



Talbot Village Phase 8

Subject Lands Status Report and Environmental Impact Study (SLSR/EIS)

Project Location:

3095 Bostwick Road, City of London, ON

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1.0 INTRODUCTION

MTE Consultants Inc. (MTE) has been retained by Southside Construction Management Limited (the Proponent) to undertake an Environmental Impact Study (EIS) which includes components of a Subject Lands Status Report (SLSR) in support of Draft Plan of Subdivision and Zoning By-law Amendment for the land holdings located at 3095 Bostwick Road, Part Lot 76, Concession east of the north branch of Talbot Rd, Block 172, City of London (herein referred to as the Subject Lands; **Figure 1**). The site was part of a suite of Community Plans completed across the City of London as part of the boundary expansion in the late 1990s. Given the large planning scale the area has been completed in phases. MTE has previously submitted an EIS for Phase 1 in 2021 and Phase 7 in 2022.

Phase 8, the subject of this EIS, includes the last phase of the development which was designated for residential development along the west side of the Legal Parcel and now proposes 112 residential lots with an effort to retain features previously removed from the natural heritage system framework in lieu of compensation works completed further southwest towards Pack Road and Colonel Talbot.

The Subject Lands of Phase 8 include a woodland feature and some smaller wetland features that were not previously considered in the supporting Community Plan process but are now considered, regardless of size, in the London Plan. The remaining lands are active agricultural lands. The surrounding lands include residential subdivisions to the west, south and east, and a single residential property to the north. In accordance with the Natural Heritage Reference Manual (NHRM; OMNR, 2010), a Study Area, including the Subject Lands and adjacent lands within 120 m, has been defined for the purposes of evaluating ecological functions and determining opportunities to retain and protect natural heritage functions as a result of proposed development (**Figure 1**).

1.1 Pre-Consultation and Site History

In accordance with provincial standards, potential impacts to natural heritage features and associated functions shall be assessed through an EIS prepared to the satisfaction of the City of London and the UTRCA. A City of London Environmental Impact Study Scoping Checklist, which constitutes the Terms of Reference for the study, was completed for the overall Legal Parcel (all phases) in 2020 to define the scope of ecological field investigations required to document existing conditions on the 3095 Bostwick Road property, including the Subject Lands. The Scoping Checklist was prepared and submitted to reviewing authorities, as part of the pre-consultation process to establish the basis for the EIS scope. A Scoping Meeting was held on April 6, 2020, with James McKay (City Ecologist), Nancy Pasato (file planner), Environmental and Ecological Planning Advisory Committee (EEPAC; Sandy Levin), and the Upper Thames River Conservation Authority (UTRCA). This Scoping Checklist is provided in **Appendix A**. Although an additional scoping checklist and meeting were requested as part of the City's "Proposal Review Meeting Summary & Record of Consultation" (dated December 31, 2023), it was confirmed through email that a new scoping exercise would not be required for the EIS (personal communication, Bruce Page, February 5, 2024).

Ecological field investigations completed on the Subject Lands are defined in Section 5.0 and updated field investigations shall be completed referencing the Data Collection Standards defined within Appendix C of the City of London Environmental Management Guidelines (2021).

1.2 Report Objective

An EIS is a requirement of the municipal planning process and is intended to provide an assessment of the development limits of the proposed residential development on the Subject Lands in support of the Draft Plan and Zoning By-law Amendment processes. The first sections of this report meet the request for a Subject Lands Status Report (SLSR). The objective of the SLSR component of the report is to describe the natural heritage features, based on field surveys and background information, and to identify important functions to be protected or replicated on the Subject Lands, given the framework of the prior North Talbot Community Plan. An analysis of ecological constraints and opportunities will be provided herein to ensure that proposed development and site alteration is consistent with the North Talbot Community Plan and compensation already provided, the Southwest Area Plan (2014 and updated 2019), the Provincial Policy Statement (PPS; MMAH, 2020), The London Plan (2023), and UTRCA regulations. Furthermore, an evaluation of potential impacts to any critical natural heritage features and functions, as well as recommendations for avoidance, mitigation and compensation measures will be provided to address potential impacts and opportunities as a result of the proposed development.

The proposed development occurs within 30 m of wetlands and 120 m of valleylands on Map 5, and within 30 m of unmapped woodlands. The Subject Lands are also within the mapped regulation limits of the Upper Thames River Conservation Authority (UTRCA). As such, an EIS and Section 28 permit application under the UTRCA's Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (i.e., Ontario Regulation 157/06) are required.

This report will be circulated to the City of London and the UTRCA for agency review and comment.

1.3 Background Documents

Natural heritage features and functions identified on the Subject Lands have been evaluated through a review of the NHRM (OMNR, 2010) for Policy 2.1 of the Provincial Policy Statement (2020), and of Section 6 (Environmental Policies) of The London Plan (2023).

In addition, the following documents were reviewed to provide an assessment of the quality and extent of natural heritage features and functions found on the Subject Lands:

- Talbot Village – Phase 8 Grading Plan (Arcadis, 2024a)
- Hydrogeological Assessment – Talbot Village Phase 8 (EXP, 2024a);
- Geotechnical Investigation – Proposed Talbot Village Phase 8 (EXP, 2024b);
- Final Proposal Report – 3095 Bostwick (Arcadis, 2024b);
- Hydrogeological Assessment and Water Balance Talbot Village Phase 7 (EXP, 2021);
- North Talbot Community Plan (1999);
- Southwest Area Plan (City of London, 2014 and updated in 2019);
- Topping Lands EIS (MTE, 2021); and
- Topping Lands Phase 7 EIS Update (MTE, 2022).

2.0 NATURAL HERITAGE LEGISLATION & POLICY CONTEXT

2.1 Planning Act

The PPS (2020) was issued under the authority of the *Planning Act, 1990* to provide direction to regional and local municipalities on matters of provincial interest related to land use planning and development in support of a comprehensive, integrated and long-term approach to planning. Land use planning decisions made by planning authorities must be consistent with the PPS (2020).

With respect to natural heritage features and resources, the PPS defines eight natural heritage features or areas:

- Significant Wetlands
- Significant Coastal Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat (SWH)
- Significant Areas of Natural and Scientific Interest (ANSIs)
- Fish Habitat, and,
- Habitat of Endangered and Threatened Species.

The Subject Lands are located within Ecoregion 7E. No development or site alteration shall be permitted in significant wetlands or significant coastal wetlands. Development and site alteration shall not be permitted in significant woodlands, significant valleylands, SWH, significant ANSIs or coastal wetlands unless it has been demonstrated, through an EIS or like study, that there will be no negative impact to natural heritage features or their ecological functions. As per the PPS (2020), development and site alteration shall not be permitted in habitat of endangered or threatened species, or in fish habitat, except in accordance with provincial and federal legislation.

Furthermore, the PPS (2020) indicates that development and site alteration shall not be permitted on lands adjacent to natural heritage features and areas unless it has been demonstrated that no negative impacts to these features or their ecological functions will occur.

The PPS provides area-specific land use planning policies and functions as a foundation for the development of lower-tier plans consistent with provincial policy. As such, The London Plan (2023) must be consistent with the PPS and is subject to the regulations of applicable provincial plans.

2.2 The London Plan

The London Plan (2023) was adopted by Council on June 23, 2016. Further, amendments have been made to The London Plan to reflect Minister-approved Official Plan amendments, with the most recent office consolidation released on May 25, 2023. The London Plan has been established to provide planning direction for the long-term protection, conservation, enhancement and management of the Natural Heritage System, as well as associated ecological functions, processes, and linkages. Environmental policies defined within The London Plan are intended to protect the Natural Heritage System by directing development away from significant natural or man-made hazards, and natural resources. The Southwest

Area Plan (SWAP) is considered a Secondary Plan of the London Plan and as a result, that document and the guidance with respect to natural Heritage prevails.

The City of London's Natural Heritage System is generally identified on Map 5 – Natural Heritage of The London Plan (2023). Map 1 – Place Types identifies intended land uses within the City of London. Where differences occur between these maps and the SWAP, SWAP supersedes The London Plan.

2.2.1 Land Use Designations

The Neighbourhoods and Green Space Place Types overlap a portion of the Subject Lands as depicted on Map 1 – Place Types of The London Plan (2023; **Figure 2**). Features occurring within the Green Space Place Type designation include significant components within the Natural Heritage System and permitted uses are limited within Green Space Place Types in accordance with Policy 1389. Permitted uses include expansions to existing development uses provided it can be demonstrated no negative impacts to natural heritage features or their ecological functions will occur.

There is a range of permitted uses in the Neighbourhoods Place Type designation as outlined in Table 10 of The London Plan including single detached, semi-detached and duplex homes. The Subject Lands are also subject to the restrictions set out in North Talbot Community section of the Place Type Policies Chapter of The London Plan (Policies 994-996).

2.2.2 Environmental Classifications

As per Map 5 – Natural Heritage of The London Plan (2023), valleylands, unevaluated vegetation patch, unevaluated wetlands and provincially significant (PSW) wetlands occur within the Subject Lands (**Figure 3**). The PSW has been reassessed and should be re-designated as a non-Provincially Significant wetland on London Plan mapping. The Green Space Place Type of Map 1 should also be removed to reflect this change from PSW to wetlands. This north wetland and the two unevaluated wetlands within the property boundary were confirmed present, although the south feature is very small and does not extend into the south adjacent lands as shown on mapping.

2.3 Southwest Area Secondary Plan

The London Plan encompasses secondary plans under separate covers for specific areas within the City of London. The Southwest Area Secondary Plan (SWAP; updated 2019) was developed for the southwest portion of London for lands generally bounded of Southdale Road West, east of White Oak Road, north of Exeter Road and east of Colonel Talbot Road as per Map 7 of the London Plan. The SWAP provides a greater level of detail for the specified area than the policies within the London Plan. The SWAP shall prevail over the London Plan where more detailed direction is supplied. The SWAP outlines detailed objectives of each of the stated principles of the plan including to “[create] a diverse and connected community, [provide] a range of housing choices, [provide] a competitive place to work and invest, [create] a green and attractive environment and [build] a model of sustainable growth management.”

The Subject Lands are located in the North Talbot Residential Neighbourhood, as shown on Schedule 12 of the SWAP (2019). The Low Density Residential, Medium Density Residential and Open Space and Environmental Review land use types overlap the Subject Lands as per Schedule 12 (North Talbot Residential Neighbourhood Land Use Designations) of the SWAP (2019; **Figure 4**). The feature associated with the Open Space and Environmental Review designation is the northern wetlands which were considered Provincially Significant at the time of SWAP. The designation was revised to non-PSW in 2019 but this has not be revised on any

Official Plan maps to date. The existing woodland within the Subject Lands is designated as Low Density Residential.

2.4 City of London Zoning By-law

Under City of London Zoning By-law No. Z.-1, the Subject Lands are zoned Urban Reserve (UR3; **Figure 5**). Permitted uses and regulations within the Urban Reserve zone are defined under Section 49 of the Zoning By-law and include existing dwellings, agricultural uses, conservation lands, and riding stables. As such, proposed development deviates from the permitted uses or the regulations identified under the Zoning By-law; therefore, a Zoning By-law Amendment is required.

2.5 Upper Thames River Conservation Authority

The UTRCA administers the *Prohibited Activities, Exemptions and Permits Regulation*, under *Ontario Regulation 41/24*, pursuant to Section 28 of the Conservation Authorities Act, 1990 (Revised April 1, 2024). Areas within the jurisdiction of the authority are delineated within the “Regulation Limit” and the Authority may grant permission for development within the Regulation Limit where it has been demonstrated that satisfactory controls will be implemented.

As per *Ontario Regulation 596/22*, which came into effect on January 1, 2023, conservation authorities have been prohibited from providing comments related to natural heritage matters. Accordingly, the UTRCA has indicated that they will not provide natural heritage comments and will defer natural heritage matters to the City of London.

As per UTRCA regulation mapping, the UTRCA considers the northern wetlands and wetland features with associated drainage features within the existing woodland to be within the UTRCA regulation area (**Figure 6**). The south surface drainage feature is shown as a flooding hazard although development has proceeded, and this flow does not appear to be present. This drainage feature is assumed to now be subsurface in the storm sewer system.

2.6 Implementation Considerations

An assessment of the quality and extent of natural heritage features and functions found on, and adjacent to, the Subject Lands was undertaken to comply with the requirements of applicable legislation, plans and policies. Federal and provincial legislation that is not subject to the provisions of the *Planning Act* has been considered in the context of the implementation of the proposed development plan and application of recommended mitigation and avoidance measures. The applicability of these documents shall be contingent upon the presence of natural heritage features, site-specific conditions, and the availability of critical habitat. Additional policy and legislative documents considered in support of anticipated planning approval and implementation requirements are summarized in the following sections.

2.6.1 Endangered Species Act

The provincial *Endangered Species Act, 2007 (ESA; Consolidated 2021)* protects all threatened, endangered and extirpated listed on the Species at Risk in Ontario (SARO) list. As defined under the *ESA*, these species are protected from killing, harm, harassment or possession, and their associated habitats are protected from damage or destruction. Activities that have the potential to impact protected species, or their associated habitats, shall be reviewed in consultation with the Ministry of the Environment, Conservation and Parks (MECP) to determine if an authorization may be granted under the *ESA*, subject to applicable exemptions.

A Species at Risk (SAR) Screening Report was submitted to MECP on August 13, 2020, to assess the need for an authorization in support of the proposed development under subsection 9(1) or 10(1) of the *ESA*. The Screening Report included the entire west half of the Legal Parcel (Phase 7 and 8), including the Subject Lands. A response was received on February 17, 2021, indicating no contravention of section 9 or 10 of the *ESA* was anticipated as long as the proposed mitigation measures provided in the preliminary screening report are implemented (**Appendix A**).

2.6.2 *Migratory Birds Convention Act*

The federal *Migratory Birds Convention Act, 1994 (MBCA; 2017)* aims to protect and conserve migratory birds (and their nests) as populations and individuals. No work is permitted to proceed that would result in the damage, destruction, removal or disturbance of nests, or the wounding, capture, removal or killing of bird species protected under the regulations of the *MBCA*.

2.6.3 *Fish and Wildlife Conservation Act*

The *Fish and Wildlife Conservation Act, 1997 (Consolidated 2023)* regulates hunting, trapping, fishing, and related activities in Ontario in order to support the conservation of fish and wildlife resources in the province. Under the authority of the Act, a licence administered by the Ministry of Natural Resources and Forestry (MNR) is required to permit the hunting or trapping of fish and wildlife (i.e., including the capture fish and wildlife for the purposes of salvage and relocation).

3.0 PHYSICAL ENVIRONMENT

Consideration of the larger ecological matrix contributes to developing a better understanding of potential interactions between abiotic and biotic flows and exchanges. As depicted on **Figure 1**, the larger local landscape setting surrounding the Subject Lands is composed of a mixture of residential subdivisions and a single residential home to the north. In terms of potential movement corridors, primary linkage features traversing the broader landscape are limited as the Subject Lands are largely surrounded by residential homes and roads. The existing woodland in the southwest corner may provide marginal connection to Talbot Park along the pedestrian trail to the Talbot Village Wetland. From the Talbot Village Wetland, movement is further limited by roads and development.

Surrounding road networks (i.e., Southdale Road West) function as a physical barrier to wildlife movement and may limit abiotic and biotic exchanges north of the Subject Lands.

3.1 Physiography

The Study Area is located within the Mount Elgin Ridges physiographic region of southern Ontario. This area is characterized by successions of ridges and vales from St. Thomas to Drumbo with the ridges comprised of brown calcareous clay and silty clay and the vales composed of alluvium gravel, sand and silt creating contrasting soils (Chapman & Putnam, 1984).

3.2 Soils & Geology

Surficial geology mapping available through the Ministry of Energy, Northern Development and Mines (2017) indicates that the Subject Lands and broader Study Area are underlain by till which is predominantly composed of clay to silt textured till deposits derived from shale and or glaciolacustrine deposits.

The Subject Lands is largely located on the Ingersoll Till Moraine with a small area along the south boundary on the Port Stanley Till (EXP, 2024a). Based on boreholes completed by EXP between 2018 and 2020, the Subject Lands are generally underlain by a low permeability silty clay/silt till layer with a sand-silt aquifer beneath the till. A permeable sand and gravel lens within the till layer and a sand unit was recorded beneath the till at the southern boundary of the Subject Lands (EXP, 2024a).

3.3 Surface Water Features & Drainage

The Study Area is situated within the Dingman Creek Quaternary Subwatershed, which forms a component of the larger Lower Thames River Watershed. The Dingman Creek Subwatershed included the municipality of the City of London, Thames Centre and Middlesex Centre. The natural cover consists of 18.4% of vegetation cover and 5.4% of wetland cover with a goal of a minimum of 6% wetland cover to align with Environment Canada recommendations (UTRCA, 2022). An un-named municipal drain (Class F drain) is mapped through the south portion of the existing woodland feature connecting to the central wetland. This drain is shown to continue west on UTRCA mapping, but it was not observed within the woodland and the west adjacent lands are fully developed. No off-site hydrogeological connection was observed. The municipal drain is further mapped as a closed/tiled drain to the north connecting to the northern wetland features (OMAFRA, 2024).

