three sections (evaluation, classification, and management) to give practitioners an understanding of the importance of individual HDFs (e.g., flow storage and conveyance, fish habitat, amphibian habitat, sediment and nutrient regulation, etc.). The following was completed to determine the form and function of the HDFs on the assessed property:

- Desktop review of drainage locations on the property to determine the extent of hydrological features and sampling effort required to assess all drainage segments as per the CVC/TRCA guidelines;
- Early spring site visit to determine flow conditions and feature type during freshet, and to identify the scope for future field work;

- Mid/late spring field visit to determine flow conditions, feature type, and fish presence during high flow conditions; and,
- Mid/late summer field visit to determine flow conditions, feature type, and fish permanence during low flow conditions.

3.0 EXISTING CONDITIONS

A total of 10 HDFs were assessed during the field investigations. Site visits to assess the HDFs were completed on March 22, 2022 (early spring visit), April 29, 2022 (mid/late spring visit), and August 11, 2022 (mid/late summer visit). A summary of the findings for each individual classification section is presented below. Representative photographs of each individual HDF is provided in **Appendix A**, and the HDF Summary Data Sheet is provided in **Appendix B**.

3.1 Hydrology Classification

During the early spring field survey, water was present at all 10 drainage features, with surface flow noted in all the HDFs assessed. During the mid/late spring visit, a mix of flow conditions were observed, ranging from HDFs that were dry (SC-H2-Seg 2) to HDFs that still had substantial surface flow (SC-H1-Seg 1). During the mid/late summer visit, all 10 drainage features were either dry or had standing water present. No visible flow was observed in any drainage feature during the mid/late summer visit, but standing water was present in multiple features (SC-H1-Seg 1, SC-H1-Seg 3, SC-H3-Seg 1, and SC-H3-Seg 2). Due to the recent development upslope of SC-H3-Seg 1 and SC-H3-Seg 2, the standing water in these features was assumed to be a result of the land/drainage alterations (parking lot drainage), and that water being present was not anticipated to be a result of natural hydrological conditions. The standing water observed during the late summer site visit was shallow had not flow, and was contained within isolated scoured segments of the drainage channel.

3.2 Riparian Classification

The riparian classifications remained the same during the three site visits. Riparian vegetation was marginal/poor throughout a majority of the drainage features. The actively cropped farm field to the east of SC-H1-Seg 1, SC-H1-Seg 2, and SC-H1-Seg 3 limited the overall function/width of riparian and feature vegetation. Development activities on the property also altered/minimized the extent of riparian vegetation along a majority of the other features.

3.3 Fish and Fish Habitat Classification

No evidence of direct fish habitat was observed throughout the assessed property and associated drainage features. The Mayfield Road culvert at the downstream (south) end of the assessed property (south of SC-H1-Seg 1) may function as seasonal direct fish habitat, as the culvert may serve as a refuge pool for small bodied fish, but no direct fish habitat functions were noted on the property. All of the features were dry or had shallow (<5cm) standing water present during the late spring field visit. No refuge pools were noted in any of the assessed HDFs that could host fish year round, and no fish were observed during any of the site visits. Therefore, a majority of the drainage features were characterized as indirect fish habitat. Two drainage features (SC-H1-Seg 6 and SC-H2-Seg 2) were characterized as 'not fish habitat' as defined features were not observed at these HDFs, and any overland/contributing flows would be expected to be minimal/non-existent for a majority of the year.

3.4 Terrestrial Habitat Classification

All terrestrial habitats in proximity to the drainage features were classified as having a limited or contributing function. Overall, terrestrial habitat on the property was limited to a few small hedgerows and narrow treed corridors, with limited function as movement corridors. Development on the property and nearby agricultural activity has limited the extent of natural terrestrial habitat along a majority of the drainage features. In addition, the presence of existing urban development, commercial development, and agricultural fields surrounding the assessed property limits the overall function in regards to terrestrial habitat and movement corridors.

4.0 MANAGEMENT RECOMMENDATIONS

HDF management recommendations are summarized in **Table 1** below based on the field surveys completed. All drainage features in the study area are shown on **Figure 2** with their management recommendations. The HDF management recommendations are based on the CVC/TRCA HDF Guidelines (2014) and the CVC/TRCA flow chart which provides direction on management options (flow chart provided in **Figure 3** below).

