



Technical Memorandum – 2019 Headwater Drainage Feature Assessment

Date: March 12, 2020 **Project No.:** 300043952.0000

Project Name: Snell's Hollow East Secondary Plan

Client Name: Snell's Hollow East Landowners Group

Submitted To: Snell's Hollow Landowner's Group c/o Glenn Schnarr & Associates Inc.
(GSAI)

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Project Coordinator

1.0 Introduction

R.J. Burnside & Associates Limited (Burnside) has been retained by the Snell's Hollow East Landowners Group to undertake a Headwater Drainage Feature (HDF) Assessment for a development, located at the northeast corner of Kennedy Road and Mayfield Road (herein referred to as the "subject property"). The subject property is in the Town of Caledon (Town) and within the jurisdiction of Toronto and Region Conservation Authority (TRCA).

The subject property is located at the southern edge of the Town of Caledon, in the proposed Snell's Hollow East Secondary Plan area. The site is bound by Highway 410 to the north, Heart Lake Road to the east, Mayfield Road to the south and Kennedy Road to the west (Figure 1). The subject property contains portions of the Heart Lake Provincially Significant Wetland (PSW) Complex, which drains beneath Mayfield Road towards Heart Lake Conservation Area to the south. The existing land use is agricultural in the uplands, with meadows on the slopes and ridges adjacent to the PSW unit.

As outlined in the Terms of Reference (TOR) dated April 8, 2019, the need for a surface water - headwater drainage feature (HDF) assessment was identified as part of the baseline monitoring plan. It is our understanding that the establishment of meaningful baseline conditions will contribute to the Secondary Plan study that began in early 2019.

2.0 Background and Desktop Review

Burnside has reviewed the following data sources for an understanding of what features existed historically.

- Recent and historical aerial photography (Google);
- Ontario Base Mapping;
- TRCA Hillshade LIDAR;
- Ages Consulting Limited: Clearbrook Headwater Features Assessment (2012);
- Ministry of Natural Resources and Forestry (MNR): Make a Map: Natural Heritage mapping to identify MNR mapped natural heritage features on the subject property (MNR, 2019);
- Fisheries and Oceans Canada (DFO) Aquatic Species at Risk (SAR) mapping; and
- MNR Aquatic Resource Area (ARA) data.

Based on this review, we have identified that there is an Unnamed Tributary to Heart Lake which flows from west to east through the subject property and enters a ponded area at the eastern boundary of the site. It was stated in a report completed by Ages Consulting Limited that this ponded area contains an overflow outlet structure which restricts fish movements but maintains a permanent pool. Brook stickleback (*Culaea inconstans*), Brown bullhead (*Ameiurus nebulosus*), Central mudminnow (*Umbra limi*) and Golden shiner (*Notemigonus crysoleucas*) are all noted in the MNR ARA mapping as historically being observed within the feature.

The DFO aquatic SAR and MNR mapping do not indicate that aquatic SAR have been historically observed on the subject property. The MNR natural heritage mapping indicates that a portion of the Heart Lake PSW Complex (Wetland No. 1) is present on the subject property.

3.0 Field Methodology

A total of three HDF surveys were completed based on the protocol outlined in the *Evaluation, Classification and Management of Headwater Drainage Features Guideline* (The Guideline) (TRCA and CVC, 2014) and supporting guidance provided in the *Ontario Stream Assessment Protocol* (OSAP) *Section 4: Modules 10 and 11*. Accessibility to sites within the subject property enabled adaptation to a reach based approach primarily utilizing OSAP S4:M11. A background review of existing TRCA Hillshade LIDAR, hydrolayer mapping, and satellite imagery were utilized to identify potential HDF features from desktop. Each potential HDF location was investigated during the initial site visit on April 9 to 11, 2019, with subsequent monitoring visits completed at sites based on observations from previous visits.

Since HDFs can vary significantly on a seasonal basis, multiple site visits are needed to correctly assess their hydrology and riparian conditions. Headwater drainage features were evaluated through a series of visits in April, May and August 2019 to capture varying conditions throughout the year (TRCA, 2014). Table 1 provides a summary of field investigation dates and recommended sampling periods.

Table 1: Recommended Timing and Field Investigation Dates

Site Visit	Guidelines Assessment Period	Field Investigation Date
1	Spring Freshet (Early April to mid-April)	April 9 to 11, 2019
2	Late April to May	May 27, 2019
3	July to August	August 26, 2019

Following field investigations, findings of the HDF evaluations were then translated into a classification of the HDF, with respect to the hydrology, terrestrial and fish habitat, and the riparian vegetation conditions of the features.