Based on field investigations and London Plan mapping, three wetlands are present within the Subject Lands (**Figure 7**). The north wetland has two sections and appears to be wet most of the year (EXP, 2024a). A second wetland is present directly east of the woodland on site. A third small (~0.03 ha) wetland inclusion is present within the south Subject Lands. This inclusion is a pool in a low part of the woodland edge. No other surface water features are present within the Subject Lands.

The existing topography of the Subject Lands is generally flat, with topographic lows associated with the wetlands and drainage feature on site (EXP, 2024a). Drainage is primarily through surface infiltration and overland flow, with runoff generally following topography. Surface runoff appears to drain to the southwest.

3.4 Hydrogeology

A review of the Source Protection Plan (TSRSPC, 2015) developed by the Upper Thames River, Lower Thames Valley and St. Clair Region Conservation Authorities, in partnership with the Source Protection Committee, was conducted to characterize existing hydrogeologic conditions within the Study Area. As per Source Protection Plan mapping, the Study Area occurs within the Upper Thames Valley Source Protection Area of the Thames-Sydenham and Region Source Protection Region established under Ontario Regulation 284/07. As per the Source Protection Plan and a review of Source Protection Information Atlas (MECP, 2023), the Subject Lands are outside of any Significant Groundwater Recharge Area, Highly Vulnerable Aquifer or Wellhead Protection Area.

As per the Hydrogeological Assessment prepared by EXP (2024a), groundwater levels were collected monthly from May 2018 or July 2020 to July 2021, and then again from October 2023 to May 2024. A datalogger was also installed in BH101-BH103 from July 2020 to July 2021. Groundwater levels in the shallow silty clay till ranged from dry to 0.19 m above ground surface (ags). All wells screened in sand were dry the entire monitoring period.

The north wetland had shallow groundwater levels with above ground surface water some of the year (EXP, 2024a). The north portion (Polygon 5) was most wet during spring freshet, and the south portion (Polygon 4) was wet January – July 2020. At BH101 (west edge), groundwater

levels changed seasonally (higher levels in spring freshet), did not respond to precipitation directly, and had levels relatively consistent between 2020-2021 and 2023-2024. At BH102 along the east edge of the north wetland, the groundwater levels had minimal seasonal changes but did respond to precipitation. Measurements at the north wetland (both sections) indicate a downward gradient with recharge conditions.

At BH103 along the north of the woodland-associated wetland (Polygon 2), groundwater levels were higher during spring freshet, responded to precipitation, and were consistent between the two monitoring periods (EXP, 2024a). Groundwater at BH6/WH (screened at lower depth next to BH103) and BH104/MW (south of wetland) had relatively consistent levels throughout the period. This wetland appears to be fed by both surface and groundwater (EXP, 2024a).

4.0 BACKGROUND REVIEW

MTE has conducted a background review to delineate regionally designated natural heritage features and linkage corridors within, the Study Area. Aerial imagery and existing natural heritage feature mapping available through The London Plan (2023), Land Information Ontario (LIO) and UTRCA regulation mapping has been reviewed to provide insight into the overall character of the Subject Lands. Natural heritage databases have also been reviewed to supplement ecological field investigations.

4.1 Biological Setting

The Study Area occurs within Lake Erie - Lake Ontario Ecoregion 7E which extends from Lake Ontario to Lake Erie and includes most of the Lake Erie shoreline. Ecoregion 7E is located within the Great Lakes Watershed and is characterized by the mild climate associated with the Deciduous Forest Region.

Natural features overlapping the Study Area include a woodland as per the provincial LIO geographic database (MNRF, 2021) and Natural Heritage Information Centre (NHIC) mapping (2023). The woodland is situated along the west boundary of the Subject Lands in the southwest corner.

Based on a review of MNRF, UTRCA and City of London mapping, two valleylands, unevaluated wetlands, a provincially significant wetland (PSW) and an unevaluated vegetation patch are present on, or adjacent to, the Subject Lands. The PSW is not currently shown on MNRF mapping as this wetland was downlisted in 2022. No PSWs are present within the Study Area.

4.2 Background Information

Background resources were reviewed to inform the overall character of the Subject Lands and to develop baseline data with regards to species and habitat with the potential to occur within the Study Area. Background documents and databases reviewed included:

- Aerial imagery;
- MNRF's NHIC database for SAR occurrences (2020);
- DFO Aquatic SAR Mapping (2023);
- Bird Studies Canada's Atlas of Breeding Birds of Ontario (2005);
- Ontario Nature's Reptile and Amphibian Atlas (Ontario Nature, 2019); and
- Online citizen science databases (e.g., eBird and iNaturalist).

The results of the background review are summarized below. This data assisted in defining targeted ecological field investigations conducted on the Subject Lands as well as level of survey effort. Field investigations are intended to confirm and refine species occurrence data, as applicable, for features present within the Study Area in order to inform the significance assessment provided in the subsequent sections of this report.

4.2.1 Species Occurrence Data

Species listed as endangered or threatened on the SARO list are legally protected from harm or harassment and their associated habitats are protected from damage or destruction, as per the *ESA* (2007). Species of Conservation Concern (SOCC) include those species listed as Special Concern on the SARO list as well as provincially rare species (i.e., ranked S1 to S3). Provincial conservation status rankings are established by the NHIC based on the number of occurrences in Ontario and are defined as follows:

- S1: critically imperiled; often fewer than 5 occurrences;
- S2: imperiled; often fewer than 20 occurrences;
- S3: vulnerable; often fewer than 80 occurrences;
- S4: apparently secure;
- S5: secure; and
- S?: unranked, or, if following a ranking, rank uncertain (e.g., S3?).

Provincial status rankings do not provide an indication of regional abundance or rarity (i.e., species uncommon in the province may still be locally abundant in some regions).

The NHIC database (2020) was reviewed for records of provincially significant species and/or habitats occurring within the Study Area. Occurrence data is provided for 1 km² area squares, with eight squares overlapping a portion of the Study Area (17MH7454, 7453, 7452, 7554, 7553, 7552, 7653, 7652). The Ontario Breeding Bird Atlas (OBBA; 2001-2005 occurrence data) and the Ontario Reptile and Amphibian Atlas contain detailed information regarding the distribution of bird and reptile species in Ontario. Data is presented on 10 km² area blocks, with one data square overlapping the Study Area (17MH75). Online citizen science sources (i.e., iNaturalist and eBird) were also reviewed to identify protected species and SOCC that have the potential to occur within the Study Area.

As per background data sources, a total of six species protected under the *ESA* (2007) were recorded within the atlas squares that overlap the Study Area, with the following species of interest noted (**Appendix B**):

- Eastern Hog-nosed Snake (*Heterodon platirhinos*)

Furthermore, nine species of provincial interest (i.e., listed as Special Concern on the SARO list or ranked S1 to S3) were identified within the atlas squares overlapping the Study Area (**Appendix B**).

Of these species, the following species of interest are noted:

- Green Dragon (*Arisaema dracontium*);
- Eastern Wood-Pewee (*Contopus virens*);
- Wood Thrush (*Hylocichla mustelina*); and
- Snapping Turtle (*Chelydra serpentina*).

As species records only provide general occurrence data, the final determination of species presence or absence shall be subject to the availability of suitable habitat on the Subject Lands as determined through site-specific field investigations and discussed in Section 5.0.

Additional SAR with the potential to occur within the Study Area include Little Brown Myotis (*Myotis lucifugus* – END), Northern Myotis (*Myotis septentrionalis* – END), and Tri-coloured Bat (*Perimyotis subflavus* – END). These species are not well-represented within background information sources and will therefore be considered on a site-specific basis where suitable habitat is present.

Critical habitat and distribution data for aquatic species was reviewed through DFO's aquatic SAR mapping (2023). No aquatic SAR were identified within the Study Area.

5.0 NATURAL ENVIRONMENT

The Natural Heritage System (NHS) is intended to support regional and site level connectivity among natural heritage features and processes to maintain biological and geological diversity, natural functions, viable native species populations and ecosystems. For this site, despite prior compensation elsewhere as part of the community planning process, any critical components of the NHS that are identified shall be protected, conserved, enhanced and managed to improve the ecological integrity, connectivity and biodiversity of the natural environment over the long term.

In consideration of the type and extent of natural heritage features and areas present within the Study Area, environmental studies have been scoped in consultation with the City and relevant agencies as part of the pre-consultation process for site-specific development. A Scoped EIS shall incorporate targeted ecological field investigations that reflect the species and habitats known or anticipated to occur within the Study Area in support of the development application.

As per the Scoping Checklist established in consultation with reviewing authorities, a suite of ecological field investigations was conducted on the Subject Lands to inform the evaluation of significance. Field investigations have been conducted on this property since 2017, however only the most recent and relevant data to the Subject Lands will be provided in this EIS.

Adjacent lands were assessed from the property boundary or publicly accessible areas, as applicable. Protocol information for each of the field investigations conducted on the Subject Lands are summarized below and discussed in detail in the following sections. Dates and conditions of the fieldwork are summarized in Table 1, below. Surveys conducted by MTE are presented in the following sections and summarized in Table 1, below.

- Preliminary Ecological Site Assessment to document existing conditions, confirm the natural heritage features present, and inform field investigations;
- Two-season botanical inventory and vegetation community classification using sampling protocols outlined in the Ecological Land Classification for Southern Ontario (Lee et. al., 1998) manual;
- Breeding Bird Surveys following protocols set forth by the Ontario Forest Bird Monitoring Program (Cadman et al., 1998) and the Ontario Breeding Bird Atlas participant's guide (OBBA, 2001) for diurnal birds;
- Anuran Surveys conducted based on the standardized Marsh Monitoring Program (BSC, 2009a) protocols for amphibians, which have been adapted based on professional experience;

- Snake Visual Encounter Surveys (VES) and snake coverboard surveys conducted based on the protocols defined within the Survey Protocol for Ontario’s Species at Risk Snakes (MNRF 2016);
- Bat Habitat Assessment following the Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF, 2017) and the Bat and Bat Habitats: Guideline for Wind Power Projects (MNRF, 2011);
- Acoustic Monitoring for bat species conducted based on the guidance provided within the Survey Protocol for Species at Risk Bats within Treed Habitats (MNRF, 2017) and the Bat and Bat Habitats: Guideline for Wind Power Projects (MNRF, 2011);
- Headwater drainage feature assessment (HDFa) as guided by the Constrained Headwater Sampling Protocol in the Ontario Stream Assessment Protocol (OSAP; 2017);
- Wildlife and Species at Risk Habitat Assessment (including a bat habitat assessment); and
- A Significant Wildlife Habitat Assessment using guidance from the Significant Wildlife Habitat Technical Guide (OMNR, 2000) and Criteria Schedules for Ecoregion 7E (MNRF, 2015).

Table 1: Ecological Field Investigations & Natural Area Inventories (2017-2020)

Survey Type	Date	Time		Temperature (°C)	Cloud Cover (%)	MTE Surveyor(s)
		Start	End			
Anuran Calling Survey #1	April 9, 2024	22:48	13:16	16	40	Will Huys
Anuran Calling Survey #2	May 7, 2024	21:03	21:45	19	60	Will Huys
Anuran Calling Survey #3	June 20, 2024	22:45	23:32	22	40	Allie Leadbetter, Cortney Groenestege
Bat Habitat Assessment	May 9, 2018	14:00	16:00	26	0	Lindsay McKay, Will Huys
Bat Acoustic Monitoring	June 4, 2020- June 18, 2020	-	-	-	-	Lindsay McKay, Heather Arseneault
Summer Floral Inventory	July 4, 2024	10:30	14:30	27	40	Elise Roth, Victoria Schveighardt
Spring Floral Inventory	May 7, 2024	18:41	21:03	22	95	Will Huys
Breeding Bird Survey #1	June 7, 2024	6:30	7:45	17	40	Will Huys
Breeding Bird Survey #2	June 21, 2024	6:45	7:45	20	0	Will Huys
Snake Coverboard	May 20 - June 18, 2020	-	-	-	-	Lindsay McKay

Survey Type	Date	Time		Temperature (°C)	Cloud Cover (%)	MTE Surveyor(s)
		Start	End			
Surveys and VES						
H DFA #1	April 22, 2024	16:30	19:00	12	50	Elise Roth, Victoria Schveighardt
H DFA #2	May 16, 2024	16:45	18:30	23	15	Elise Roth, Victoria Schveighardt
H DFA #3	July 4, 2024	10:30	14:30	27	40	Elise Roth, Victoria Schveighardt

5.1 Terrestrial Habitat & Species

5.1.1 Ecological Land Classification

Ecological Land Classification (ELC) was completed to the finest level of resolution (i.e., Vegetation Community Type) in accordance with the sampling protocols outlined in the Ecological Land Classification for Southern Ontario (Lee et al., 1998) manual. Vegetation community types were sampled, verified and revised, if necessary to determine the provincial and regional significance of features present within the Study Area based on the rankings assigned by the NHIC (2022).

Five vegetation cover types were identified within the Study Area, as illustrated on **Figure 7** and summarized in Table 2, below. All vegetation communities are ranked secure in Ontario. Field data collection sheets are provided in **Appendix C**.

Table 2: Ecological Land Classification

Polygon	ELC Code	Description	S-Rank	Area (ha) on the Subject Lands
1	FOD7	Fresh-Moist Deciduous Lowland	N/A	3.86
2	MAM	Mineral Meadow Marsh	N/A	0.21
3	OAGM1	Annual Row Crops	N/A	7.14
4	MAS2	Mineral Shallow Marsh	N/A	0.14
5	SWD3	Maple Mineral Deciduous Swamp	N/A	0.27

Polygon 1

Polygon 1 is a Fresh-Moist Deciduous Lowland (FOD7) community dominated by American Basswood and Black Walnut in the canopy with Sugar Maple and Northern Red Oak to a lesser extent. Hawthorn species are dominant in the understorey along with Common Buckthorn, Gray Dogwood, and Tartarian Honeysuckle. Garlic Mustard, White Avens, Black Raspberry, and Common Burdock are frequently found in the ground layer. This community has a small (~0.03 ha) wetland inclusion in the south. Surface water was observed in parts of the woodland during spring freshet in 2021 and 2024 (EXP, 2024a).

Polygon 2

Polygon 2 is a Mineral Meadow Marsh (MAM) embedded in the east side of the existing woodland dominated by Eastern Buttonbush, White Willow and Red-osier Dogwood. As per the

previous owner's recollection, Polygon 2 was created between 1954-1962 as a pond for horses and cattle on the property. In 2017, the pond was partially filled as it was no longer used for cattle and horses as the property transitioned to crop farming. The wetland has decreased in size due to partial filling in 2017; however, here is still a wetland feature present along the woodland functioning as a wetland. The feature appears to be wet for most of the year based on observations by MTE.

Polygon 3

Polygon 3 is active agricultural lands surrounding Polygons 1, 2, 4 and 5. A portion of Polygon 3, to the east of the existing woodland, was previously a Dry-Moist old Field Meadow (CUM1-1) used for pasture; however, it has been annexed into agricultural lands and has been farmed with rotational crops. A portion of the agricultural lands to the east has been developed as a part of Phase 7 of the residential subdivision.

Polygon 4

Polygon 4 is a Mineral Shallow Marsh (MAS2) located to the north of the woodland within the agricultural field, south of Polygon 5. Polygon 4 is dominated by Narrow-leaved Cattails. A downward gradient is present, indicating surface infiltrating conditions (EXP, 2021). Polygon 4 was considered the same wetland unit as Polygon 5 during the original OWES assessment, although it should be noted that the two sections are not connected by wetland habitat (<50% wetland plant cover), and they do not have a permanent surface water connection.

Polygon 5

Polygon 5 is a Maple Mineral Deciduous Swamp (SWD3) wetland community along the north border of the Subject Lands, to the north of Polygon 4. The canopy is largely dominated by Silver Maple with Eastern Buttonbush, Common Buckthorn and Gray Dogwood in the understory. Eastern Buttonbush is currently dominant in the understory. Polygon 5 had standing water during all manual surface water measurements from April to September 2021 (EXP, 2024a).

Assessment of Candidate Significant Wildlife Habitat

The Significant Wildlife Habitat Technical Guide (OMNR, 2000) and the Criteria Schedules for Ecoregion 7E (MNRF, 2015) provide guidance to planning authorities with respect to the identification and protection of SWH in the context of the municipal planning process. Candidate habitat has been evaluated in accordance with ELC Ecosite Codes and habitat criteria defined within the Criteria Schedules for Ecoregion 7E (MNRF, 2015) to identify potential protection areas. Not all sites identified as candidate habitat will be protected due to habitat limitations and based on minimum standards for habitat quality and sustainability.

Appendix D provides a detailed screening of SWH types with the potential to occur within the Study Area. Based on the results of the SWH assessment, the following candidate habitat types were identified on, or adjacent to, the Subject Lands:

Candidate Significant Wildlife Habitat (Subject Lands)

- Bat Maternity Colonies (FOD7);
- Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs; SWD3);
- Amphibian Breeding Habitat (Woodland; FOD7, SWD3, MAM, MAS2);
- Marsh Breeding Bird Habitat (MAM, SWD3);
- Terrestrial Crayfish (MAM, MAS2, SWD3); and
- Habitat for SOCC species: Green Dragon, Eastern Wood-Pewee, Wood Thrush and Snapping Turtle.