Table 1. Tullamore Headwater Drainage Feature Assessment Summary

HDF Segment Code	Step 1		Step 2	Step 3	Step 4	Management Recommendation
	Hydrology	Modifiers	Riparian	Fish and Fish Habitat	Terrestrial Habitat	
SC-H1-Seg 1	Important	-	Important	Valued	Contributing	Protection
SC-H1-Seg 2	Valued	Agriculture	Important	Contributing	Contributing	Protection
SC-H1-Seg 3	Important	Agriculture	Important	Contributing	Contributing	Protection
SC-H1-Seg 4	Valued	Development	Limited	Contributing	Limited	Mitigation
SC-H1-Seg 5	Valued	Development	Limited	Contributing	Limited	Mitigation
SC-H1-Seg 6	Contributing	-	Limited	Contributing	Contributing	Mitigation
SC-H2-Seg 1	Contributing	Development	Limited	N/A	Limited	Mitigation
SC-H2-Seg 2	Contributing	Development	Limited	N/A	Limited	Mitigation
SC-H3-Seg 1	Valued	Development	Valued	Contributing	Limited	Mitigation
SC-H3-Seg 2	Valued	Development	Valued	Contributing	Limited	Mitigation

The hydrology of SC-H3-Seg 1 and SC-H3-Seg 2 has been altered from recent development in the area, which appears to have infilled a portion of the drainage feature to the west of the assessed area where a parking lot is located. Drainage from the parking lot area appears to flow into both of these drainage features, although a direct source of the upstream flows could not be found. Regardless, both of these features were wet and/or had flowing water during all three field investigations, most notably during the late summer visit. Therefore, based on the CVC/TRCA HDF Guidelines (2014), they are considered to have 'Important' hydrological functions and are to have a management recommendation of 'Protection'.

Similarly, SC-H1-Seg 3 also had water present during all three field investigations, and is therefore considered to have 'Important' hydrological functions and a management recommendation of 'Protection'. Downstream of SC-H1-Seg 3, SC-H1-Seg 2 was dry during the late summer site visit and was originally given a management recommendation of 'Conservation'. However, based on the CVC/TRCA HDF Guidelines (2014), in the event that a lower level of protection is identified for a segment downstream of a segment with a higher level of protection, the more conservative approach shall be adopted for both segments and the downstream segment should be reclassified to match the upstream

segment. Therefore, the management recommendation for SC-H1-Seg 2 was changed to 'Protection' as well, similar to SC-H1-Seg 3.

For the remaining five drainage features, they were all assigned a management recommendation of 'Mitigation'. All of these features had either 'Valued' or 'Contributing' hydrology, but had no fish habitat, terrestrial habitat, or riparian vegetation that would be characterize them as 'Conservation' or 'Protection'.

Each management recommendation in the CVC/TRCA HDF Guidelines (2014) has a set development criteria for HDFs. For reference, these development criteria are as follows:

Protection – Important Functions: e.g. swamps with amphibian breeding habitat; perennial headwater drainage features; seeps and springs; SAR habitat; permanent fish habitat with woody riparian cover.

- Protect and/or enhance the existing feature and its riparian zone corridor, and groundwater discharge or wetland in-situ;
- Maintain hydroperiod;
- Incorporate shallow groundwater and base flow protection techniques such as infiltration treatment;
- Use natural channel design techniques or wetland design to restore and enhance existing habitat features, if necessary; realignment not generally permitted;
- Design and locate the stormwater management system (e.g. extended detention outfalls) are to be designed and located to avoid impacts (i.e. sediment, temperature) to the feature.

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

- Maintain, relocate, and/or enhance drainage feature and its riparian zone corridor;
- If catchment drainage has been previously removed or will be removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage), as feasible;
- Maintain or replace on-site flows using mitigation measures and/or wetland creation, if necessary;
- Maintain or replace external flows,
- Use natural channel design techniques to maintain or enhance overall productivity of the reach; and,
- Drainage feature must connect to downstream.

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

- Replicate or enhance functions through enhanced lot level conveyance measures, such as well-vegetated swales (herbaceous, shrub and tree material) to mimic online wet vegetation pockets, or replicate through constructed wetland features connected to downstream;
- Replicate on-site flow and outlet flows at the top end of system to maintain feature functions with vegetated swales, bioswales, etc. If catchment drainage has been previously removed due to diversion of stormwater flows, restore lost functions through enhanced lot level controls (i.e. restore original catchment using clean roof drainage); and,
- Replicate functions by lot level conveyance measures (e.g. vegetated swales) connected to the natural heritage system, as feasible and/or Low Impact Development (LID) stormwater options (refer to Conservation Authority Water Management Guidelines for details).