4.0 HDF Classification and Management Recommendations

The majority of features on the subject property were found in actively tilled agricultural fields with poor definition and lacking natural channel vegetation. Overall, 12 potential drainage networks were investigated (H1-H12) throughout the subject property (Figure 1). All the drainage networks, except for H3, flow, partially or wholly, through cultivated agricultural fields. Of the 33 reaches within these networks 20 were classified as 'No Management Concern', 12 as 'Mitigation' and one as 'Conservation', based on the management decision matrix provided in Figure 2 of The Guideline.

Table 2: Reach Based Headwater Drainage Feature and Habitat Classifications

HDF Reach	Hydrology	Modifiers	Riparian Classification	Fish and Fish Habitat	Terrestrial Habitat	Management Recommendation
H1-R1	Limited Function	n/a	Limited Function	Contributing Function	Limited Function	No Management Required
H1-R2	Limited Function	Property limit	Valued Function	Contributing Function	Limited Function	No Management Required
H2-R1	Valued Function	n/a	Valued Function	Valued Function Functions	Valued Function	Conservation
H2-R2	Contributing Function	Industrial / Development Activities	Limited Function	Contributing Functions	Limited Function	Mitigation
H2-R3	Valued Function	Industrial / Development Activities	Limited Function	Contributing Functions	Limited Function	Mitigation
H2-R4	Valued Function	Industrial / Development Activities	Valued Function	Contributing Function	Limited Function	Mitigation
H3	Limited Function	n/a	Valued Function	Contributing Function	Limited Function	Mitigation
H4-R1	Limited Function	Agricultural practices	Limited Function	Contributing Function	Limited Function	No Management Required
H4-R2	Limited Function	Agricultural Practices	Valued Function	Contributing Function	Limited Function	No Management Required
H4-R3	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H5	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H6	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H7-R1	Limited Function	n/a	Valued Function	Contributing Function	Limited Function	No Management Required
H7-R2	Limited function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H8-R1	Limited Function	n/a	Limited Function	Contributing Function	Limited Function	No Management Required
H8-R2	Contributing Function	n/a	Limited Function	Contributing Function	Limited Function	Mitigation
H8-R3	Contributing Function	n/a	Limited Function	Contributing Function	Limited Function	Mitigation

HDF Reach	Hydrology	Modifiers	Riparian Classification	Fish and Fish Habitat	Terrestrial Habitat	Management Recommendation
H8-R4	Contributing Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	Mitigation
H8-R5	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H8-R6	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H8-R7	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H8-R8	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H9-R1	Limited Function	n/a	Valued Function	Contributing Function	Limited Function	Mitigation
H9-R2	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H9-R3	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H10-R1	Limited Function	n/a	Valued Function	Contributing Function	Limited Function	Mitigation
H10-R2	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H10-R3	Contributing Function	Suspected tile drain outlet	Limited Function	Contributing Function	Limited Function	Mitigation
H10-R4	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H11-R1	Limited Function	n/a	Valued Function	Contributing Function	Limited Function	Mitigation
H11-R2	Limited Function	Agricultural Practices	Limited Function	Contributing Function	Limited Function	No Management Required
H12-R1	Limited Function	n/a	Valued function	Contributing Function	Limited Function	Mitigation
H12 – R2	Limited Function	Agricultural Practices	Limited Function	Contributing function	Limited Function	No Management Required

1 = features with no flow with sandy or gravelly soils; 2 = sampling not required in unconnected wetlands;
 3 = classification not required if no alteration is proposed

Most features were dry, contained standing water, or were minimally flowing (i.e., less than 0.5 L/s) during the April assessment, with all features dry by the August assessment. Features H1, H4, H5, H6, H7 and H8 are primarily isolated and do not directly convey water to fish habitat or the PSW. Feature H1 flows out of the subject property and down the road embankment, between the subject property and Highway 410.