Candidate SWH shall subsequently be reviewed in Section 6.5 in the context of defining criteria for confirmed SWH based on the results of targeted ecological field investigations assessing species presence, abundance and diversity.

5.1.2 Vascular Plants

A two-season botanical inventory was completed in 2024 to confirm the provincial status of vascular plant species on the Subject Lands. Spring ephemerals were surveyed in April to May while summer flowering periods were captured in June to August. A fall inventory was not completed in 2024 due to restricted survey timelines; however, no fall-blooming rare or protected species were recorded in the background review or previous study years. The status of all plant species is based on the provincial NHIC database (2022) and the List of Vascular Plants for Ontario's Carolinian Zone (Oldham, 2017).

A total of 149 vascular plant species were identified on the Subject Lands, of which 136 or 92% are native to Ontario and 13 or 8% are introduced species. A full species list is provided in **Appendix E**. The majority of the species (72%) observed on the Subject Lands are ranked S4 or S5 (apparently secure or secure in Ontario).

No species ranked S1 to S3 (i.e., provincially rare species) or nationally rare (i.e., G1 to G3 and SAR) were observed within the Subject Lands. Three species locally rare in Middlesex County were recorded within the Subject Lands including Larger Straw Sedge (*Carex normalis*) and Rock Polypody (*Polypodium virginianum*) in Polygon 1, and Rusty Flatsedge (*Cyperus odoratus*) in Polygon 5.

Although not rare species but worthy of protection, six mature, large diameter Oak tree specimens were identified within Polygon 1 (FOD7). These trees are very large and in good health. The approximate locations of these trees are shown on **Figure 9**.

Coefficient of Conservatism (CoC) values were applied to species in each vegetation community to assist in the identification of potentially sensitive native plants. CoC values range from 0 to 10 and are assigned based on a species tolerance of disturbance and degree of fidelity to certain ecological parameters (Oldham et al., 1995; Wilhelm & Masters, 1995). Species occurring within a wide range of habitat types are assigned a low CoC value, while species occurring only within a narrow range of habitat parameters are assigned a high CoC value. No species identified on the Subject Lands had a high CoC value (i.e., 9 or 10).

Floristic Quality Analysis

Floristic quality is generally defined by the mean CoC and the Floristic Quality Index (FQI). This evaluation system provides an assessment of the fundamental character of the site, without relying on ambiguous parameters such as frequency, dominance, physiognomy, or productivity. Floristic quality allows for an objective numerical comparison between two or more natural areas or vegetation community types by evaluating native plant species' tolerance to disturbance and their degree of fidelity to specific habitats. Each native species is assigned a numerical value (i.e., CoC) in order to calculate a mean CoC that may be used to compare the relative quality of natural areas based on species degree of fidelity to a range of ecological parameters (Wilhelm & Ladd, 1988; Wilhelm & Masters, 1995).

Botanical inventories conducted on the Subject Lands were used to inform associated vegetation community assessments using the Southern Ontario Floral Inventory Analysis (SOFIA; Lebedyk, 2018). SOFIA assigns quantitative plant community values based on floral inventories to evaluate the ecological significance and natural quality of vegetation communities. Results of the floristic quality analysis are provided in Table 3 for each ELC unit identified on the Subject Lands.

Through SOFIA, the mean CoC of vegetation communities was calculated based on all species observed to provide a measure of floristic quality (Lebedyk, 2018). A mean CoC greater than 3.5 is indicative of a floristic quality characteristic of remnant natural habitats. A mean CoC greater than 4.5 indicates a relatively intact natural area with high floristic quality (Oldham, et. al., 1995; Wilhelm & Masters, 1995).

The FQI defined through SOFIA is intended to quantify the overall vegetative quality of a community based on the mean CoC and the number of species present (Oldham et.al., 1995). A community with a FQI less than 20 is considered to have minimal significance from a natural quality perspective, while a community with a FQI greater than 20 is of high floristic quality and a community with a FQI greater than 35 is considered to have sufficient conservatism and richness to be floristically important from a provincial perspective (Wilhelm & Ladd, 1988). No mean CoC or values identified for community types on the Subject Lands are higher than the minimum thresholds for moderate floristic quality (i.e., 3.5). Polygon 1 was the only community type with a mean FQI higher than the minimum threshold for high floristic quality (i.e., greater than 20).

Table 3: Southern Ontario Floral Inventory Analysis (SOFIA) Results

Vegetation Community	Mean CoC	FQI	Native Species (%)	Non-Native Species (%)	Conservative Species (CoC ≥7)
Polygon 1	2.68	29.39	74	26	1
Polygon 2	2.68	16.55	74	26	1
Polygon 3	-	-	-	-	-
Polygon 4	2.00	6.63	73	27	0
Polygon 5	2.77	19.97	69	31	3

Due to the requested timing of the EIS submission, an updated fall plant inventory has not been conducted. Fall flowering plants were recorded in previous years (2018) and some species that are likely to still be present were included in the analysis based on professional judgement. An updated fall inventory is not considered necessary based on previous surveys and lack of likely fall-blooming rare or protected floral species.

5.1.3 Breeding Birds

Breeding bird surveys were conducted following protocols set forth by the Ontario Forest Bird Monitoring Program (Cadman et al., 1998) and the Ontario Breeding Bird Atlas participant's guide (OBBA, 2001) for diurnal birds. As point count stations are intended for repeat and long-term monitoring, wandering transects through the various habitat types present on the Subject Lands to characterize breeding bird communities were surveyed. Surveys were conducted at least ten days apart between dawn and five hours after dawn during the peak breeding season (i.e., Round 1: May 24 to June 17 and Round 2: June 15 to July 10) when no high winds, heavy fog or precipitation was present. All species within a 100 m radius of the sampling station were recorded during a five-minute period. The number of individuals present, and the highest level of breeding evidence were recorded for all avian species observed.

Results

A total of 25 breeding bird species were identified on the Subject Lands. All species are provincially ranked secure (i.e., S5) or apparently common and secure (i.e., S4; NHIC 2022) in Ontario. One SOCC species was detected within the Subject Lands.

One singing Eastern Wood-Pewee was observed during the first breeding bird survey in Polygon 1 (FOD7). Two singing male Eastern Wood-Pewees were observed during the second breeding bird survey in Polygon 1. This species is considered likely to be breeding in this woodland.

A complete list of the bird species observed within the Subject Lands in 2024 is provided in **Appendix F**.

5.1.4 Amphibians

Targeted surveys for calling anurans (i.e., frogs and toads) were completed for suitable habitats (e.g., wetlands, ponds) located on, and immediately adjacent to, the Subject Lands in accordance with the standardized Marsh Monitoring Program (BSC 2009a) protocols for amphibians. Surveys were conducted at least 15 days apart in early spring (i.e., April 1 to April 15), mid-spring (i.e., May 1 to May 15), and late spring (i.e., June 1 to June 15) when nighttime air temperatures exceeded 5°C, 10°C and 17°C, respectively. Each station was surveyed for a total of three minutes and call levels of all amphibians detected within a 100 m radius were recorded. Surveys began no earlier than 30 minutes after sunset and were completed before midnight.

A summary of observations is provided in Table 4, below. Complete data sheets are provided in Appendix G and station locations are shown on **Figure 8**.

Table 4: Amphibian Call Count Survey Results

Station	Survey Round	Species				
		No Amphibians	Spring Peeper	Western Chorus Frog	American Toad	Gray Tree Frog
1	1		3 ¹		1-2	
	2	x				
	3	x				
2	1		3			
	2		1-5			1-2
	3				1-1	
3	1			3		
	2	x				
	3				1-1 ¹	

¹Indicates calls detected outside of the 100 m radius of the call count station (Figure 8).

²Indicates calls detected outside of the Subject Lands.

A total of four amphibian species (i.e., Spring Peeper, Chorus Frog, American Toad and Gray Tree Frog) were detected during amphibian call count surveys on the Subject Lands and two species (i.e., Spring Peeper and American Toad) were recorded within the wetland feature

located to the northeast along Southdale Road West outside of the Study Area. Of these, all amphibian species are provincially ranked secure (i.e., S5) or apparently common (i.e., S4) in Ontario.

Station 1 was located along Southdale Road West facing south into the wetland feature to the northeast of the Study Area. Only two individual American Toads were heard from this feature.

Station 2 was located to the north within the Subject Lands facing east into the Maple Mineral Deciduous Swamp (Polygon 5) and Mineral Shallow Marsh (Polygon 4). Spring Peeper was heard at Call Code 3 in the swamp portion (Polygon 5) in April 2024. Five individual Spring Peeper were heard from this same swamp in May, and two individual Gray Treefrogs were detected in the marsh portion (Polygon 4) at that time. One American Toad was heard in the marsh in June, with no frogs detected from the swamp.

Station 3 was located at the end of Frontier Avenue facing northwest into the Mineral Meadow Marsh (Polygon 2). Spring Peepers were heard at Call Code 3 in April, but no frogs were detected in this feature in May or June 2024.

5.1.5 Snake Visual Encounter and Coverboard Surveys

Visual encounter and coverboard surveys were conducted during the spring emergence period (i.e., late April and late June) based on the protocols defined within the Survey Protocol for Ontario's Species at Risk Snakes (MNR, 2016). Where no SAR snake species were detected through background reviews, survey protocols and level of effort have been refined to more accurately coincide with the detection probabilities of generalist species.

Area searches conducted on the Subject Lands generally targeted open, semi-open and forest edge habitats where species tend to be more abundant to increase detection rates. A total of 14 coverboards were placed within the Subject Lands. Suitable habitats were searched to detect foraging and basking snakes during the first sunny, warm days of early spring. All survey rounds were completed during sunny conditions when ambient temperatures were between 10°C and 25°C or under overcast conditions when air temperatures were between 15°C and 30°C.

Results

Visual encounter and coverboard surveys were conducted in various habitat types on the Subject Lands, as depicted on **Figure 8**. In accordance with the Survey Protocol for Ontario's Species at Risk Snakes (MNR, 2016), survey effort was based on one or two person hours per hectare within suitable habitats, depending on the complexity of the habitat. A summary of survey results is provided in **Appendix H**.

In total, three Eastern Gartersnakes were encountered under coverboards over the course of the survey period (May 20, 2020 – June 18, 2020). On May 20, an Eastern Gartersnake was also incidentally encountered in the field near Board #14.

Potential hibernacula sites identified on the Subject Lands are limited to Terrestrial Crayfish burrows, which may be used by Butler's Gartersnake. General locations of areas where chimneys/burrows and crayfish individuals were found are depicted on **Figure 9**. Butler's Gartersnake typically prefer open grassy areas next to water sources; however, they have also been recorded along tree edges and vacant urban areas (MECP, 2019). No Butler's Gartersnake or other snake species protected under the *ESA* were observed during targeted coverboard surveys suggesting there are no protected species present to utilize the crayfish burrows for hibernation.

5.1.6 Bat Habitat Assessment

A bat habitat assessment was conducted following the Survey Protocol for Species at Risk Bats within Treed Habitats (MNR, 2017) and the Bat and Bat Habitats: Guideline for Wind Power Projects (MNR, 2011) as amended through the Bats & Treed Habitats - Maternity Roost Survey (MECP, 2022) protocol to identify candidate maternity roosting habitat. In accordance with the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015), maternity colonies may occur within anthropogenic structures and mature forested communities and support critical life cycle functions.

With respect to SWH, snag density provides an indicator of high quality potential maternity roost habitat based on the number of snags/cavity trees with a diameter at breast height (DBH) greater than or equal to 25 cm occurring within each ELC plot (MNR, 2017). In terms of SAR bats, potential habitat is characterized “as any standing live or dead trees ≥ 10 cm [DBH] with cracks, crevices, hollows, and/or loose or naturally exfoliating bark” in accordance with the Survey Protocol for Species at Risk Bats within Treed Habitats (MNR, 2017). As such, all trees with a DBH of 10 cm or greater were reviewed to assess candidate maternity roosting SWH and potential SAR habitat. Targeted surveys were conducted within suitable ecosites identified on the Subject Lands. Surveys were conducted during the leaf-off period (i.e., spring or fall) when tree cavities would not be obscured by foliage.

Results

A cumulative total of 11 candidate maternity trees were identified on the Subject Lands. The locations of all snag/cavity trees are depicted on **Figure 9** and field sheets are provided in **Appendix I**.

Species at Risk Bats

Snag/cavity trees with a DBH ≥ 10 cm were documented to evaluate suitable roosting habitat for SAR bats (i.e., Little Brown Myotis, Northern Myotis and Tri-coloured Bat) within coniferous, deciduous and mixed forest communities (i.e., FO and SW) on the Subject Lands. As per the Survey Protocol for Species at Risk Bats within Treed Habitats (MNR, 2017), high quality potential maternity roost habitat for SAR bats was identified where an ELC unit contained ≥ 10 snags with a DBH ≥ 10 cm per hectare.

No communities within the Subject Lands meet this density criteria but targeted acoustic surveys were proposed regardless to evaluate the presence/absence of SAR bats. Where proposed tree removals may occur within suitable habitat for SAR bat populations (i.e., where multiple snags with ≥ 10 cm DBH occur), acoustic monitoring surveys have been conducted.

Bat Maternity Colony Significant Wildlife Habitat

With respect to bat maternity colony SWH, snag density surveys considered trees ≥ 25 cm DBH occurring within mixed and deciduous forest and swamp communities (i.e., FOD, FOM, SWD and SWM). Where a snag/cavity tree density of ≥ 10 snags per hectare occurred (i.e., for trees with a DBH of ≥ 25 cm), ecosites were identified as candidate maternity colony roost habitat in accordance with the Bat and Bat Habitats: Guideline for Wind Power Projects (MNR, 2011) and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (MNR, 2015). A summary of bat habitat assessment results for each ELC unit surveyed on the Subject Lands is provided in Table 5, below.

Of the two habitat polygons assessed on the Subject Lands, Polygons 1 and 5 do not meet suitable maternity roost habitat criteria based on snag/cavity density. Acoustic data collected is evaluated for the presence of SWH-associated species (i.e., Big Brown Bat, Silver-haired Bat) but SWH is not considered likely to be present.

Table 5: Bat Habitat Assessment Results

Polygon	ELC Ecosite	Area (ha)	Cavity Trees ≥ 10 cm DBH	Cavity Trees ≥ 25 cm DBH	Snag Density (i.e., for trees ≥ 10 cm DBH)	Snag Density (i.e., for trees ≥ 25 cm DBH)
1	FOD7	3.86	0	11	N/A	~2.8 snags/ha
5	SWD3	0.27	0	0	N/A	N/A

No other forested ecosites identified on the Subject Lands meet suitable habitat criteria to be considered candidate SWH.

5.1.7 Bat Acoustic Monitoring

Acoustic monitoring was conducted within each ELC unit determined to have suitable candidate maternity roost habitat in accordance with the guidance provided within the Survey Protocol for Species at Risk Bats within Treed Habitats (MNR, 2017) and the Bat and Bat Habitats: Guideline for Wind Power Projects (MNR, 2011) as amended through the Bats & Treed Habitats - Maternity Roost Survey (MECP, 2022) protocol. Monitoring was conducted using broadband bat detectors, Song Meter SM4Bat Full Spectrum Bioacoustic Recorders, in conjunction with computer software analysis using Kaleidoscope to determine the composition of the species present on the Subject Lands. Acoustic monitoring is intended to detect species presence/absence but does not allow for a direct estimate of species abundance as the number of passes does not have a 1:1 relationship with the number of individuals present (i.e., it is not possible to distinguish between several passes by one individual or a single pass by multiple individuals).

Acoustic surveys are to be conducted over at least ten consecutive evenings (i.e., ambient temperature $>10^{\circ}\text{C}$) between June 1 and June 30, when ambient temperature are above 10°C and there are low winds (i.e., <6 m/s) and no precipitation.

Two Song Meter SM4Bat Full Spectrum Bioacoustic Recorders (Wildlife Acoustics) were deployed in Polygon 1 (FOD7) from June 4 to June 18, 2020. Batcorder 1 (BD1) was equipped with an omni-directional SMM-U1 microphone (Wildlife Acoustics) and Batcorder 2 (BD2) was equipped with an omni-directional SMM-U2 microphone (Wildlife Acoustics). Both microphones were set up 8' off the ground to record bats and recordings were collected from 30 minutes before sunset to 30 minutes after sunrise each night. Batcorder 1 was located at the northern forest edge of Polygon 1 near the farm field (UTM 42.934231, -81.303670) and Batcorder 2 was at the western forest edge of Polygon 1 near a school sports field (UTM 42.932942, -81.303954).

Results

A total of five bat species were recorded on the Subject Lands: Big Brown Bat, Silver-haired Bat, Hoary Bat, Eastern Red Bat and Northern Myotis. Results of acoustic monitoring are summarized in Table 6.

Table 6: Bat Acoustic Monitoring Results

Station	Bat Species						
	Silver-haired/ Big Brown	Big Brown	Hoary	Hoary/ Silver-haired	Silver- haired	Eastern Red Bat	Northern Myotis
BD1	82	42	14	27	2	0	1
BD2	267	433	74	134	28	18	0

Species at Risk Bats

Northern Myotis, listed as endangered on the SARO list, was detected at Bat Detector 1 within Polygon 1; however, only passes with three or more clear calls were considered in analysis thus only a single Northern Myotis pass was recorded. Suitable roosting habitat for this species is characterized by mature wooded forest habitat along forest edges in hollow trees with cavities or under loose bark. The single recorded pass of Northern Myotis over the course of bar recorder deployment is not indicative of maternity roost colonies as many recordings would be expected at dusk and dawn when bats typically emerge and return to roosts. There is no consistent Northern Myotis calling activity; therefore, the ELC community is not considered to represent confirmed maternity roost habitat for species at risk bats. No other protected bat species were detected within the Subject Lands.