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

- Maintain overall water balance by providing mitigation measures to infiltrate clean stormwater, unless the area qualifies as an Area of High Aquifer Vulnerability under the Oak Ridges Moraine Conservation Plan (ORMCP) or Significant Recharge Areas under the Source Water Protection Act. These areas will be subject to specific policies under their respective legislation; and,
- Terrestrial features may need to be assessed separately through an Environmental Impact Study to determine whether there are other terrestrial functions associated with them

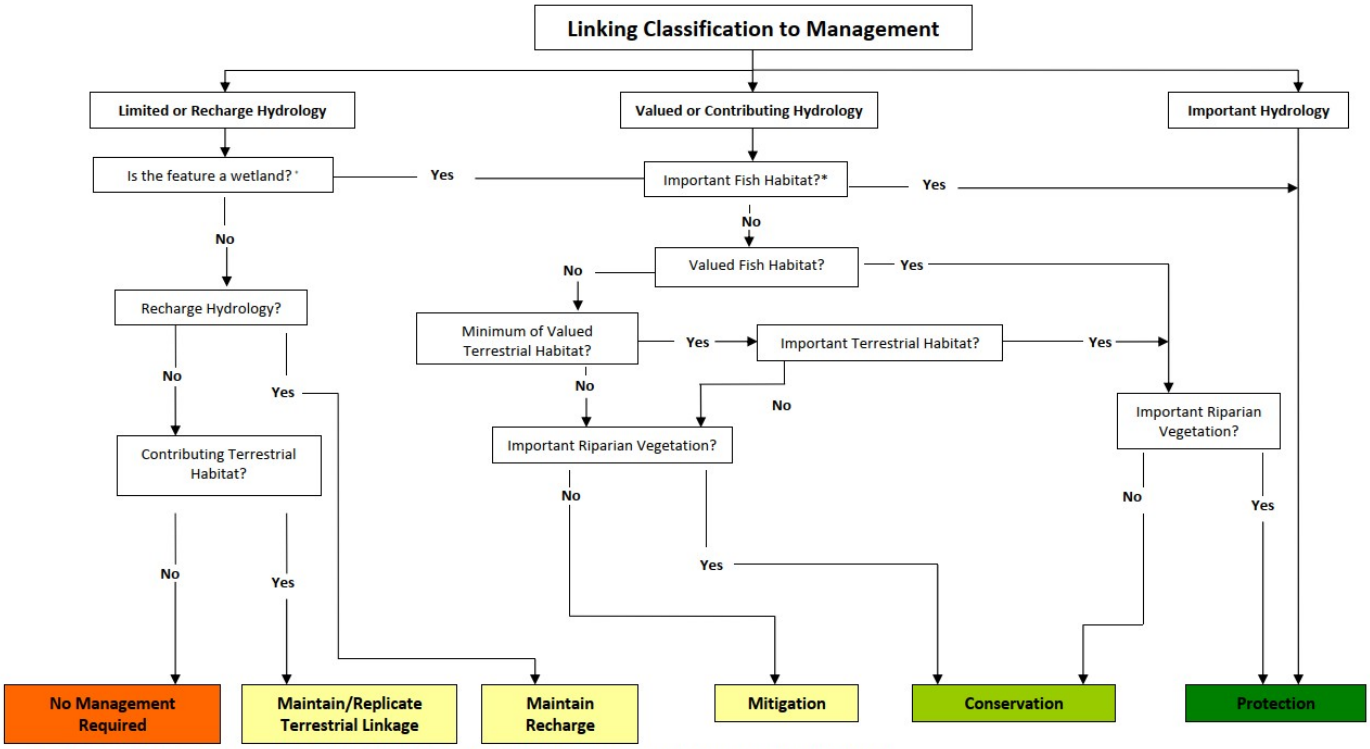
Maintain or Replicate Terrestrial Linkage – Terrestrial Functions: e.g. features with no flow with woody riparian vegetation and connects two other natural features identified for protection.

- Maintain the corridor between the other features through in-situ protection or if the other features require protection, replicate and enhance the corridor elsewhere; and,
- If the feature is wider than 20 m, it may need to be assessed separately through an Environmental Impact Study to determine whether there are other terrestrial functions associated with it.