The H2 feature is located south of the industrial / commercial site along the western boundary of the subject property. The feature originates immediately downstream of the access driveway, with no culvert or surface conveyance mechanism to upstream habitat observed during the assessments. Reach R4 was categorized as having swale feature characteristics with limited riparian function and contained standing water during both the April and May site visits. Substrate sorting and defined bed and banks were not observed. The flow featured standing water in April and May and it was dry in August. Reach R3 is marginally defined and conveys drainage along the margin of the agricultural land and industrial complex. Reach R2 contains an undefined channel and lack of riparian habitat, which is anticipated to be a result of frequent tilling and agricultural practices. Minimal erosional power (i.e., sediment transport) and flow was observed through this reach during the spring assessments, with no water present under summer baseflow conditions. Reach R-1 is a tributary to Heart Lake with a defined natural channel and narrow supporting riparian vegetation buffer that contained water during the April and May site visits, but it was dry during the August assessment. It flows through an area featuring meadow riparian lands and eventually discharges to the ponded area described in Section 2.0.

No surface connectivity was observed between the H4 and H3 features during the field investigations. H4 originates along a fence line and drains eastward, eventually infiltrating and becoming indiscernible. The entirety of H4 lacks definition and was observed to pond and infiltrate at the downstream limit of the feature. H3 flows entirely within the meadow area, eventually discharging to the PSW.

Features H5, H6 and H7 are all located in cropped agricultural lands. H5 is a small channel which conveys flows to the roadside ditch on Heart Lake Road. It was dry during all site visits with primary function to convey surface sheet flow following precipitation events. H6 is an isolated feature that does not convey flows to the downstream network. H7 conveys drainage parallel to the roadside ditch embankment, adjacent to the Highway 410 off-ramp. All three features within this parcel were undefined, lacked riparian vegetation, contained standing water during the spring site visits but were dry during the August site visit.

Feature H8 flows through cropped lands and contained either standing water, minimal flows and dry conditions during the April and May site visits. During the August visit it was completely dry. Field investigations generally corroborated findings outlined in the 2013 HDF assessment, completed by Ages Consultants Ltd., as no surface connectivity to fish habitat or the downstream network was observed for the H8 drainage network.

Features H9, H10, H11 and H12 potentially flow into the PSW. They all originate in cultivated agricultural fields and flow into a meadow ecotype associated with the downgradient PSW complex. Based on review of the LIDAR mapping and the aerial photography, it was anticipated that a tile drain outlet was present at H10-R3, however none were observed during the field visits. A channel or depression through which H10, H11 and H12 would flow to the PSW, or the tributaries of Heart Lake, was not discernible during the field investigations.

A potential wetland is located in the southwestern section of the subject lands, between Kennedy Road and the industrial property. This wetted area is bound by a driveway to the south, the industrial property to the east, and an agricultural field to the northwest. Surface connectivity between this area and the downstream network (i.e., H2-R4), was not identified during the 2019 site visits. Analysis of Region of Peel historical mapping indicates that the industrial lands, driveway and wetted area have been in place since at least 1964, with historical land use consistent with existing conditions. Potential channelization or surface conveyance between the wetland is not evident through aerial imagery review. As outlined in The Guideline (TRCA/CVC, 2014), unconnected wetlands (i.e., wetlands that do not have an obviously surface water outlet draining to downstream) and not captured within the HDF assessment and management recommendation framework. As such, it is recommended that management considerations for this feature is determined through subsequent investigations such as hydrogeological investigations, amphibian breeding call surveys and ELC mapping during the 2020 field season.

5.0 Conclusion

In conclusion, 12 potential HDF networks were investigated during 2019 field season. These HDF networks were sub-categorized into 33 separate reaches and classified following the HDF Guideline (TRCA/CVC, 2014). In total, 22 are considered 'No Management Concern', meaning they do not require any specific management considerations. Ten of the reaches were classified as 'Mitigation', suggesting they should be replicated or enhanced through enhanced lot level conveyance measures (e.g., vegetated bioswales), Low Impact Development (LID) storm water treatment designs, or house foundation pump discharge points to maintain water balance input downstream, but do not necessarily need to be retained on the landscape. Feature H2-R1 is a defined watercourse identified on the MNRF ARA mapping, which contains seasonal fish habitat, and was classified as Conservation. Features that are classified as conservation should be avoided or enhanced to maintain their function.