Bat Maternity Colony Significant Wildlife Habitat

In accordance with the Criteria Schedules for Ecoregion 7E (MNR, 2015), maternity colonies with *confirmed use* by greater than 10 Big Brown Bats or greater than five adult female Silver-haired Bats meet defining criteria for confirmed bat maternity colony SWH. However, as acoustic monitoring does not allow for a direct estimate of species abundance, age or sex, the number of passes does not correlate with the number of individuals present (i.e., it is not possible to distinguish between several passes by one individual or a single pass by multiple individuals).

Acoustic does confirm that Big Brown Bat and Silver-haired Bat are present within the Subject Lands, though exact numbers of individuals and time of calls were not determined. Silver-haired Bat was detected at relatively low numbers with several nights having no calls recorded; therefore, it is considered unlikely that the SWH criterion (>5 adult female Silver-haired Bat) is met. Big Brown Bats were more numerous, but six nights still had fewer than 10 passes recorded.

Bat maternity colony SWH is considered to be absent from Polygon 1 (FOD7) based on the relatively low occurrence of target species.

5.1.8 Incidental Observations

Incidental encounters with wildlife were documented during all ecological field investigations conducted on the Subject Lands from 2017-2024 to supplement targeted wildlife surveys.

Two bird and one mammal species were recorded incidentally during field investigations and are noted below.

Table 7: Incidental Species Observations

Species	Date	Observation Type	# of Species Observed	ELC Ecosite
Wood Duck	May 6, 2020	Individual	1 Adult Male	MAS2
Wild Turkey	May 25, 2020	Individual		
White-tailed Deer	May 28, 2020	Individual	1 Fawn	Farm field
White-tailed Deer	June 11, 2020	Individual	1 Fawn	FOD7
Big Brown Bat	June 15, 2020	Individual	3	FOD7 adjacent
Eastern Wood-Pewee	June 18, 2020	Heard call	1	FOD7
Eastern Wood-Pewee	July 4, 2024	Individual	1	FOD7
Mallard	April 22, 2024	Individual	1 Adult Male	FOD7
Red-tailed Hawk	May 16, 2024	Individual	1 Flying	FOD7
Red-tailed Hawk	July 4, 2024	Pair	2 Flying	FOD7
Wild Turkey	July 4, 2024	Individual	1 Adult Male	FOD7

All incidental species observed on the Subject Lands are provincially ranked secure (i.e., S5) or apparently common and secure (i.e., S4) in Ontario. Species identified as SAR, locally uncommon, or as potential SWH indicator species (e.g., S1-S3) are discussed below.

A calling Eastern Wood-Pewee male (Special Concern) was observed in Polygon 1 (FOD7) during snake coverboard surveys. As discussed in Section 5.1.3, this species was heard calling during breeding bird surveys in 2024 and is likely breeding in Polygon 1. No incidental observations of turtle basking or activity was noted at any of the wetland features.

5.2 Aquatic Habitat & Species

The biological components of aquatic ecosystem types present within the Study Area have been reviewed through ecological field investigations conducted by MTE in 2024. Field investigations conducted on the Subject Lands include a headwater drainage feature assessment. No other aquatic habitat investigations were conducted within the Study Area. The lower reaches of the drainage feature now appear to sheet flow westward based on contours, but no flow was observed during any visit in 2024. This drainage feature is considered to be contained within the stormwater system of previously developed phases of this North Talbot Community and as a result, the flow paths are isolated from surface water.

5.2.1 Headwater Drainage Feature Assessment

Despite a lack of observed downstream connection, an HDFA was completed to assess the potential flowpath within the Subject Lands noted on spring aerial imagery, as well as identification of a closed/tiled drain on UTRCA mapping. The feature labelled as “UT-DC-285” was assessed. The feature further east (“UT-DC-478”) is not present as this area has been developed.

Methods

A headwater drainage feature assessment (HDFA) was conducted on the Subject Lands in accordance with Credit Valley Conservation and Toronto and Region Conservation Authority Evaluation, Classification and Management of Headwater Drainage Features Guidelines (2014). As per the guidelines, three site visits are required to assess headwater drainage features (HDFs).

Results

The first site visit was conducted in the spring on April 22, 2024. The second visit to assess baseflow conditions was conducted in late spring on May 16, 2024. The third-round survey was completed on July 4, 2024, when flows were expected to cease.

Eight (8) reaches of this one intermittent tributary were studied (**Figure 10**). Data collection sheets are provided in **Appendix J**.

Overall, the drainage feature was largely dry with poor definition and no water (standing or flowing) being observed in many of the reaches, including both HDF1-7 and HDF1-8. Through the assessment, this drainage feature was determined to possibly convey surface flows in the early spring, but otherwise have no flow. Only the wetlands were consistently wet, and these will be addressed as wetland features under London policy. Neither of the downstream reaches (HDF1-7 or HDF1-8) were wet during any visit April to July and reach HDF1-8 was not clearly visible within the woodland. No connection to a downstream feature was observed. The purpose of an HDFA is to identify drainage features that provide fish habitat or are a source of food, sediment, water, nutrient, or organic matter to downstream reaches. With no clear downstream connection to a watercourse, this drainage feature has limited contributions to the overall watershed function. A complete assessment and assignment of management recommendations is therefore not considered appropriate for this feature. Considerations for future development will be protection of wetlands and management of overland flows through stormwater management controls.

5.3 Animal Movement Corridors & Ecological Linkages

Animal movement corridors and ecological linkages are defined as habitat areas where wildlife movement and important life cycle functions are concentrated or particularly susceptible to the impacts of adjacent land uses. As per Policy 1354 of The London Plan (2023), the significance of these areas shall be assessed following criteria outlined within the NHRM (OMNR, 2010), Significant Wildlife Habitat Technical Guide (OMNR, 2000) and the associated Ecoregion 7E Criteria Schedule (MNR, 2015). Given the previous development, the site is isolated from habitat towards the Dingman Creek and as a result, there are no aquatic, lowland or terrestrial linkages.

6.0 EVALUATION OF SIGNIFICANCE

In accordance with applicable provincial, municipal, and conservation authority regulatory policies, the significance of natural heritage features and more particularly any critical ecological functions identified within the Study Area was reviewed to determine appropriate levels of protection and/or compensation given prior planning approvals and compensation previously provided through the Community Planning process.

As per the PPS (2020), the following significant natural heritage features and areas shall be evaluated to assess significance and ecological functions on the landscape to inform the planning process:

- Significant Wetlands
- Significant Coastal Wetlands
- Significant Woodlands
- Significant Valleylands
- Significant Wildlife Habitat
- Significant Areas of Natural and Scientific Interest
- Fish Habitat, and,
- Habitat of Endangered and Threatened Species.

The above features are reviewed in the context of municipal policies where applicable since The London Plan (2023) includes guidelines for evaluation and policies for all relevant features.

6.1 Significant Wetlands and Wetlands

Within the City of London, provincially significant wetlands, wetlands and unevaluated wetlands are protected in accordance with Policies 1330 to 1336 of The London Plan (2023) in conjunction with applicable conservation authority regulations. Provincially significant wetlands and unevaluated wetlands are identified on Map 5 of The London Plan (2023) and may be subject to a significance evaluation through the Ontario Wetland Evaluation System (OWES; MNRF, 2022). Unmapped wetlands identified through vegetation community classification may also require a significance evaluation per OWES.

According to Map 5 of the London Plan, there are four wetland units within the Subject Lands. Two wetlands are to the north of the existing woodland and one wetland borders the woodland along the east side. The south unevaluated wetland is partially present along the property boundary. It is unclear if this feature was partially removed for the south adjacent residential development, or it was always smaller than mapped. One additional unevaluated wetland is shown on Map 5 off property to the west. The west adjacent wetland was not studied or confirmed in the field.

Evaluated Wetlands

The two wetland units to the north (Polygons 4 and 5) were previously complexed into the North Talbots Wetlands PSW. A previous MTE OWES evaluation was completed under a separate cover and a wetland boundary revision request was submitted to the MNRF. The wetland boundary revision request was accepted by the MNRF on July 4, 2022. As such, the LIO mapping has been updated and no longer includes Polygons 4 and 5 as PSW. The London Plan mapping should be updated to reflect this change. The wetland units will be carried forward to the impacts section as non-significant 'Wetlands' under London policy. As per Policy 1333, wetlands confirmed to be non-PSWs by the MNRF will remain as wetlands on Map 5 and the Green Space place type on Map 1.

Unevaluated Wetlands

There is one unevaluated wetland unit along the east side of the existing woodland. The wetland is approximately 0.21 ha (Polygon 2). Typically, wetlands less than 0.5 ha are not evaluated under OWES as units must be a minimum of 0.5 ha to be considered a separate vegetation community (MNRF, 2022). The unevaluated wetland will be carried forward to the impacts section as a non-PSW.

The south wetland inclusion is very small (~0.03 ha) and is a shallow pool at the edge of the woodland. This inclusion is too small to map according to OWES protocol, however, since The London Plan requires the protection of all wetlands in some form, the inclusion will be carried forward in this EIS as a ‘Wetland’ (non-PSW) under London policy.

For non-significant wetlands, as per Policy 1334 of the London Plan, no net loss of wetland functions or features is to occur. Wetlands between 0.1 and 0.5 ha may be considered for less than 1:1 replacement provided there is a net gain to the wetland system in addition to the overall natural heritage system. Where a wetland is less than 0.1 ha, the City may consider replacement on a less than one-to-one land area basis and/or additional measures to achieve no net loss of function.

6.2 Significant Coastal Wetlands

As with significant wetlands, significant coastal wetlands are identified by MNRF or their designates and are defined under the NHRM (OMNR, 2010) as:

- “any wetland that is located on one of the Great Lakes or their connecting channels (Lake St. Clair, St. Mary’s, St. Clair, Detroit, Niagara and St. Lawrence Rivers); or
- any other wetland that is on a tributary to any of the above-specified water bodies and lies, either wholly or in part, downstream of a line located 2 kilometres upstream of the 1:100 year floodline (plus wave run-up) of the large water body to which the tributary is connected.”

No significant coastal wetlands were identified within the Study Area.

6.3 Significant Woodlands

Significant woodlands are included in the Green Space Place Type on Map 1 and identified on Map 5 of The London Plan (2023). Potential woodlands are identified as Unevaluated Vegetation Patches on Map 5 – Natural Heritage. The existing woodland is currently mapped as an unevaluated vegetation patch on Map 5, though it is not mapped on the SWAP (2019). No mapped significant woodlands occur within the Study Area.

As per previous community plans and the SWAP plan, the wooded feature within Phase 8 was designated for development given the previous compensation and connectivity linkage provided through prior phases of development.

Although this woodland has been designated for development, the unevaluated vegetation patch within the Subject Lands will still be assessed using criteria from the 2021 EMGs to determine critical components of the woodland that could be considered for retention and/or compensation. The evaluation of functions is outlined in Table 8, below.

Table 8: Woodland Evaluation for Subject Lands (City of London 2021 EMGs)

Evaluation Category	Woodland Characteristics	MTE Assessment
1.1 Site Protection	<ul style="list-style-type: none"> • HIGH – Small (0.2 ha) wetland is not large enough to qualify as a separate wetland community worthy of OWES evaluation nor do City criteria specify wetland size; however, wetland is contiguous with the patch. • LOW – Minimal erosion risk (slope <10%) 	High

Evaluation Category	Woodland Characteristics	MTE Assessment
1.2 Landscape Integrity	<ul style="list-style-type: none"> • LOW – landscape richness (<7% local vegetation cover within a 2 km radius from the patch centroid) • LOW – landscape connectivity (barriers include roads and urban development; patch minimally connected to west trail leading to North Talbot PSW) • LOW – patch distribution (isolated patch, no patch cluster >20 ha) 	Low
2.1 Age and Site Quality	<ul style="list-style-type: none"> • HIGH – Mature forest (FOD7) community • LOW – mean coefficient of conservatism <4.2 	High
2.2 Size and Shape	<ul style="list-style-type: none"> • MEDIUM – Patch is ~4 ha (2.0 - 9.0 ha) • LOW – Patch has no interior habitat. • MEDIUM – Patch provides breeding habitat for Eastern Wood-Pewee (SC) 	Medium
2.3 Diversity	<ul style="list-style-type: none"> • LOW – low community diversity (patch contains two ELC communities) • MEDIUM – Patch contains two communities; wetland and bottomland topographic features • LOW – no critical habitat for amphibians • LOW – no conifer communities • LOW – no fish habitat available 	Low
4.1 Significant Habitat for Threatened or Endangered Species	<ul style="list-style-type: none"> • No Threatened or Endangered species were observed within the patch. • Eleven candidate maternity roost trees were identified; however, this does not represent significant habitat of Threatened or Endangered species. MECP generally accepts compensation for the removal of a small number of potential habitat trees. Only one Northern Myotis call was detected through acoustic surveys throughout the survey duration period. One single call is not indicative of significant (i.e., roosting or foraging) endangered species habitat. 	NO
5.1 Distinctive, Unusual, or High Quality Communities	<ul style="list-style-type: none"> • LOW – no communities with S-rank greater than S5 • HIGH – Eastern Wood-pewee and Terrestrial Crayfish SWH confirmed within FOD7 • MEDIUM – One regionally rare plant in the City of London (Larger Straw Sedge) • MEDIUM – Trees greater than 50 cm dbh are occasional throughout the patch • MEDIUM – average basal area for all communities in the patch is >16m²/ha for trees >10 cm DBH 	High
5.2 High Quality Landform	<ul style="list-style-type: none"> • MEDIUM – patch is located on the Ingersoll Till Moraine 	Medium

Based on data collected from 2017-2020 and using the 2021 EMGs provided by the City of London above, the woodland provides functions which score high for presence of a wetland, maturity, and significant wildlife habitat. Wetland size and location on the Ingersoll Tille Moraine are also contributing factor (medium scores). As a result, the proponent has revised development plans to retain these components in their development application.

6.4 Significant Valleylands

No significant valleylands have been identified by the planning authority within the Study Area. The two valleylands shown on Map 5 are not connected to features downstream and would not qualify as significant valleylands. These drainage features will be discussed in this EIS in terms of stormwater management on site.

6.5 Significant Wildlife Habitat

The Significant Wildlife Habitat Technical Guide (OMNR, 2000), Criteria Schedules for Ecoregion 7E (MNRF, 2015) and the NHRM (OMNR, 2010) provide technical guidance for the identification and evaluation of SWH in the context of the municipal planning process. Candidate SWH was evaluated at the onset of the project (Section 5.1.1), based on ELC Ecosite Codes and general habitat criteria defined within the Criteria Schedules for Ecoregion 7E (MNRF, 2015), to define the scope of ecological field investigations conducted on the Subject Lands. Candidate SWH has subsequently been reviewed in the context of defining criteria for confirmed SWH based on the results of targeted ecological field investigations assessing species presence, abundance and diversity.

In addition to provincial evaluation criteria for the designation of SWH defined through the Significant Wildlife Habitat Technical Guide (OMNR, 2000), Criteria Schedules for Ecoregion 7E (MNRF, 2015), and the NHRM (OMNR, 2010), key considerations outlined under Policies 1352 and 1354 of The London Plan (2023) shall also be reviewed to inform the determination of SWH.

Four categories of SWH are defined within the Criteria Schedules for Ecoregion 7E (MNRF, 2015): Seasonal Concentration Areas of Animals, Rare Vegetation Communities or Specialized Habitat for Wildlife, Habitat for Species of Conservation Concern and Animal Movement Corridors. A detailed screening of each SWH type with the potential to occur within the Study Area is provided in **Appendix D**. Based on the results of the SWH assessment, the following candidate and confirmed habitat types were identified within the Study Area:

- Terrestrial Crayfish SWH (FOD7, MAS2, MAM);
- Habitat for Eastern Wood-Pewee (FOD7); and
- Assumed habitat for Snapping Turtle (MAM, 2, SWD3)

Candidate SWH types have been carried forward for further evaluation where screening requirements could not be satisfied through detailed, site-specific studies (e.g., timing windows missed, access restrictions, etc.). As such, candidate SWH types that could not be confirmed absent are assumed to be present within the Study Area for the purposes of evaluating potential impacts of the proposed development. Only habitat for Snapping Turtle is unconfirmed and therefore will be assumed present.

Confirmed and assumed SWH types identified within the Study Area are discussed below in detail to outline the targeted surveys completed, habitat suitability, habitat location(s), and defining habitat criteria. SWH that has been confirmed absent is discussed in **Appendix D**.

Terrestrial Crayfish

There is suitable MAM, MAS2 and SWD3 habitats to support terrestrial crayfish life processes. Terrestrial crayfish chimneys and individuals were observed along all wetland communities within the Subject Lands; therefore, confirming significance in Polygons 5 (SWD3), 4 (MAS2), and 2 (MAM).