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

- The feature that was identified during desktop pre-screening has been field verified to confirm that no feature and/or functions associated with headwater drainage features are present on the ground and/or there is no connection downstream. These features are generally characterized by lack of flow, evidence of cultivation, furrowing, presence of a seasonal crop, and lack of natural vegetation. No management recommendations required.

Figure 3: Management Recommendations Flow Chart from CVC/TRCA HDF Guidelines



*Other Conservation Authority policies or other legislation with respect to wetlands, watercourses and/or species at risk need to be assessed in the context of this key.
+Note that headwater wetlands are considered to be HDFs in the context of this guideline.

Figure 2: Flow chart providing direction on management options

Source: CVC/TRCA HDF Guidelines (2014)

5.0 CONCLUSIONS

Of the 10 HDFs that were assessed during the field investigations, three assigned a management recommendation of 'Protection' as per the CVC/TRCA HDF Guidelines (2014). The remaining seven drainage features were all assigned a management recommendation of 'Mitigation' as these features had either 'Valued' or 'Contributing' hydrology, but none had fish habitat, terrestrial habitat, or riparian vegetation that would be characterize them as 'Conservation' or 'Protection'.

Overall, it should be noted that previous development activities on the property have altered the form and function of many HDFs assessed in this report. The CVC/TRCA HDF Guidelines (2014) states that "an HDF has been altered and/or eliminated without a permit under a conservation authority's Section 28 Regulation, a "No Management Required" category will not be assigned, and restoration of the HDF may be required." The HDF assessment presented in this report assessed the drainage features based on their current state during the field investigations. The timing and extent of the previous development activities on the property are unknown, and any further development in proximity to these HDFs may alter site characteristics presented in this report.