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MM:js

Enclosure(s) Figure 1.0: Headwater Drainage Features

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 Margherita Bialy, Community Planner, Policy, Town of Caledon (enc.) (Via: Email)

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- Reach Break
- Conservation
- Mitigation
- No Management Required
- Provincially Significant Heart Lake Wetland Complex (MNR)
- Study Area

Sources:

1. Ministry of Natural Resources and Forestry, © Queen's Printer for Ontario.
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Coord. System: NAD 1983 UTM Zone 17N		
Projection: Transverse Mercator		
Central Meridian: 81°0'0.00"W		
False Easting: 500,000m	False Northing: 0m	
Page Orientation: 310.49°		Scale Factor: 0.99960

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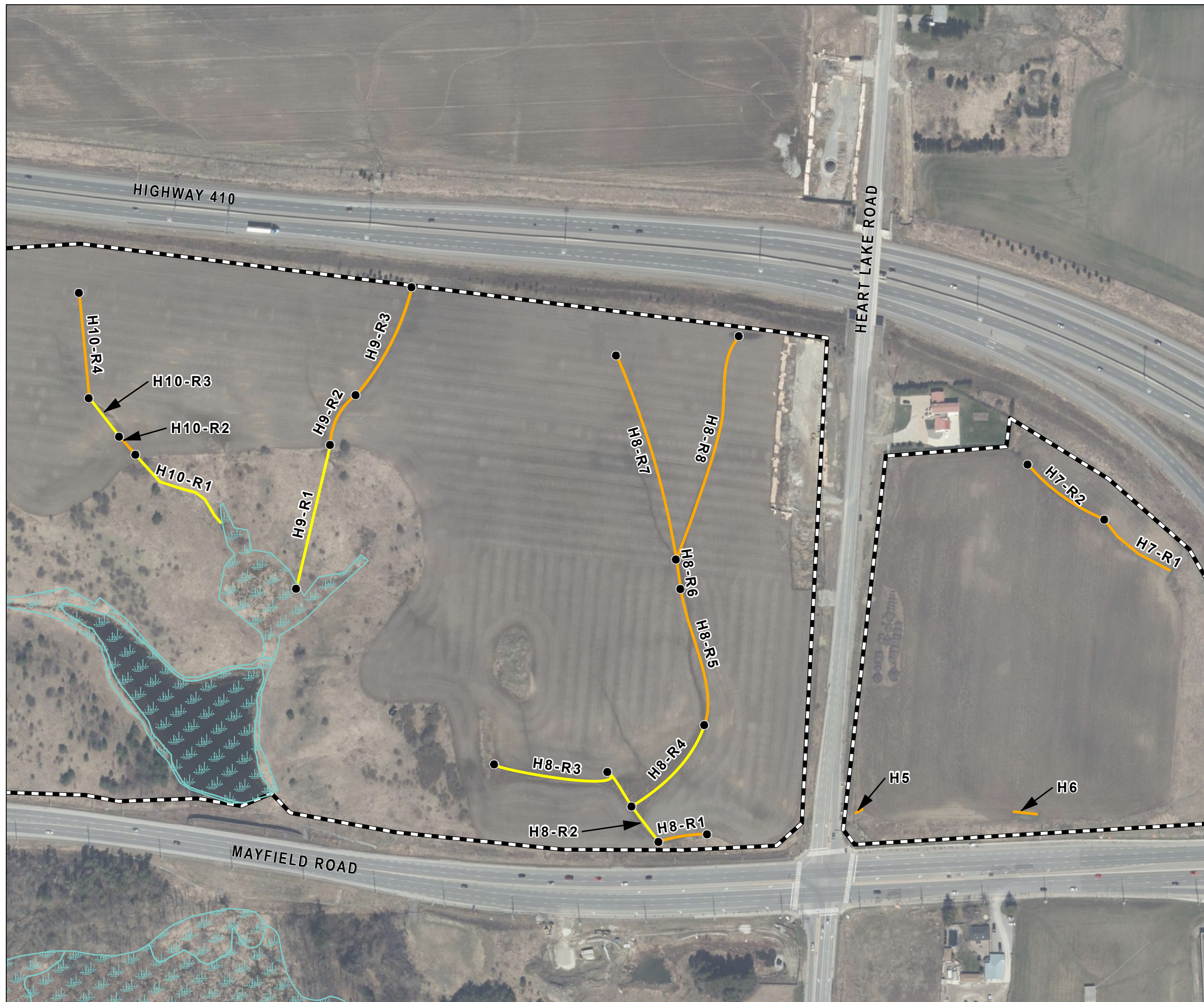
SNELL'S HOLLOW LANDOWNERS GROUP



Figure Title

SNELL'S HOLLOW EAST SECONDARY PLAN

HEADWATER DRAINAGE FEATURES

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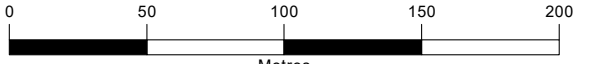


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Figure Title
SNELL'S HOLLOW EAST SECONDARY PLAN
HEADWATER DRAINAGE FEATURES

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