Habitat for SOCC Species – Eastern Wood-pewee

Eastern Wood-pewee was observed (calling males) during both breeding bird surveys in Polygon 1 (FOD7), confirming significance. This species is found in a variety of deciduous and mixed forests, with a preference for intermediate-age mature forests with limited understory vegetation.

Habitat for SOCC Species – Snapping Turtle

There is wetland habitat within the Subject Lands that may be suitable to support this species during the spring/summer, although all wetlands are isolated by agricultural lands and not connected online to permanent watercourses. Snapping turtles prefer slow-moving water but have been found in most freshwater habitats. No targeted surveys to confirm presence or absence of turtles were conducted; however, no incidental encounters were observed during any site investigation from 2017 to 2024 and no nesting habitat has been observed. Habitat for Snapping Turtle conservatively remains candidate in Polygons 2, 4, and 5 to flag for wetland compensation to ensure wildlife capture and relocation is considered.

6.6 Significant Areas of Natural and Scientific Interest

Significant ANSIs are identified as provincially significant by MNRF in accordance with evaluation procedures established by the province.

As per LIO ANSI Mapping, no significant ANSIs were identified within the Study Area.

6.7 Fish Habitat

No direct fish habitat is present within the Study Area. There are no observed opportunities for upstream fish movement and there is a lack of permanent surface water in the reaches within the Subject Lands. In consideration of potential biophysical and ecological contributions to downstream fish habitat, surface water drainage features on the Subject Lands have been evaluated not significantly contributing as indirect fish habitat.

Fish habitat will not be considered further in this EIS.

6.8 Habitat of Endangered or Threatened Species

In accordance with the *ESA* (2007), the habitat of all provincially ranked threatened or endangered species shall be protected from damage or destruction. Delineation of endangered, threatened or special concern species' habitat is required through secondary plans, SLSRs and EISs where known. Habitat of special concern species will also be evaluated through considerations listed in Policy 1327 (1-3) of the London Plan. Development or site alteration is generally not permitted except in accordance with applicable provincial and federal requirements.

Through the background review, one threatened (i.e., Eastern Hog-nosed Snake) and three endangered species (i.e., Little Brown Myotis, Northern Myotis, Tri-coloured Bat) with the potential to occur on, or adjacent to, the Subject Lands were identified (**Appendix B**). Targeted field investigations were completed to assess habitat suitability and presence of these species, and the results are summarized below.

All other species occurrences detected through the background review were evaluated in the context of the Subject Lands based on the availability of suitable habitat and detailed ecological field investigations. No threatened or endangered species or associated suitable habitats for these species were detected on, or adjacent to, the Subject Lands.

Eastern Hog-nosed Snake

There is no critical habitat (i.e., open grassy areas with loose, sandy soils) present to support life processes (i.e., nesting and overwintering) of Eastern Hog-nosed Snake. There is a very low potential for Eastern Hog-nosed Snake to be present within the Subject Lands due to a lack of critical habitat, minimal habitat suitability, isolation by roads and development, and limited distribution in central London. No Eastern Hog-nosed were observed during any field investigations, including snake coverboards surveys, though it is acknowledged they are a cryptic species. Overall, this species is not considered likely to be present within the Study Area.

Little Brown Myotis, Northern Myotis & Tri-coloured Bat

Suitable maternity roosting habitat is present within the Polygon 1 (FOD7) woodland for Little Brown Myotis, Northern Myotis and/or Tri-coloured Bat. As discussed in Section 5.1.8, targeted acoustic surveys were conducted in June 2020 to identify species at risk bats. Acoustic results revealed no Little Brown Myotis, Northern Myotis and Tri-coloured Bat were utilizing the Subject Lands for roosting. Only a single Northern Myotis call was recorded, which is not indicative of roost habitat presence.

No endangered or threatened species or their habitat is present in the Subject Lands.

6.9 Environmentally Significant Areas

As per Map 1 and Map 5 of The London Plan (2023), confirmed ESAs are designated Green Space Place Type while potential ESAs requiring further evaluation are included in the Environmental Review Place Type designation. As per the evaluation criteria defined within the Environmental Management Guidelines (2021), potential ESAs that satisfy two or more evaluation criteria shall be considered for designation as a confirmed ESA.

There are no mapped ESAs within or adjacent to the Subject Lands as per Map 5 of The London Plan. Three or more criteria as set out in the London EMGs (2021) has not been met to confirm a regional ESA.

6.10 Upland Corridors

Upland corridors are vegetated areas that connect natural heritage features. There are no mapped upland corridors as per Map 5 of The London Plan.

6.11 Summary of Identified Features and Functions

The PPS (2020) and The London Plan (2023) define key natural heritage features to be considered in terms of the impact and net effects assessment. The following ecological components within the Study Area were considered for impact avoidance, mitigation and/or potential offsets.

- Wetlands;
- Woodland components scoring High or Medium (patch size, maturity, wetland presence, SWH) - a large portion of woodland has been removed from development designation for this application as a result; and
- Significant Wildlife Habitat.

Figure 9 depicts all potential constraints identified on the Subject Lands.

7.0 PROPOSED DEVELOPMENT

The proposed development includes 74 single detached residential homes and 38 street townhouses with approximately 4.4 ha of open space. An extension of Jack England Drive is proposed to connect to Old Garrison Boulevard in the south and an extension of Raleigh Boulevard in the north. The townhouses are proposed along the northern limits of the Subject Lands while the remaining lots are proposed for single detached residential homes (**Figures 11 and 12**).

A multi-use pathway may be considered, extending between lots 19 and 20 heading south along the edge of the proposed wetland compensation area described below. The details for the pathway would be determined by the City of London. A 10 m buffer to the wetland compensation area has been incorporated into the proposed development plan.

Stormwater Management

The Stormwater Management (SWM) design for Phase 8 is consistent with the North Talbot Community Plan and the Talbot Village Stormwater Management Functional Design Report. A conceptual SWM report has been provided in Section 12.0 of the FPR which includes preliminary Stormwater Management details.

The north portion of the development will consist of a network of storm sewers and manholes along the Phase 8 internal streets to collect drainage via catchbasins and ultimately connect to the proposed storm sewer along the easement. Drainage from the west woodland is expected continue to drain uncontrolled to the west to the existing storm pond and PSW. The remainder of the Phase 8 natural lands will be graded and a berm will be constructed at the west and north limits of the Phase 8 easement to maintain and create new wetland. Drainage in excess of the volume of standing water required to maintain the wetlands will overflow into the existing ditch inlet drain at the intersection of the easement and Jack England Drive. The south-east corner of Phase 8 drains to the existing storm stub at Mersea Street via proposed storm sewer on Jack England Drive. Please refer to Figure 3: Storm Drainage (Arcadis, 2024b) for the preliminary storm sewer design and layout.

Please refer to Figure 4: Existing Storm Drainage Areas for the interim major flows and Figure 5: Grading Plan the ultimate overland flow directions (Arcadis, 2024b). The grading design aims to provide a drainage strategy to safely convey proposed major flows from the Phase 8 lands. The wooded area located at the middle west and southwestern corner of the Subject Lands will drain overland via the south-west corner. Drainage designs have been coordinated with EIS and hydrogeological recommendations to target maintenance of stormwater conveyance to natural features and/or water balance during development/buildout and post-construction. Final detail calculations will be confirmed and provided at the detailed design stage.

8.0 IMPACTS & NET EFFECTS ASSESSMENT

In accordance with provincial standards, potential impacts, predicted effects, mitigation and enhancement measures associated with the proposed development and/or site alteration should be assessed through an EIS, or like study, prepared to the satisfaction of the municipality and appropriate conservation authority. The impact assessment and mitigation measures presented herein shall address the requirements of the PPS (2020) to ensure that the test of no negative impacts to natural heritage features and areas or their ecological functions is demonstrated. Potential impacts to the natural heritage features and environmental functions that occur on, and adjacent to, the Subject Lands have been evaluated over the short and long term to ensure that proposed avoidance and/or mitigation strategies will contribute to the sustainability and resiliency of a diverse ecosystem over the long term.

The predominant natural heritage features present on, and adjacent to, the Subject Lands include woodland, significant wildlife habitat, and wetlands (**Figure 9**). Potential impacts of proposed development and/or site alteration on existing ecological features and functions shall be reviewed in the context of:

- 1) Direct Impacts: Associated with the direct removal or alteration of natural heritage features that may occur in support of a proposed land use application;
- 2) Indirect Impacts: Potential secondary effects to ecological functions or pathways that could result in long-term, negative impacts to natural heritage features;

Potential direct and indirect effects based on the proposed limit of development illustrated on **Figure 12**, and a summary of general recommended mitigation and restoration strategies are provided below. Mitigation measures are outlined on **Figure 13 and 14**.

A preliminary Environmental Management Plan (EMP) has also been created based on these recommendations. The EMP is provided in **Appendix K** and includes all recommendations from this EIS, as well as recommendations from other consultants where available.

8.1 Direct Impacts

Direct impacts associated with the proposed limit of development are reviewed in the following section. Potential effects on the the viability and integrity of natural heritage features and associated ecological functions within the Study Area have been evaluated over the short and long term.

8.1.1 Wetlands

Based on the outcome of the OWES assessment/ecological surveys, all wetlands on the Subject Lands are non-PSWs. For non-PSWs, as per Policy 1334 of the London Plan no net loss of wetland function or feature is to occur. Wetlands between 0.1 and 0.5 ha may be considered for less than 1:1 replacement provided there is a net gain to the wetland system in addition to the overall natural heritage system. Where a wetland is less than 0.1 ha, the City may consider replacement on a less than one-to-one land area basis and/or additional measures to achieve no net loss of function.

Wetland Removals

No wetlands greater than 0.5 ha are present within the Subject Lands. Polygons 4 and 5 are proposed to be fully removed (0.14 ha and 0.27 ha respectively). A small portion (~0.02 ha) of Polygon 2 in the south is proposed to be removed to allow for lot construction and associated grading. The south wetland inclusion (~0.03 ha) will also be removed, though this wetland habitat is less than 0.1 ha and has limited wetland functions. The proposed limit of development has been refined through the design process to limit the interface between development and Polygon 2 to the maximum extent possible.

In addition to the wetlands within the Study Area, the northeast SAS1 pond is proposed to be removed for the City-approved road-widening of Southdale Road and the approved subdivision connection to Southdale Road. As part of the Draft Plan Conditions for this overall subdivision, the City of London requires the Proponent to compensate for their portion of this wetland to be removed (~0.13 ha) at a rate of 2:1 surrounded by a 10 m buffer.

Wetland Compensation and Buffers

A 0.70 ha wetland compensation area has been included in the development plan to account for the removal of a total of 0.46 ha of wetland habitat from the Subject Lands plus double the 0.13 ha (i.e., 0.26 ha) of SAS1 to be removed in the northeast. Exactly 1:1 compensation for the on-

site wetlands is not required as they are less than 0.5 ha in size and the compensation area aims to provide a net benefit to the natural heritage system. A 10 m buffer between the created wetland and development is incorporated into the development plan as required by the Draft Plan Conditions.

The impacted wetlands will be recreated within the allotted area adjacent to the existing mineral meadow marsh (Polygon 2) contiguous with the remaining woodland. The compensation area location was strategically chosen to retain the existing mineral meadow marsh and take advantage of suitable soil conditions. In 2020, a borehole/monitoring well was installed to the east of the mineral meadow marsh as a part of the hydrogeological investigation (EXP, 2021). The borehole logs revealed fill underlain by silty clay till followed by sand and gravel and silty clay till. The location of the proposed wetland compensation area is therefore underlain by silty clay till. The silty clay till is stiff and slightly impervious; therefore, able to support wetlands if graded appropriately. This is similar to the soils of the existing Polygons 4 and 5, and therefore considered a suitable area for wetland compensation (EXP, 2024a). In addition, the created wetland area will provide enhanced function as it is connected to existing natural features thereby providing a greater range of habitat and connectivity for species life processes.

The functions of the wetlands to be removed include non-significant amphibian breeding habitat, terrestrial crayfish habitat, and general storage and conveyance of water on site. The wetland compensation area is proposed to provide a similar sized area of diverse wetland habitat that can support all of these functions but with the benefit of less isolated features (i.e., more connectivity to a variety of natural habitats) and increased natural quality. The improvement to linkage habitat may be particularly beneficial for woodland breeding amphibians that require different spring breeding and summer habitats. Meadow marsh, thicket swamp, and emergent native species are recommended to be planted within the compensation area among a variety of topographies and water depths to provide a connected network of diverse wetland habitats. Clean water will continue to be collected in this area as in the existing wetlands. The compensation area is considered a net benefit to the natural heritage system within the Subject Lands. In addition to the 0.13 ha of the northeast SAS1 pond compensated on the site, it is MTE's opinion this created wetland area may also be considered as compensation for the remainder of that wetland to be removed from the north adjacent property and the City's lands.

A detailed wetland design will be provided as part of the detailed design process, but a concept has been produced in conjunction with input from the hydrogeological and engineering consultants to provide a framework for the future compensation area. The concept is provided in **Figure 14**. Water will be sourced from clean overland flow from the backyards and rooftops of the north and south lots. To ensure water is collected within the compensation area, a berm may be placed along the east, along the 10 m buffer that will also contain servicing and possibly a pathway. Details for this area will need to be confirmed as part of detailed design. The compensation area is proposed to include several habitat types to make up for the different types of wetlands removed and produce a biodiverse feature:

Open shallow aquatic habitat – Permanent deeper open water (0.5 – 1.5 m) with surrounding emergent vegetation planted on shallower shelf edges.

- Deeper depths encourage multi-season use by turtles (i.e., summer basking, overwintering).
- Open water encourages use by waterfowl.

Thicket swamp - Shallow standing water (pools up to 1 m deep) with standing water at least until spring or early summer with shrubs like dogwood.

- Thicket provides shade and respite areas for amphibians and other wildlife.

- Shrubs can provide foraging opportunities (e.g., berries) for wildlife.
- Consider transplanting (from Polygon 5) or planting Buttonbush live stakes.

Meadow marsh - Grassy wetland area with spring flooding and shallow pools.

- Meadow marsh could act as overflow areas surrounding the deeper wetland areas.
- Water table to be consistently high to support terrestrial crayfish.
- Variation in topography to encourage pooling in spring for woodland breeding amphibians (maximum of 0.5 m water depth in the pool centres).
- Pollinator species (e.g., Milkweed) can be included in the seed mix.

A detailed wetland plan including grading and landscaping will be provided at detailed design.

EXP completed a water balance for the future wetland compensation area as part of the Hydrogeological Assessment (2024a). The post-development conditions are compared to the pre-development conditions of the north wetland (Polygons 4/5) and Polygon 2 to allow a quantitative comparison. Runoff volumes per area are also considered. When considering the growing season (March-August), approximately 0.89 m of surface water is expected to be delivered to the 0.7 ha compensation area. This runoff is 82% of what Polygons 4, 5, and 2 currently receive. In addition, the deeper areas of the compensation wetland are anticipated to be maintained by shallow groundwater contributions, similar to the existing condition of Polygon 2. From a biological perspective, the proposed surface and groundwater inputs are expected to be sufficient to support wetland plants and soils, as well as habitat for wetland wildlife such as Terrestrial Crayfish and amphibians. Runoff inputs also do not need to exactly match the existing wetlands because the new wetland area will include a wider variety of wetland habitats, including meadow marsh that will dry out throughout the summer. A detailed wetland plan will be needed at detailed design, and hydrogeological monitoring during and post-development will be required to confirm hydrogeological conditions are appropriate for wetland creation in the long-term.

A multi-use paved pathway is being considered between lots 19 and 20 following the east wetland buffer, though this will need to be confirmed with the City of London. The multi-use pathway would likely be 5 m wide within the 10 m buffer, leaving 5 m to be naturalized with suitable upland native species adjacent to the wetland compensation area. It is recommended that the multi-use pathway be created on the outer edge of the wetland buffer.

Recommendation 1:

The wetland buffer and compensation area should be actively naturalized with pollinator-friendly native seed mixes and native shrub species to support the ecological function of the area. Plant species should be native to Ecoregion 7E and appropriate for the soil conditions and water depths present.

Recommendation 2:

An amphibian and reptile salvage plan should be developed for Polygons 4, 5, and the northeast SAS1 pond prior to removal. Species should be relocated to the existing wetland (Polygon 2) and created wetland habitat. A wildlife collection permit will be required for this work.

Recommendation 3:

Wetland removal should occur outside of the breeding bird period (April 1 to August 31) to ensure maximum protection of species. Alternatively, a nest sweep can be completed prior to vegetation removal to ensure no active bird nests are present. If nesting birds are present, works in the area should not proceed until after August 31 or until the nest has been confirmed inactive (e.g., young have fledged).

Recommendation 4:

The wetland compensation area should begin to be established prior to wetland removal. This is recommended to allow for wildlife relocation and pumping of water to the compensation lands to help initiate wetland creation.

8.1.2 Woodlands

No important woodland functions are proposed to be removed. As detailed in Section 6.3, natural treed communities (FOD7) on the Subject Lands shall be largely retained on the landscape to maintain a size greater than 2 ha and retain a mature woodland with only a small portion (~0.60 ha) of the woodland proposed for removal. The contiguous wetland (Polygon 2) will be maintained and enhanced with additional wetland area. The forest will remain mature in age and most of the largest specimens are retained. Finally, Eastern Wood-pewee breeding habitat will remain. Although trees will be removed, the functions of this patch will be preserved. This is in comparison to the full removal in the previous North Talbot Community Plan (1999) which provided compensation for the woodland. Additional recommendations to mitigate the effects of tree removals and preserve the remaining woodland are provided below.