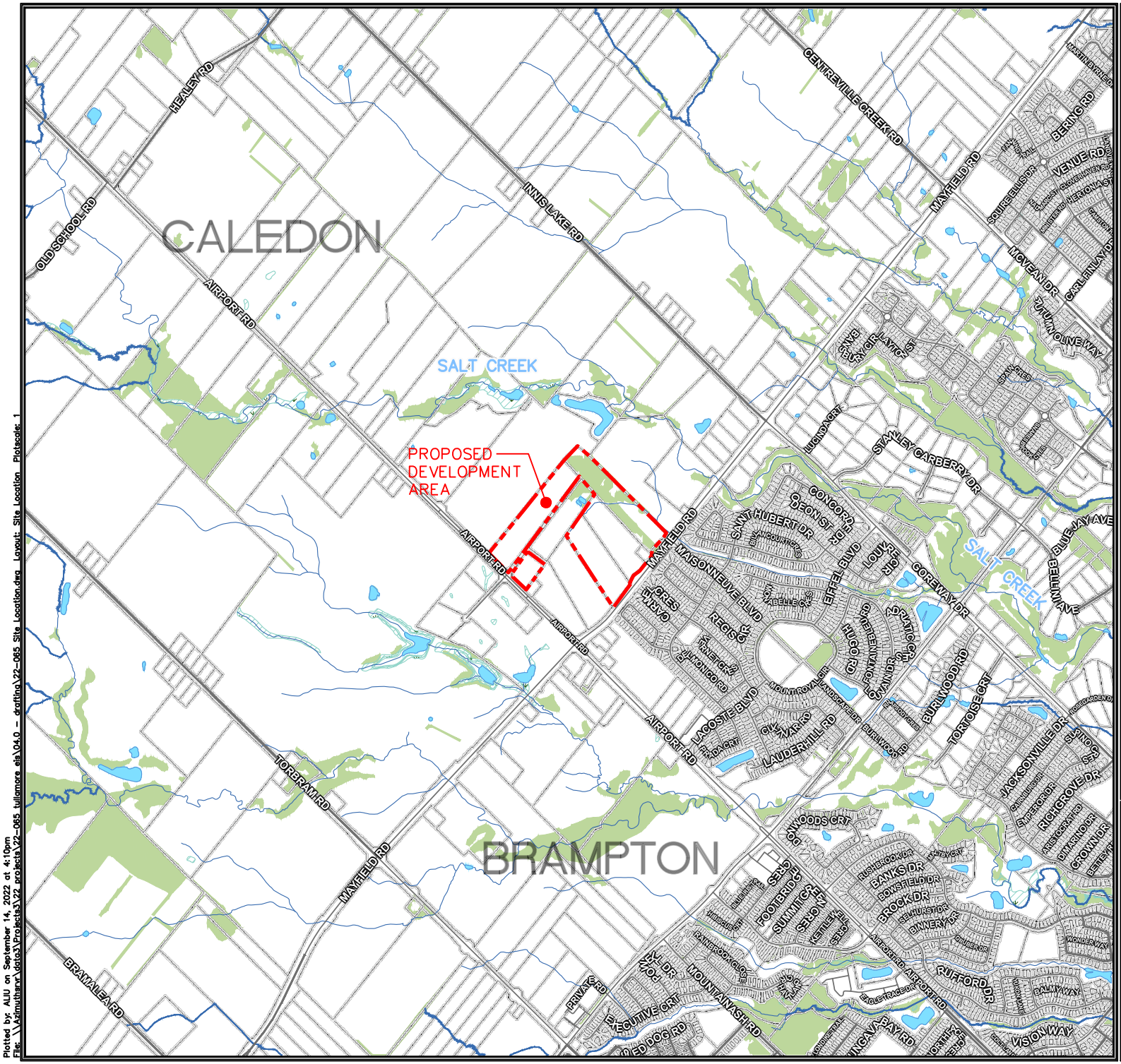
6.0 REFERENCES

Dodds, W. K., & Oakes, R. M. (2008). Headwater influences on downstream water quality. *Environmental Management, 41*(3), 367-377.

Evaluation, Classification and Management of Headwater Drainage Features Guidelines. Toronto and Region Conservation Authority and Credit Valley Conservation, TRCA Approval July 2013 (Finalized January 2014).

Greenwood, M. J., Harding, J. S., Niyogi, D. K., & McIntosh, A. R. (2012). Improving the effectiveness of riparian management for aquatic invertebrates in a degraded agricultural landscape: Stream size and land-use legacies. *Journal of Applied Ecology, 49*(1), 213-222.

Miltner, R., & Rankin, E. (1998). Primary nutrients and the biotic integrity of rivers and streams. *Freshwater Biology, 40*(1), 145-158.



LEGEND:

STUDY AREA BOUNDARY

REGIONAL MAP

SCALE 1: 250000

0 625 1250

HORIZONTAL SCALE 1: 25000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

ENVIRONMENTAL ASSESSMENTS & APPROVALS

SITE LOCATION

PART OF LOT 1, CONCESSION 1
CALEDON, ON

DATE ISSUED: *SEPTEMBER 2022*	Figure No.
CREATED BY: *A.L.*	
PROJECT NO.: *22-065*	1
REFERENCE: *REGION OF PEEL*	

Plotted by: ALU on September 14, 2022 at 4:10pm
File: \\Azimuthsrv-data\Projects\22 projects\22-065 tullamore ela\04.0 - drafting\22-065 Site Location.dwg Layout: Site Location Plotscale: 1

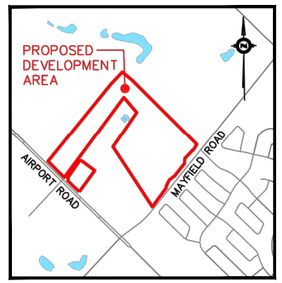
LEGEND:

- PROPOSED DEVELOPMENT AREA
- CULVERT LOCATION

HEADWATER DRAINAGE FEATURES:

- MITIGATION
- PROTECTION

TABLE OF MANAGEMENT RECOMMENDATIONS	
DRAINAGE FEATURE SEGMENT CODE	MANAGEMENT RECOMMENDATION
SC-H1-Seg 1	PROTECTION
SC-H1-Seg 2	CONSERVATION
SC-H1-Seg 3	CONSERVATION
SC-H1-Seg 4	MITIGATION
SC-H1-Seg 5	MITIGATION
SC-H1-Seg 6	MITIGATION
SC-H2-Seg 1	MITIGATION
SC-H2-Seg 2	MITIGATION
SC-H3-Seg 1	PROTECTION
SC-H3-Seg 2	PROTECTION



LOCATION PLAN

0 100.00 200.0

HORIZONTAL SCALE 1:4000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
ENVIRONMENTAL ASSESSMENTS & APPROVALS

HEADWATER DRAINAGE FEATURE ASSESSMENT

PART OF LOT 1, CONCESSION 1 CALEDON, ON

DATE ISSUED:	*SEPTEMBER 2023*	Figure No. 2
CREATED BY:	*A.L.*	
PROJECT NO.:	*22-065*	
REFERENCE:	*TOWN OF CALEDON*	

APPENDICES

Appendix A: Site Photographs
Appendix B: HDF Summary Sheet

APPENDIX A

Appendix A: Site Photographs

Photographs

SC-H1-Seg 1 (March 20, 2022)

Segment ID: SC-H1-Seg 1
Hydrology: Important
Modifier: N/A
Riparian: Important
Fish Habitat: Valued
Terrestrial Habitat: Contributing
Mgmt Rec.: Protection
Notes: Short (20m) segment immediately north of Mayfield Road within treed area.

SC-H1-Seg 2 (April 29, 2022)

Segment ID: SC-H1-Seg 2
Hydrology: Valued
Modifier: Agriculture
Riparian: Important
Fish Habitat: Contributing
Terrestrial Habitat: Contributing
Mgmt Rec.: Protection
Notes: Small channel through grassed meadow segment. Originally assigned 'Conservation' management recommendation, but was changed to 'Protection' due to SC-H1-Seg 3 upstream.

SC-H1-Seg 3 (August 11, 2022)

Segment ID: SC-H1-Seg 3
Hydrology: Important
Modifier: Agriculture
Riparian: Important
Fish Habitat: Contributing
Terrestrial Habitat: Contributing
Mgmt Rec.: Protection
Notes: Short (20m) segment in treed hedgerow with standing water present during late summer site visit.

SC-H1-Seg 4 (August 11, 2022)

Segment ID: SC-H1-Seg 4
Hydrology: Valued
Modifier: Development
Riparian: Limited
Fish Habitat: Contributing
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Dense cattail swale with no natural riparian/terrestrial vegetation. Development on both sides of feature.

SC-H1-Seg 5 (August 11, 2022)

Segment ID: SC-H1-Seg 5
Hydrology: Valued
Modifier: Development
Riparian: Limited
Fish Habitat: Contributing
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Dense cattail swale with no natural riparian/terrestrial vegetation. Development on both sides of feature. Separated from SC-H1-Seg 4 by twin CSP culverts.

SC-H1-Seg 6 (August 11, 2022)

Segment ID: SC-H1-Seg 6
Hydrology: Contributing
Modifier: N/A
Riparian: Limited
Fish Habitat: Contributing
Terrestrial Habitat: Contributing
Mgmt Rec.: Mitigation
Notes: Poorly defined swale in scrubland area. No substrate sorting or aquatic vegetation observed.

SC-H2-Seg 1 (August 11, 2022)

Segment ID: SC-H2-Seg 1
Hydrology: Contributing
Modifier: Development
Riparian: Limited
Fish Habitat: N/A
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Poorly defined swale in meadow area. Upstream segment altered by development in feature (truck parking lot).

SC-H2-Seg 2 (August 11, 2022)

Segment ID: SC-H2-Seg 2
Hydrology: Contributing
Modifier: Development
Riparian: Limited
Fish Habitat: N/A
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Poorly defined swale in meadow area. Upstream segment altered by development in feature (truck parking lot).

SC-H3-Seg 1 (August 11, 2022)

Segment ID: SC-H3-Seg 1
Hydrology: Valued
Modifier: Development
Riparian: Valued
Fish Habitat: Contributing
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Narrow swale feature with cattails present. Standing water present in feature during late summer site visit. Upstream segment altered by development in feature (parking lot).

SC-H3-Seg 2 (August 11, 2022)

Segment ID: SC-H3-Seg 2
Hydrology: Valued
Modifier: Development
Riparian: Valued
Fish Habitat: Contributing
Terrestrial Habitat: Limited
Mgmt Rec.: Mitigation
Notes: Narrow channel feature with cattails present. Standing water present in feature during late summer site visit. Upstream segment altered by development in feature (parking lot).