Special attention has been given to retaining the mature, large diameter (>100 cm dbh) oak trees that were flagged as high-quality specimens worthy of protection as natural heritage trees due to their size, age and habitat provisions. The lot limits of Lots 9 and 10 have specifically been reduced to protect the critical root zone of the large oak tree identified the northwest woodland. Critical root zones of trees are established using the tree's diameter at breast height (dbh). For every cm dbh 10 cm is added to the buffer distance plus an added 5 m. Only one large diameter tree (Red Oak greater than 100cm dbh) will be removed under the proposed development.

Recommendation 5:

Complete a Tree Preservation Report to inform tree protections and site design prior to earth or construction works. Include the surveyed locations of the large diameter natural heritage trees within the Tree Preservation Report.

Recommendation 6:

Install fencing without gates along the rear of lots where lots are directly abutting the remaining woodland in the south and along the north. Material, height and style details should be determined in consultation with City of London staff.

8.1.3 Significant Wildlife Habitat

As discussed in Section 6.5, confirmed SWH for Terrestrial Crayfish (MAS2, MAM, SWD3) and Habitat for Eastern Wood-Pewee (FOD7) was identified within the proposed development boundary. The following recommendations are listed to mitigate impacts to confirmed SWH.

Terrestrial Crayfish SWH

The terrestrial crayfish habitat in Polygon 2 will be retained and incorporated into the proposed wetland compensation area. Polygons 4 and 5 are proposed for removal, but the wetland compensation area will be built on similar soils with a high water suitable for terrestrial crayfish burrowing and foraging habitat. An additional benefit will be reduced disturbance to crayfish habitat from agricultural activities (e.g., adjacent ploughing). By retaining and creating habitat for terrestrial crayfish, there will be no net negative impact and populations of terrestrial crayfish will be able to persist in the post-development landscape.

Eastern Wood-pewee SWH

Eastern Wood-pewee habitat will be largely retained in Polygon 1. Eastern Wood-pewee is not a sensitive species; it does not require interior habitat, uses small woodland patches, and is known to be relatively tolerant of adjacent development (Friesen et al., 1995; Mancke & Gavin, 2000). Although the woodland will be reduced in size, the function of the SWH will be retained.

Candidate Snapping Turtle SWH

Although unlikely to be present based on limited deep-water habitat and lack of observations, Snapping Turtle may use the wetland habitat (Polygons 2, 4, 5) within the Subject Lands. Polygons 4 and 5 will be removed for the proposed development. Wetland compensation and a salvage is proposed in Section 8.1.1. No additional recommendations are proposed.

Recommendation 7:

Tree removals should occur outside of the breeding bird nesting period (April 1 to August 31) unless a nest sweep confirms no active nests are present.

8.1.4 Habitat for Endangered and Threatened Species

MECP was consulted in 2020-2021 regarding the potential for species at risk within the Subject Lands. In 2021, the MECP responded that no protected habitat appears to be present, and no contraventions of the *ESA* are anticipated to occur under the current proposal given the provided mitigation measures are implemented. Although the development plan has changed since correspondence with MECP, impacts have been reduced with the new plan. The plan provided to MECP proposed the removal of all wetlands and woodlands on site. The new plan is similar and is considered to have no expected impacts on protected species.

Although the Subject Lands are not considered habitat for Eastern Hog-nosed Snake and no encounters with this species are anticipated, mitigation measures were conservatively proposed in the Preliminary Screening Report to MECP to account for incidental encounters. The mitigation measures proposed in the report are listed below.

Recommendation 8:

Prior to conducting any work on site, project personnel and contractors should be made aware of the possible presence of Eastern Hog-nosed Snake and their protection under the *ESA*, 2007.

Recommendation 9:

Vegetation clearing, including grubbing, should occur when weather conditions are suitable to allow snakes to flee (sunny and at least 18°C). Vegetation clearing and grubbing should occur in an orderly and systematic manner to direct wildlife movement in one direction, and to reduce the possibility of wildlife encounters with equipment. Vegetation clearing will occur under the supervision of a qualified biologist to ensure no reptiles or other protected species are harmed. Clearing of vegetation can occur without the supervision of a qualified biologist if it occurs during the inactive season (between December 1 and March 31) and no grubbing or below-ground works are undertaken. Vegetation clearing during the inactive season should be performed in a manner that avoids soil compaction; vegetation can be cleared by hand, or cleared while the soil is frozen with light machinery that is equipped to reduce compaction.

Recommendation 10:

Once vegetation has been cleared, geotextile fencing should be installed as snake exclusion barrier along the construction boundary. ESC fencing may function as exclusion fencing. The geotextile fence should be at least 1.0 meters high from grade at all locations and buried at least 0.2 meters below grade. Exclusion fencing should extend out from its terminal edges by a distance of at least 5 meters and angle out or back at a 45° angle (whichever is most beneficial)

to direct wildlife away from the construction site. Installation of fencing during the active season (April 1 to November 30) will be supervised by a qualified biologist. Outside the active season, fencing may be installed without the supervision of a qualified biologist.

Recommendation 11:

To prevent entanglement of wildlife, including snakes, mesh or netting-type material must not be used for erosion control. Net-free materials, such as Curlex Net-Free blanket, riprap over geotextile fabric, or similar alternative is recommended.

Recommendation 12:

Between April 1 and November 30, all equipment and machinery that is left idle for over 1 hour, or overnight, on the property must be visually examined prior to (re)ignition, to ensure snakes are not present within the machinery. This visual examination should include all lower components of the machinery, including operational extensions and running gear.

Recommendation 13:

Any protected species that is encountered on site (not anticipated) must be protected from harm and harassment. Should a snake protected by the ESA be observed in the work area and presumed to be unharmed, all project personnel and operating machinery should maintain a minimum 30-meter distance from it at all times until it has left the area. Contact MECP immediately if this cannot be done. A large Rubbermaid type container with ventilated lid should be kept on site at all times in the event a snake is injured or killed during the project. If an ESA-protected snake is injured, it should be immediately transported in the container to a licensed Wildlife Custodian. During transport, the snake inside the container should be maintained at a temperature between 10 and 30°C. MECP immediately if any protected snakes are harmed or killed during construction.

Recommendation 14:

The property should be clean and free of debris for any activities that occur during the active season for snakes (April 1 to November 30). Snakes may find and occupy materials and equipment stored on site and could be harmed when materials and debris are handled or used. The creation and duration of debris stockpiles within the development footprint should be limited. Materials such as excavated soils, lumber, and other construction materials should only be stored in areas that previously had understorey vegetation (1 m or shorter), mowed to a height of 5 cm or shorter. Excavated soil should not be stored on the sites long term. Flat materials such as plywood or rubber mats should not be left lying on the ground. Any material stockpiles created on the property during the project must be visually examined for snakes prior to disturbance or removal.

Recommendation 15:

Cleared areas should be maintained at a height of 7-10 cm. Allowing grass to grow greater than 15 cm in height could attract snakes to the construction sites.

8.1.5 Summary of Direct Impacts

The impact assessment outlined in Table 9 provides a summary of predicted natural heritage feature removals based on the proposed development footprint. Areas to be maintained, and where possible, enhanced, are identified on **Figure 14**.

Table 9: Direct Impacts by Vegetation Community Type Within the Subject Lands

Natural Heritage Features & Associated Functions	Polygon	ELC Code	Polygon Area (ha)	Proposed Removal Area (ha)
Mature Woodland (Eastern Wood-Pewee SWH)	1	FOD7	3.86	0.60
Wetland (Terrestrial Crayfish SWH)	2	MAM	0.21	0.21
Wetland (Terrestrial Crayfish SWH)	4	MAS2	0.14	0.14
Wetland (Terrestrial Crayfish SWH)	5	SWD3	0.27	0.27

8.2 Indirect Impacts & Mitigation

Indirect impacts identify potential adverse effects on the biophysical environment that may occur as a result of proposed development. This may include erosion from the work area and associated sedimentation into natural features, accidental spills, impacts to migratory birds, and the introduction of exotic and/or invasive plant species. Each of these are discussed in the following sections.

8.2.1 Sediment and Erosion Control Measures

The most critical time for the protection of natural heritage features is during the construction phase. For all works, and especially those within 30 m of adjacent natural heritage features, an Erosion and Sediment Control Plan (ESC) will be required to contain ground disturbances on site and to protect adjacent natural heritage features identified in this report from sediment transport and potential sedimentation.

Recommendation 16:

A multi-barrier approach for sediment and erosion control should be used for this development and contained within a project-specific ESC Plan. Prior to works on site, robust sediment and erosion control fencing should be installed in areas immediately adjacent to retained natural features and across low-lying areas prone to receiving overland runoff. The fencing will act as a barrier to keep construction equipment and spills away from vulnerable natural areas and features where sediment loading has the potential to negatively impact wildlife habitat.

Recommendation 17:

During construction, the lands between the sediment and erosion control fencing must be maintained. The fencing should remain in place until construction is complete and the remainder of the natural areas to remain are stabilized and/or naturalized.

Recommendation 18:

Sediment and erosion control fencing should be inspected prior to construction to ensure it has been installed correctly and during construction to ensure that the fencing is being maintained and is functioning properly. Any issues that are identified are to be resolved in the same day.

Recommendation 19:

Sediment and erosion control fencing must be installed according to the City of London Design Specifications and Requirements Manual specifications (2019b), the Guidelines for Erosion and Sediment Control for Urban Construction Sites (TRCA 2019), and the applicable standards established in the Ontario Provincial Standard Specification/Ontario Provincial Standard Drawings (OPSS/OPSD) documents.

Recommendation 20:

Sediment and erosion control fencing should not be removed until adequate re-vegetation and site stabilization has occurred. Additional re-vegetation plantings and/or time for vegetation to establish may be required; however, two growing seasons are typically sufficient to stabilize most sites.

Recommendation 21:

Re-seed all disturbed areas as soon as possible to maximize erosion protection and to minimize the establishment of invasive species, which may spread to the adjacent natural features.

Recommendation 22:

Site runoff over bare ground can generate considerable sediment movement beyond the construction limits. Until the lots have been vegetated and are stable for development adjacent to vegetation, site/lot runoff should be directed to nearby stabilized vegetated areas or ditches.

Recommendation 23:

The implementation of select non-infiltration based low impact development (LID) techniques to maintain surface water inputs into the natural features (i.e., provision of clean rooftop water) on the Subject Lands should be considered as part of the stormwater management plan.

8.2.2 Construction Site Management

Construction on the Subject Lands should be organized, executed and controlled to ensure compliance with approved EIS requirements, erosion and sediment control monitoring and applicable legislation. Development should be directed away from natural areas to minimize impacts and/or damage to adjacent properties.

Recommendation 24:

Regular cleanup of the site must be completed during construction and post-construction to ensure the adjacent natural heritage features are not degraded.

Recommendation 25:

Dust abatement measures (e.g., watering) are recommended if site grading will occur during extended dry weather periods.

Recommendation 26:

Equipment should be cleaned prior to arrival on site including tires, undercarriage, and any part of the equipment that may transport invasive seeds to the site. Clean equipment protocols are provided by the Ontario Invasive Plant Council's Clean Equipment Protocol for Industry (Halloran, Anderson & Tassie, 2016) and London's Invasive Plant Management Strategy (2017) and should be followed where appropriate.

8.2.3 Migratory Birds & Wildlife

Recommendation 27:

As per the *MBCA* (1994), it is recommended that any tree removals occur outside of the migratory breeding bird season (i.e., April 1 to August 31). If this window cannot be avoided, nest searches to determine the presence or absence of nesting birds or breeding habitat should be conducted until clearing is complete, or until August 31, whichever comes first.

Recommendation 28:

Advise workers of potential encounters with wildlife during construction. If an animal enters the work site, work at that location will stop and the animal should be permitted to leave un-harassed.

Recommendation 29:

Where tree removal is proposed, removal of trees of any size should occur outside the bat maternity roost period, which is approximately May 1 to September 31. All trees proposed for removal must be assessed for bat habitat. This avoidance measure includes dead standing trees.

8.2.4 Landowner(s) Education

Informing landowners or residents within the future development of their potential impacts on the natural environment can help mitigate encroachment impacts. It is important that residents understand how they can reduce their impacts and act as stewards to the remaining woodland and created wetland feature.

Recommendation 30:

The installation of educational signage on permanent fencing post-development is recommended to inform future landowner(s) of the significance of the adjacent features. Signage discussing the ecological value of the wetland areas and wildlife species present may be particularly effective. Some studies show the public are more likely to avoid damaging activities (ex: littering, trampling plants, dumping landscape waste) if they are aware of the link between their actions and the subsequent negative impacts, and if they feel they are responsible for the stewardship of a natural area (Gamman et al., 1995; Johnson and Van de Kamp, 1996). People are also more likely to respect a barrier if they understand the reason for it (Johnson, 1989).

Recommendation 31:

For the future development, provide homeowners with the “Living with Natural Areas” brochure published by UTRCA in 2005. This will help educate residents on appropriate ways to interact with natural areas and discourage damaging encroachment activities such as dumping landscape waste, using chemicals on lawns, mowing past residential boundaries, and creating trails.

8.2.5 Noise and Lighting Impacts

A portion of the Subject Lands proposed for development includes woodland and wetlands. Noise is managed through existing By-laws (By-law No. PW-12) implemented by the City of London, which restrict excessive noise. Increased noise due to traffic, construction and general ongoing use of the proposed mixed residential space is not expected to significantly impact adjacent natural areas. Lighting associated with exterior building lights, streetlights and other exterior lighting may impact adjacent natural features. Recommendations to avoid or reduce impacts related to lighting are provided below:

Recommendation 32:

Exterior lighting should be fully shielded and pointed downward to minimize skyglow, glare and light trespass into the adjacent natural features.

9.0 MONITORING PLAN

Recommendations in this EIS aim to avoid, minimize or compensate for direct and indirect impacts to significant natural heritage features and functions. A monitoring plan will be needed for the future proposed development to document the implementation of the mitigation and compensation measures during construction and post-construction.

The monitoring plan will be two-phase and will consist of a construction monitoring plan and a long-term post-construction plan. The construction monitoring plan will monitor for construction-

related impacts, document successes or deficiencies of the implemented mitigation measures and provide guidance on remedial actions for circumstances when mitigation is not successful. This plan should continue from clearing and grubbing through to the home building construction until rear yards and grounds adjacent to natural features are vegetated and stabilized. This plan will be developed during the detailed design stage. Reports should be made available to the appropriate staff at the City of London.

Long-term post-construction monitoring shall evaluate the success of the proposed encroachment prevention strategies, wetland compensation creation and invasive species management. This plan should include remedial actions that are triggered if effects exceed pre-determined thresholds. Monitoring requirements should be determined at the detailed design stage in consultation with City of London staff. Recommendation for monitoring include but are not limited to the following.

9.1 Buffer and Wetland Naturalization – Vegetation Monitoring Plan

- Complete vegetation monitoring in the created wetland and associated buffer over three years (monitor in Year 2 and 3 coordinated with hydrogeological monitoring) after enhancement efforts to document compliance with a prepared landscape plan. Monitoring in Year 1 by the landscape contractor should document success of seed germination/cover and tree/shrub installation and confirm the correct seed mixes and trees/shrubs species were used. Monitoring in Years 2 and 3 should document plant establishment and growth through completion of a floral inventory through one visit conducted by a qualified professional during the growing season.
- Implement adaptive management strategies such as supplemental plantings and or control of non-native invasive species if required. Adaptive management may be triggered by poor survival of planted material (triggered at <80% survival of seeded species or woody materials), insufficient vegetation cover (triggered at <80% if planted at 100%) and the presence of unacceptable invasive species (triggered at >20% invasive groundcover; 80% non-native/native is target)
- Adaptive management strategies within the wetland buffer and created wetland habitat will depend on the issue encountered but may include:
 - Removal of invasive species with a species-specific method outlined in the Best Management Practices (BMPs) from the Ontario Invasive Plant Council. These may include biological, physical/mechanical, chemical management strategies or a combination of strategies;
 - Re-seeding with a target seed mix;
 - Re-planting of dead trees/shrubs or other plant materials; and
 - Increased monitoring frequency or length (e.g., adding monitoring in Year 4).
- Inventory invasive plants throughout the ecological monitoring period. This should include identification of invasive species type, location and abundance within the wetland buffer and created wetland feature as well as a record of completed management strategies.

9.2 Wetland Habitat Monitoring Plan

- Complete targeted searches for Terrestrial Crayfish (i.e., visual survey for chimneys) in Years 2 and 3 to confirm presence/absence. Habitat suitability is to be reviewed in collaboration with groundwater level monitoring.

9.3 Encroachment Monitoring Plan

- Encroachment monitoring should be completed for two years (Years 2 and 3) in coordination with the wetland monitoring. Monitoring should focus on the wetland compensation area and remaining woodland. Observations should include looking for litter in natural features, dumping of yard waste, informal trail creation, fence damage and other impacts.
- If encroachment is an issue post-construction, additional strategies should be implemented. The strategy should be tailored to the issue but may include additional signage, fences, monitored garbage cans along the multi-use pathway, additional landowner awareness, or other identified strategies.