APPENDIX B

Appendix B: HDF Summary Sheet

Headwater Drainage Feature Segment Data

Site/Segment details										Hydrology Functions						Riparian Functions							Feature Dimensions						
Date (yyyy/mm/dd)	Feature Code (from Map)	Investigators	Consultant/Agency	Assessment Direction	Site Visit	Flow Influence	Segment Code	Waypoint Data Type	Waypoint ID	Feature Type	Feature type modifier	Flow Condition	Sediment adjacent	Sediment Valley	Sediment Deposition	Feature Veg	0m - 1.5m	1.5m-10m	10m-30m	0m - 1.5m	1.5m-10m	10m-30m	Width Method MT	Feature width (m)	Bankfull width (m)	Channel depth (mm)	Photo # up	Photo # down	Easting
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 1	UTM 17	NA	1	NA	4	1	7	Yes	1	6	4	4	6	4	4	2	3.6	3.6	350			
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 2	UTM 17	NA	1	NA	5	1	1	No	4	4	4	4	4	3	3	2	1.95	1.95	160			
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 3	UTM 17	NA	1	NA	4	NA	NA	NA	7	7	7	4	5	3	3	NA	NA	NA	NA			
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 4	UTM 17	NA	6	NA	5	1	1	No	4	4	4	1	4	5	3	2	2.8	2.7	290			
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 5	UTM 17	NA	6	NA	4	1	1	No	7	4	1	1	1	1	1	3	8	8	45			
2022-03-22	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H1-Seg 6	UTM 17	NA	4	NA	5	1	1	No	4	1	1	1	4	5	4	3	1	NA	20			
2022-03-22	SC-H2	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H2-Seg 1	UTM 17	NA	4	NA	4	1	2	Yes	1	4	4	4	4	4	4	3	3.5	NA	130			
2022-03-22	SC-H2	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H2-Seg 2	UTM 17	NA	4	NA	4	1	2	Yes	1	4	4	4	4	4	4	4	0.1	NA	30			
2022-03-22	SC-H3	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H3-Seg 1	UTM 17	NA	1	NA	4	1	1	No	7	4	4	4	4	4	4	3	0.7	0.7	90			
2022-03-22	SC-H3	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	1	Freshet	SC-H3-Seg 2	UTM 17	NA	2	NA	4	1	1	No	4	4	4	1	4	4	4	3	1	NA	225			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 1	UTM 17	NA	1	NA	5	1	1	No	1	6	4	4	6	4	4	2	2.3	2.3	0.35			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 2	UTM 17	NA	1	NA	4	1	1	No	4	4	4	4	4	3	3	2	2	2	250			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 3	UTM 17	NA	1	NA	4	NA	NA	NA	7	7	7	4	5	3	3	NA	NA	NA	NA			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 4	UTM 17	NA	6	NA	3	1	1	No	4	4	4	1	4	5	3	2	2.76	2.76	290			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 5	UTM 17	NA	6	NA	2	1	1	No	7	4	1	1	1	1	1	4	8	8	NA			
2022-04-29	SC-H1	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H1-Seg 6	UTM 17	NA	4	NA	4	1	1	No	4	1	1	1	4	5	4	1	1	NA	NA			
2022-04-29	SC-H2	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H2-Seg 1	UTM 17	NA	4	NA	2	1	1	No	1	4	4	4	4	4	4	4	0.1	NA	30			
2022-04-29	SC-H2	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H2-Seg 2	UTM 17	NA	4	NA	1	1	1	No	1	4	4	4	4	4	4	NA	NA	NA	NA			
2022-04-29	SC-H3	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H3-Seg 1	UTM 17	NA	1	NA	3	1	1	No	7	4	4	4	4	4	4	3	0.78	0.78	0.5			
2022-04-29	SC-H3	Mike Gillespie	Azimuth Environmental Consulting, Inc.	NA	2	Spate	SC-H3-Seg 2	UTM 17	NA	2	NA	2	1	1	No	4	4	4	1	4	4	4	3	1	NA	NA			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 1	UTM 17	NA	1	NA	2	1	1	Yes	1	6	4	4	6	4	4	2	2.5	2.5	0.35			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 2	UTM 17	NA	1	NA	1	1	1	No	4	4	4	4	4	3	3	2	2	0.2	20			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 3	UTM 17	NA	1	Ag	2	1	6	No	7	7	7	4	5	3	3	4	5	NA	NA			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 4	UTM 17	NA	6	NA	1	2	6	Yes	4	4	4	1	4	5	3	4	2	2.76	290			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 5	UTM 17	NA	6	NA	1	2	6	Yes	7	4	1	1	1	1	1	4	8	NA	NA			
2022-08-11	SC-H1	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H1-Seg 6	UTM 17	NA	4	NA	1	1	1	No	4	1	1	1	4	5	4	4	2	NA	NA			
2022-08-11	SC-H2	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H2-Seg 1	UTM 17	NA	4	NA	2	2	6	No	1	4	4	4	4	4	4	4	3	NA	NA			
2022-08-11	SC-H2	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H2-Seg 2	UTM 17	NA	4	NA	1	2	6	No	1	4	4	4	4	4	4	4	0.5	NA	NA			
2022-08-11	SC-H3	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H3-Seg 1	UTM 17	NA	1	NA	2	1	6	Yes	7	4	4	4	4	4	4	4	0.6	0.78	0.5			
2022-08-11	SC-H3	Roger Holmes	Azimuth Environmental Consulting, Inc.	NA	3	Baseflow	SC-H3-Seg 2	UTM 17	NA	2	NA	2	1	6	Yes	4	4	4	1	4	4	4	4	0.3	0.3	0.1			