9.4 Wetland Hydrogeological Monitoring Plan

- As outlined in the Hydrogeological Assessment (EXP, 2024a) implement a development phase monitoring plan to monitor wetlands during construction and complete post-development hydrological monitoring of the created wetland for three years to ensure sufficient soil saturation is achieved to maintain suitable growing conditions for wetland plants. The details for this monitoring plan are provided in the EMP (**Appendix K**) and should be finalized at detailed design.

10.0 NET EFFECTS SUMMARY

Table 10 below summarizes potential impacts to natural heritage features and functions as well as proposed mitigation, compensation and enhancement measures.

Table 10: Summary of Net Effects

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects Summary	Recommendations for Management and Monitoring
Artificial Lighting	Woodland, created wetland	Low impacts expected - residential and streetlights	Exterior lighting to be shielded and pointed downward to minimize skyglow, glare and light trespass into the adjacent natural features.	No net effect	N/A
Litter and Garbage	Woodland, created wetland	Low impacts expected - garbage litter from residential area	Permanent fence between remaining woodland and development; public education (brochure, signage).	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan.
Yard Waste	Woodland, created wetland	Medium impacts expected - residents transporting yard waste from dwellings to woodland and wetland	Public education (brochure, signage); permanent fence between woodland and residential homes.	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan. Ongoing education of residents.
Increased access to sensitive area	Woodland, created wetland	Medium impacts expected - vegetation could get trampled	Public education (brochure, signage); permanent fence between woodland and residential area.	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan. Ongoing education of residents.
Creation of new trails	Woodland, created wetland	Medium impacts expected - ad-hoc trails may trample ground cover, transport invasive species	Public education (brochure, signage) to discourage off-property wandering; permanent fence between natural areas and residential homes.	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan.
Tree removals and damage	Woodland	High impacts expected - woodland removed to accommodate development	Tree compensation provided through North Talbot Community Plan process; prepare tree preservation report prior to removals, retain trees at the rear of lots as possible; provide appropriate critical root zone	No net effect	Monitor for tree damage during construction and follow recommendations set out in a Tree Preservation Report if needed. Complete encroachment monitoring as part of the long-term post-construction monitoring plan.

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects Summary	Recommendations for Management and Monitoring
			setback to identified natural heritage trees.		
Increased noise	Woodland, created wetland	Low impacts expected - one bird species of concern was observed within the woodland, but it is not a sensitive species to development.	The created wetland will act as a natural buffer from residential homes to the east to the remaining woodland.	No net effect	Residential by-laws restrict excessive noise.
Disturbance to wildlife during construction	Wildlife in adjacent natural features	Low impacts expected - disruption to activities of nearby wildlife	Restrict timing of habitat and vegetation removal to outside breeding and sensitive periods for birds and other wildlife; make workers aware of potential incidental encounters and necessary protections; if an animal enters the work site, work at that location will stop and the animal should be permitted to leave unharassed; if there are repeat observations of wildlife in the work area, barrier fencing may be used to direct wildlife away from active construction and toward natural areas.	No net effect	Protocols for incidental wildlife encounters should be followed.
Decreased infiltration and increased run-off	Woodland, created wetland	Low to medium impacts expected - impervious surfaces decrease infiltration	LID measures should be used where appropriate; ESCI fencing at edge of development; fencing should remain until the area is serviced by storm sewers and disturbed areas are seeded; all issues with sediment and erosion control measures should be resolved the same day.	No net effect	Post-construction monitoring to be recommended by the Hydrogeological Assessment (EXP).

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects Summary	Recommendations for Management and Monitoring
Increased erosion	Woodland, created wetland	Low impacts expected	Sediment and erosion control fencing at edge of development; fencing should remain until the area is serviced by storm sewers and disturbed areas are seeded; all issues with sediment and erosion control measures should be resolved the same day.	No net effect	Monitor sediment and erosion control fence during construction.
Increased nutrient, pesticide and sediment	Woodland, created wetland	Low impacts expected - wetland may receive regular seasonal nutrient and sediment loads	Sediment and erosion control plan during construction; ban on cosmetic pesticides; limit the use of commercial fertilizers and other chemical applications, especially adjacent to wetlands; consider the use of grass varieties which are heartier and require less extensive watering or fertilizers.	No net effect	Post-construction water quality monitoring to be recommended by the Hydrogeological Assessment (EXP).
Visual intrusion	Woodland, created wetland	Low impacts expected	Maximum retention of trees within the rear lots as per the Tree Preservation Report.	No net effect	N/A
Domestic animals	Woodland, created wetland	Medium impacts expected - cats that roam and catch small animals; off leash dogs can trample plants	UTRCA brochure includes information on the impacts of domestic animals on wildlife; signage; permanent fence between woodland and residential homes to limit access.	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan. Ongoing education of residents.
Introduced invasive plants	Woodland, created wetland	Medium impacts expected - disposed yard waste can have invasive species that can spread if disposed incorrectly; invasive species may be planted	UTRCA brochure; permanent fence between woodland and residential homes to limit access; invasive species removal from the removed wetlands and planting native species in the compensation area.	Positive net effect	Monitor the success of establishment of native species within the created wetland. Ongoing education of residents.

Source of Impact	Affected Feature	Predictions of Impact	Mitigation Strategy	Net Effects Summary	Recommendations for Management and Monitoring
Increase in urban wildlife species	Woodland, created wetland	Medium impacts expected - garbage can attract nuisance wildlife	UTRCA brochure including information on what attracts nuisance wildlife.	No net effect	Ongoing education.
Air pollution	Woodland, created wetland	No impacts expected	Residential homes will not generate substantial air pollution.	No net effect	N/A
Fire Hazards	Woodland, created wetland	Low impacts expected - potential for recreational gatherings in the woodland and wetland	UTRCA brochure including information on potential impacts of encroachment on the woods; permanent fence between retained woodland and residential homes.	No net effect	Encroachment monitoring as part of the long-term post-construction monitoring plan. Ongoing education of residents.
Use of heavy machinery – broken limbs	Woodland, created wetland	High impacts expected - machinery too close to woodland edge can break off branches unintentionally	Complete a Tree Preservation Report; install construction fence to restrict access to the remaining woodland; tree protection fencing/sediment and erosion control fencing should be inspected frequently; all issues with fencing should be resolved the same day; remain outside of the critical root zones of natural heritage trees.	No net effect	Regular monitoring during construction to ensure tree protection fencing and sediment and erosion control fencing is functioning.
Use of heavy machinery – soil compaction	Woodland, created wetland	High impacts expected - machinery too close to the woodland can compact soils over vital tree roots	Complete a Tree Preservation Report for the Subject Lands; install construction fence to restrict access to retained woodland. Remain outside of the critical root zones of natural heritage trees.	No net effect	Regular monitoring during construction to ensure tree protection fencing and sediment and erosion control fencing is functioning, and tree roots are protected.

11.0 CONCLUSIONS

Southside Construction Management Limited has initiated the Draft Plan of Subdivision and Zoning By-law Amendment process for Phase 8 of the Talbot Village residential subdivision development at 3095 Bostwick Road in London, Ontario.

The proposed development will require the removal of several small wetlands within the Subject Lands, as well as a portion of woodland. Compensation will be provided through a wetland compensation area which will result in the creation of a diverse wetland area with improved natural quality, enhanced linkage between wetland and woodland habitats, and retention of terrestrial crayfish and non-significant amphibian breeding habitat. The wetland compensation area will additionally compensate for removal of a northeast adjacent shallow aquatic wetland and fulfill a Draft Plan Condition for replacement of 0.13 ha of this wetland at a ratio of 2:1. A 10 m naturalized buffer is also proposed for the wetland creation area. The west woodland will be retained to the extent possible, retaining the important functions of the woodland. Large natural heritage trees have been identified and prioritized for retention. A Tree Preservation Plan will be needed. A wetland design and Landscape Plan will also be required for the wetland compensation area as part of the detailed design process.

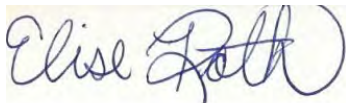
Indirect impacts are to be managed through general site management recommendations, an ESC Plan, landowner education, and avoidance of light and noise impacts.

Provided the recommendations in this EIS and the related technical reports supporting the proposed development are followed, it is our opinion that Phase 8 of the Talbot Village Subdivision can proceed. Detailed design phases of the development application can be assessed through a revision of the Environmental Management Plan (EMP). This EIS does not need to be updated once Draft Plan approval has been obtained.

MTE seeks comments from the City of London and the UTRCA with respect to the contents of the EIS. Formal comments can be submitted in writing to MTE of behalf of the client. Should you wish to clarify any questions or require additional information as part of the review of this EIS, do not hesitate to contact us.

All of which is respectfully submitted,

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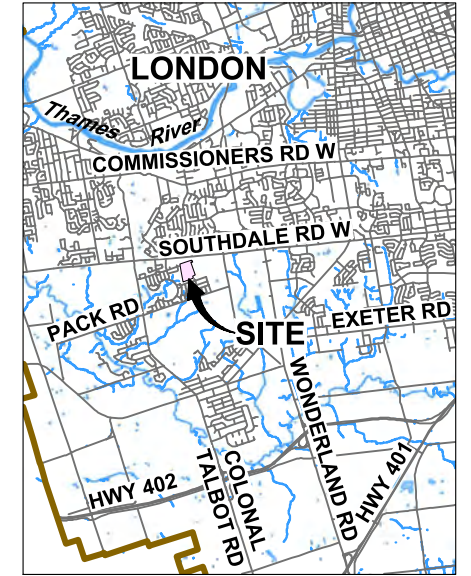
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Figures



KEY PLAN (nts)

LEGEND

- SUBJECT LANDS
- - - STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL

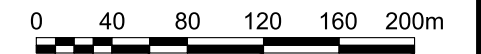
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CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

NOTES

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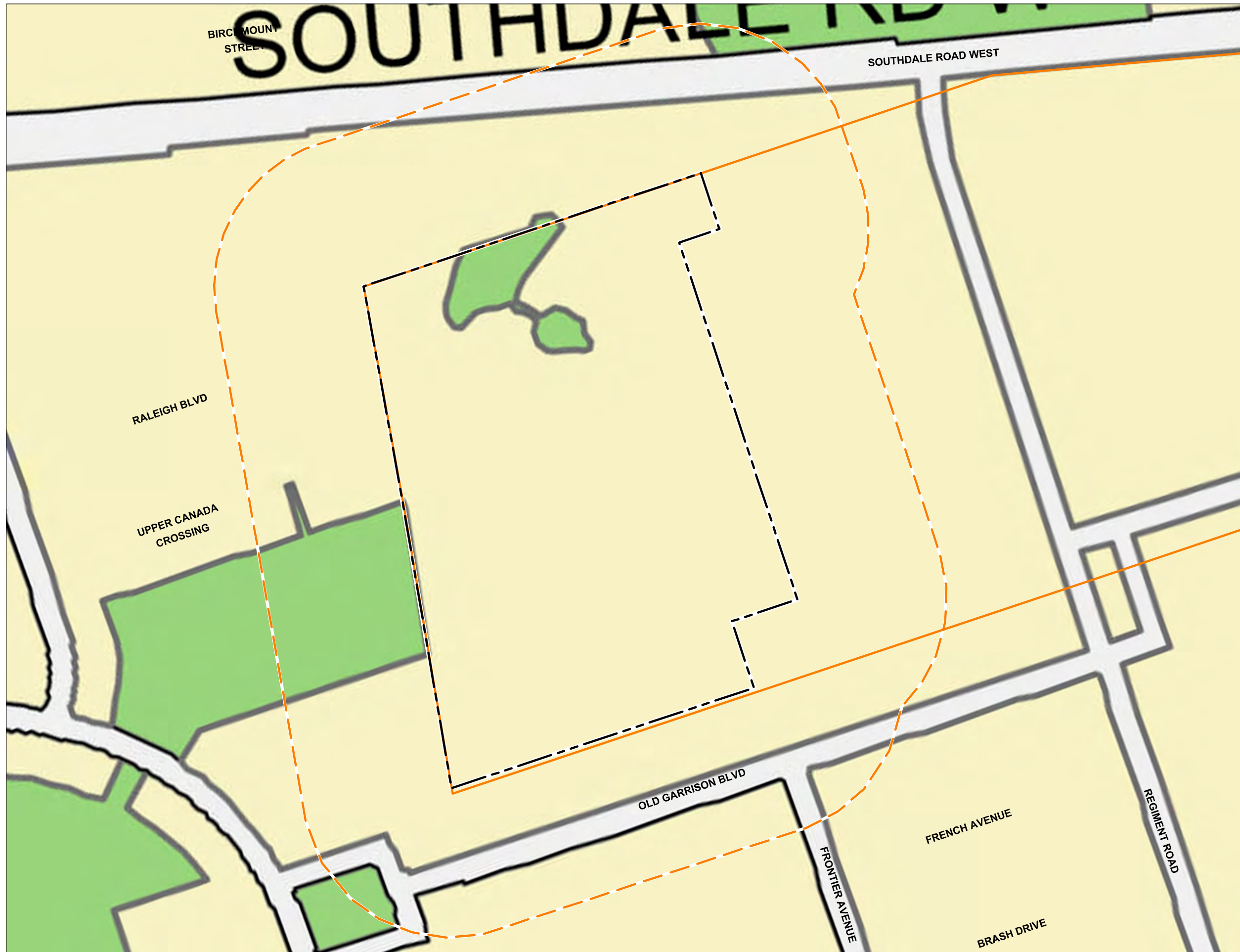
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PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

TITLE
PROJECT LOCATION

Drawn	DCH	Scale	1:4,000	Figure	1
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		



LEGEND

-  SUBJECT LANDS
-  STUDY AREA
(120m from Subject Lands)
-  LEGAL PARCEL

-  GREEN SPACE
-  NEIGHBOURHOOD
-  STREET

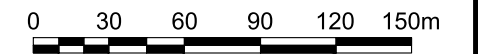
REFERENCES

CITY OF LONDON, MAP 1 - PLACE TYPES, MAY 25 - 2023.

NOTES

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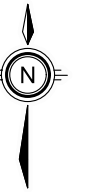
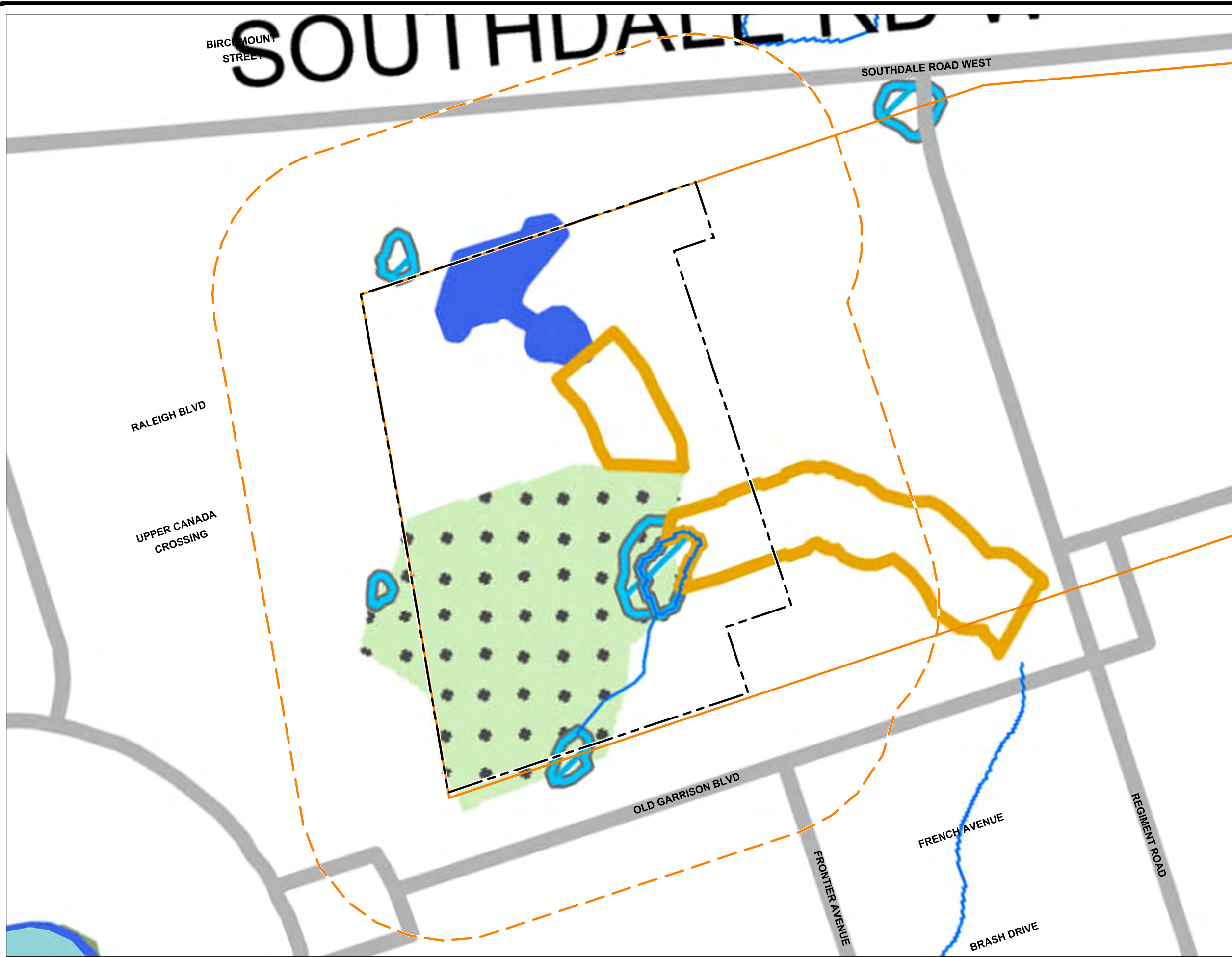
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PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

TITLE
PLACE TYPES
THE LONDON PLAN

Drawn	DCH	Scale	1:3,000	Figure	2
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		



LEGEND

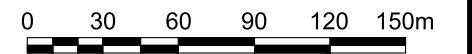
- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- PROVINCIALY SIGNIFICANT WETLAND
- STREET
- UNEVALUATED VEGETATION PATCH
- UNEVALUATED WETLAND
- VALLEYLAND
- WATERCOURSE/POND

REFERENCES

CITY OF LONDON, MAP 5 - NATURAL HERITAGE, MAY 25 - 2023.