			Flow Measurements - Details		Point Feature Data											
Northing	Segment Code	Wetted Width (m)	Flow - flow meter	Visual Estimate	Point Feature Type	Left/Right Bank	Bank Seepage Length	Watercress Surface Area	Perch Height - note "0" if not perched	Jump Height	Culvert Type	Flow Condition - same as Hydrology function	Water Temperature (°C)	Channel Hardening Material	Fish and Fish Habitat	Comments
	SC-H1-Seg 1	2.39	Flow meter - 0.09 m/s												indirect	Mayfield Road CSP inlet (2.35m wide x 1.40m high) No fish observed.
	SC-H1-Seg 2	0.97	Flow meter - 0.85 m/s												indirect	Channel still defined but lots of vegetation in channel
	SC-H1-Seg 3	NA	NA												indirect	Dense cattails. Feature is on adjacent property and could not be fully assessed.
	SC-H1-Seg 4	1.1	Flow meter - 0.67 m/s												indirect	
	SC-H1-Seg 5	5	Flow meter - 0.13 m/s		K				5.5 cm		twin CSP	4	2.2		indirect	Twin 600 mm CSP culvert. No fish observed. cattail dominated channel
	SC-H1-Seg 6	1	Flow meter - 0.7 m/s												indirect	
	SC-H2-Seg 1	3.5	Flow meter - 0.06 m/s												none	Silt fence and earthworks force downstream flow path to the south towards H1
	SC-H2-Seg 2	0.1	Flow meter - 0.03 m/s												none	seepage entering cattail dominated channel from SW, from adjacent truck park
	SC-H3-Seg 1	0.5	Flow meter - 0.06 m/s												indirect	
	SC-H3-Seg 2	NA	Flow meter - 0.03 m/s												indirect	
	SC-H1-Seg 1	1.15		<0.01											indirect	No fish observed
	SC-H1-Seg 2	0.18		<0.01											indirect	
	SC-H1-Seg 3	NA		<0.01											indirect	
	SC-H1-Seg 4	2		<0.01											indirect	
	SC-H1-Seg 5	2.5		<0.01											indirect	
	SC-H1-Seg 6	1		NA											indirect	
	SC-H2-Seg 1	NA		NA											none	
	SC-H2-Seg 2	NA		NA											none	
	SC-H3-Seg 1	0.35		NA											indirect	
	SC-H3-Seg 2	0.47		NA											indirect	
	SC-H1-Seg 1	0.5		NA											indirect	Channel partially dry, no flow. Small treed patch on north side of Mayfield.
	SC-H1-Seg 2	NA		NA											indirect	Dry grassed ditch feature through meadow lands, poorly defined banks with no substrate sorting and grasses throughout channel.
	SC-H1-Seg 3	NA		NA											indirect	Small reach in forested hedgerow with pocket of water. No flow observed.
	SC-H1-Seg 4	NA		NA											indirect	Dry cattail swale with pockets of water at culvert outlet. Partailyl constrained by riparian infilling and concrete blocks.
	SC-H1-Seg 5	NA		NA											indirect	Dry cattail swale. Partailyl constrained by riparian infilling and concrete blocks.
	SC-H1-Seg 6	NA		NA											indirect	Dry meadow/thicket lands, no defined feature. No evidence of overland flow. No aquatic plants.
	SC-H2-Seg 1	NA		NA											none	Majority of feature dry. No defined banks, no substrate sorting, patches of cattails along edge of feature, originates from truck lot to the west.
	SC-H2-Seg 2	NA		NA											none	Small (10m) drainage feature from truck lot that drains into Seg 1, no defined feature, appears to be a rill that collects flow during rain events.
	SC-H3-Seg 1	0.3		NA											indirect	Poorly defined drainage channel that collects overland flow from parking lot to the west. Standing water with no flow observed.
	SC-H3-Seg 2	0.1		NA											indirect	Poorly defined drainage channel that collects overland flow from parking lot to the west. Standing water with no flow observed.