NOTES

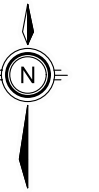
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PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

TITLE
**NATURAL HERITAGE
 THE LONDON PLAN**

Drawn	DCH	Scale	1:3,000	Figure	3
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		



LEGEND

- SUBJECT LANDS
- STUDY AREA
(120m from Subject Lands)
- LEGAL PARCEL
- LOW DENSITY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- OPEN SPACE AND ENVIRONMENTAL REVIEW
- PARK (EXISTING AND PROPOSED)

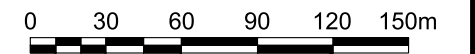
REFERENCES

CITY OF LONDON, SECONDARY PLAN,
SOUTHWEST AREA PLAN,
DECEMBER 13 - 2019

NOTES

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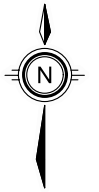
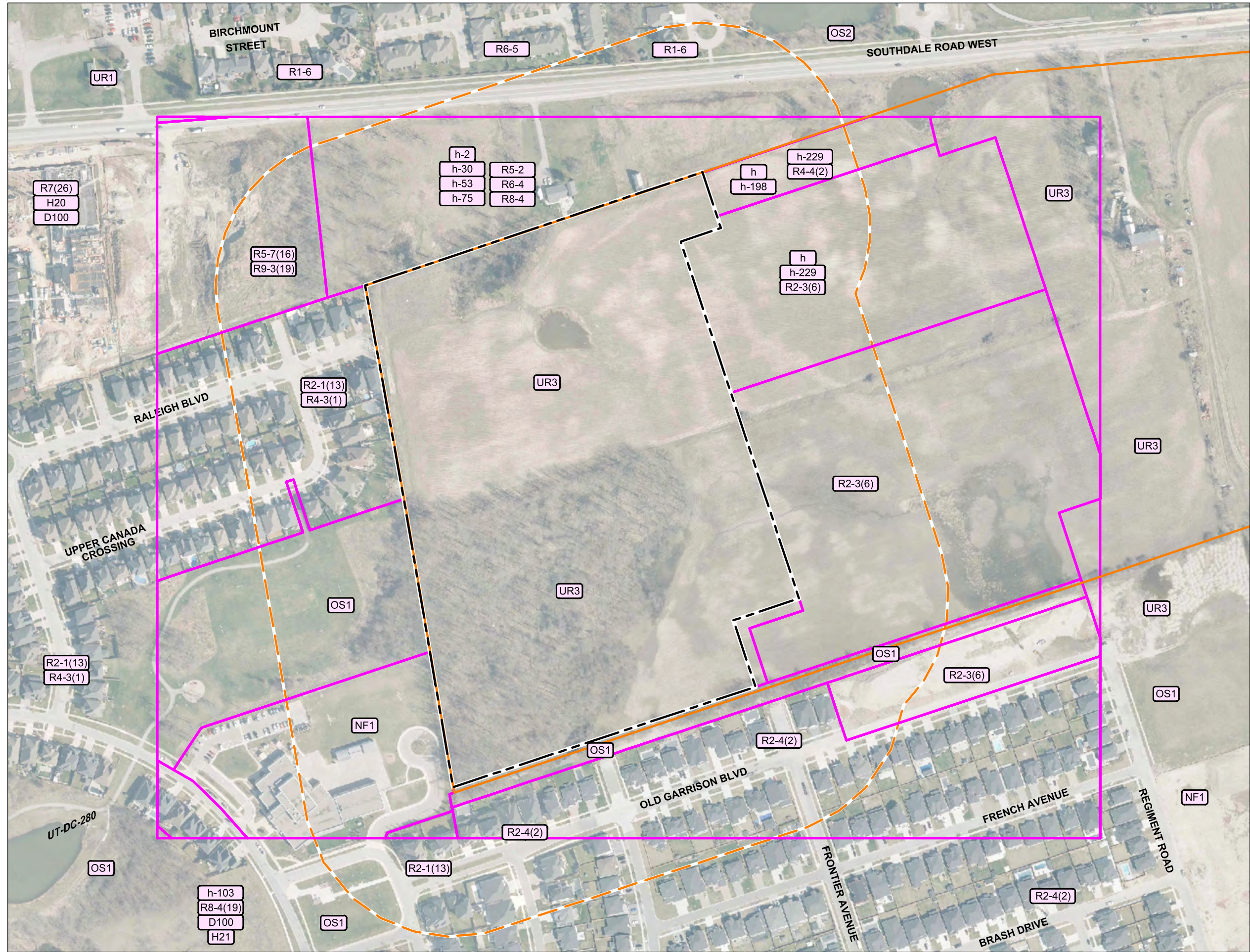
ALL LOCATIONS ARE APPROXIMATE.



PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
LAND USE
SOUTHWEST AREA SECONDARY PLAN

Drawn	DCH	Scale	1:3,000	Figure	4
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		



LEGEND

- SUBJECT LANDS
 - STUDY AREA (120m from Subject Lands)
 - LEGAL PARCEL
 - ZONING
-
- D DENSITY UNITS/HECTARE
 - h HOLDING ZONE PROVISION
 - H HEIGHT MAXIMUM
 - NF NEIGHBOURHOOD FACILITY ZONE
 - OS OPEN SPACE ZONE
 - R RESIDENTIAL ZONE

REFERENCES

CITY OF 2023 LONDON PARCEL, AERIAL IMAGERY, AND ZONING, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

NOTES

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ALL LOCATIONS ARE APPROXIMATE.

PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
ZONING

Drawn	DCH	Scale	1:3,000	Figure	5
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		

Figure 6: UTRCA Regulation Areas (2024)



Regulated Areas

Regulation under s.28 of the *Conservation Authorities Act*
Prohibited Activities, Exemptions and Permits.
O. Reg. 41/24.

Legend

- Assessment Parcel (MPAC)
- Watercourse (UTRCA, 2020)
 - Open
 - Closed Design/Tiled
- Wetlands (MNR)
 - Evaluated-Provincial
 - Evaluated-Other
 - Not Evaluated
- Regulated Wetland
- Flooding Hazard Limit
- Erosion Hazard Limit
- Regulation Limit 2024

The mapping is for information screening purposes only, and shows the approximate regulation limits. The text of Ontario Regulation 41/24 supersedes the mapping as represented by this data layer. This mapping is subject to change. A site specific determination may be made by the UTRCA.

This layer is the approximate limit for areas regulated under Ontario Regulation 41/24: Prohibited Activities, Exemptions and Permits, which came into effect April 1, 2024.

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The UTRCA assumes no liability for any errors, omissions or inaccuracies in the information provided herein and further assumes no liability for any decisions made or actions taken or not taken by any person in reliance upon the information and data furnished hereunder.

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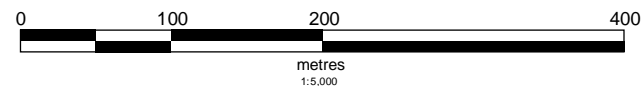
This document is not a Plan of Survey.

Sources: Base data, Aerial Photography used under licence with the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry Copyright © King's Printer for Ontario; City of London.

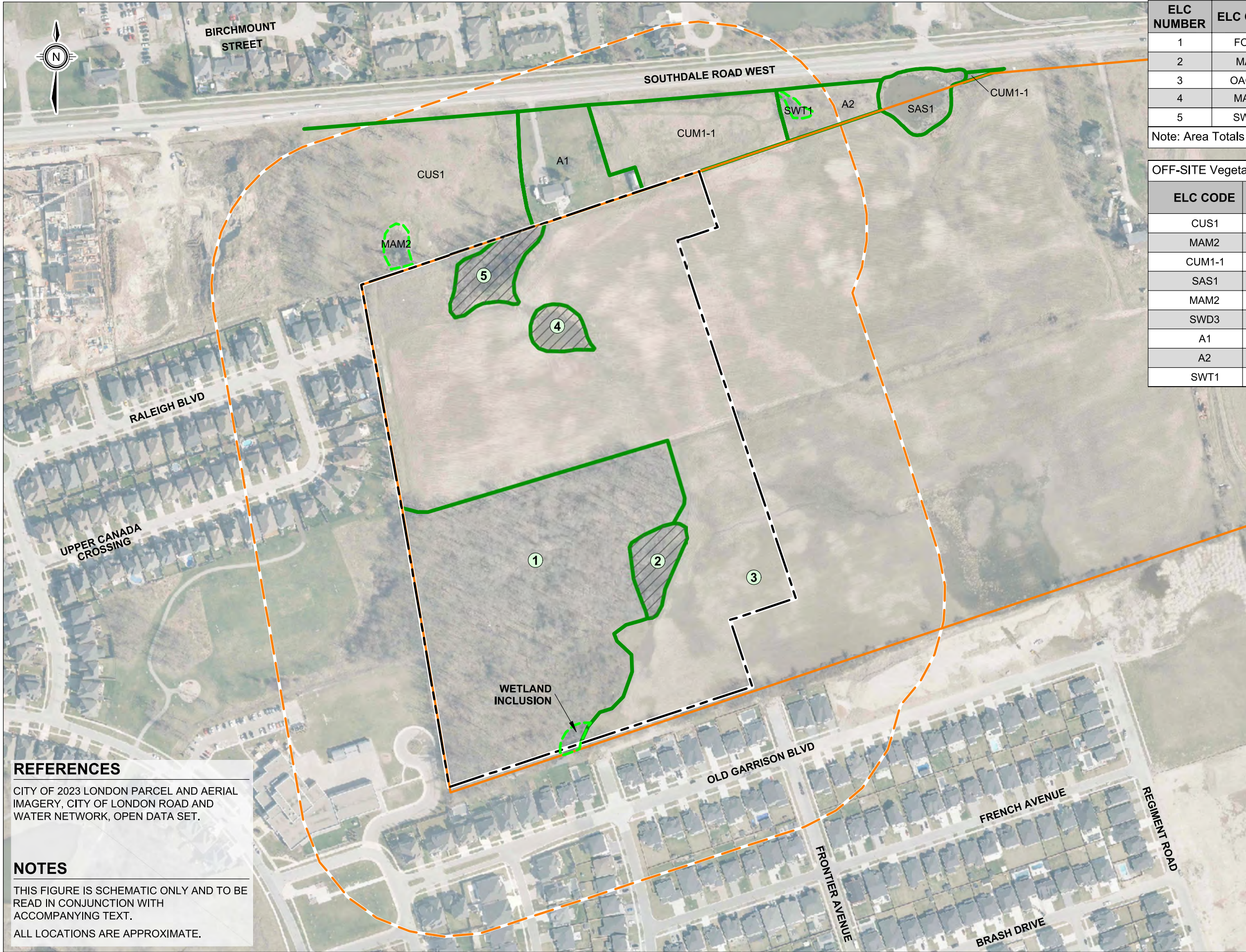
Notes:
3095 Bostwick Road, London

Created By: AL July 5, 2024

* Please note: Any reference to scale on this map is only appropriate when it is printed landscape on legal-sized (8.5" x 14") paper.



UPPER THAMES RIVER
CONSERVATION AUTHORITY
Copyright ©2024 UTRCA.



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	SWD3	Maple Mineral Deciduous Swamp (0.27ha)

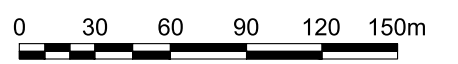
Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
SWD3	Maple Mineral Deciduous Swamp Ecosite (0.28ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)


LEGEND

- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- 1 VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)



REFERENCES
 CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

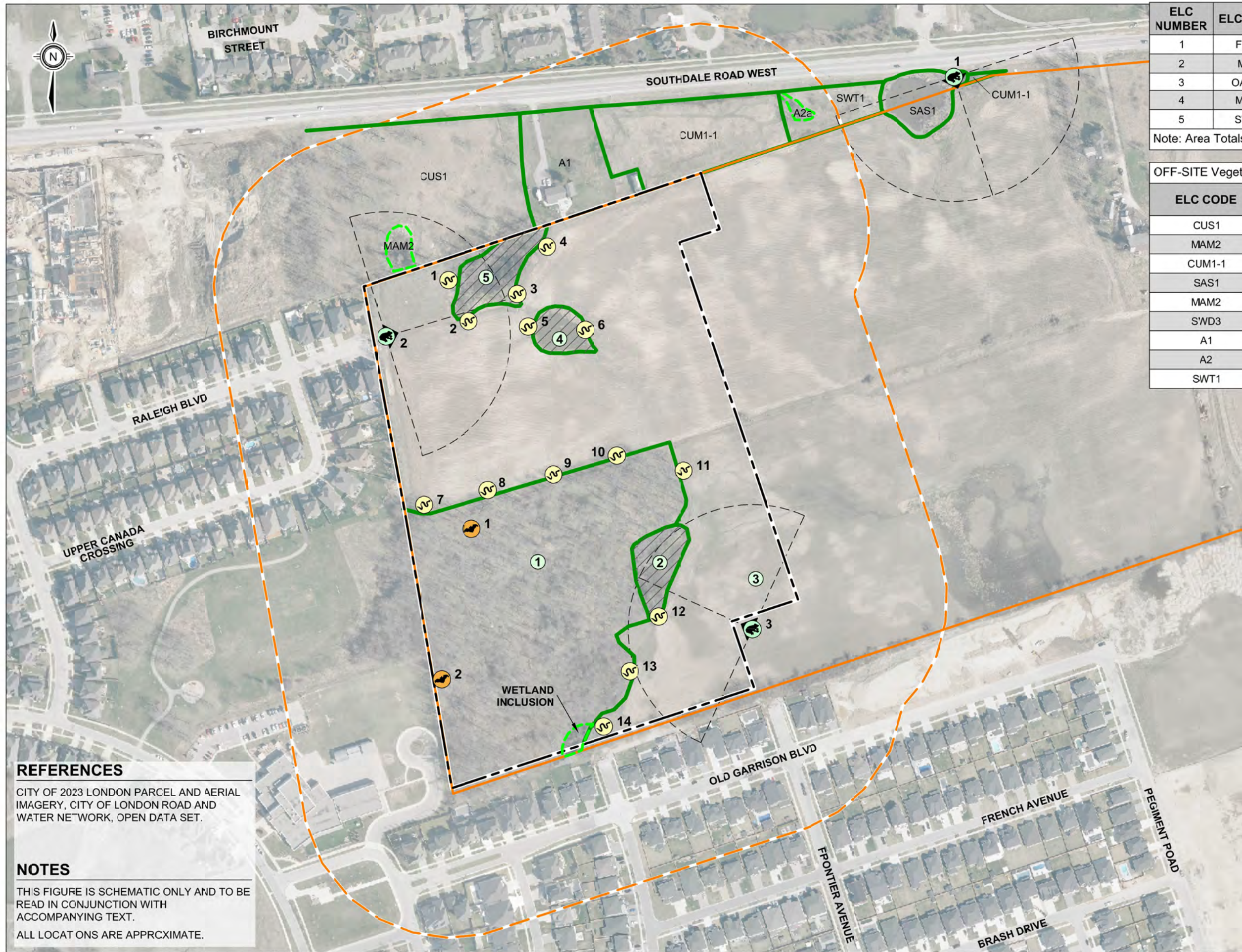
NOTES
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 ALL LOCATIONS ARE APPROXIMATE.



PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

TITLE
VEGETATION COMMUNITIES

Drawn DCH	Scale 1:3,000	Figure 7
Checked	Project No. 46666-100	
Date 2024-08-14	Rev No. 0	



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	S'WD3	Maple Mineral Deciduous Swamp (0.27ha)

Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
S'WD3	Maple Mineral Deciduous Swamp Ecosite (0.28ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)

LEGEND

- SUBJECT LANDS
- - - - STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- ① VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)
- 🦎 AMPHIBIAN BREEDING SURVEY STATION (location, viewing direction, and 100m radius shown)
- 🐍 SNAKE COVERBOARD
- 🦇 BAT RECORDER

0 30 60 90 120 150m

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

NOTES

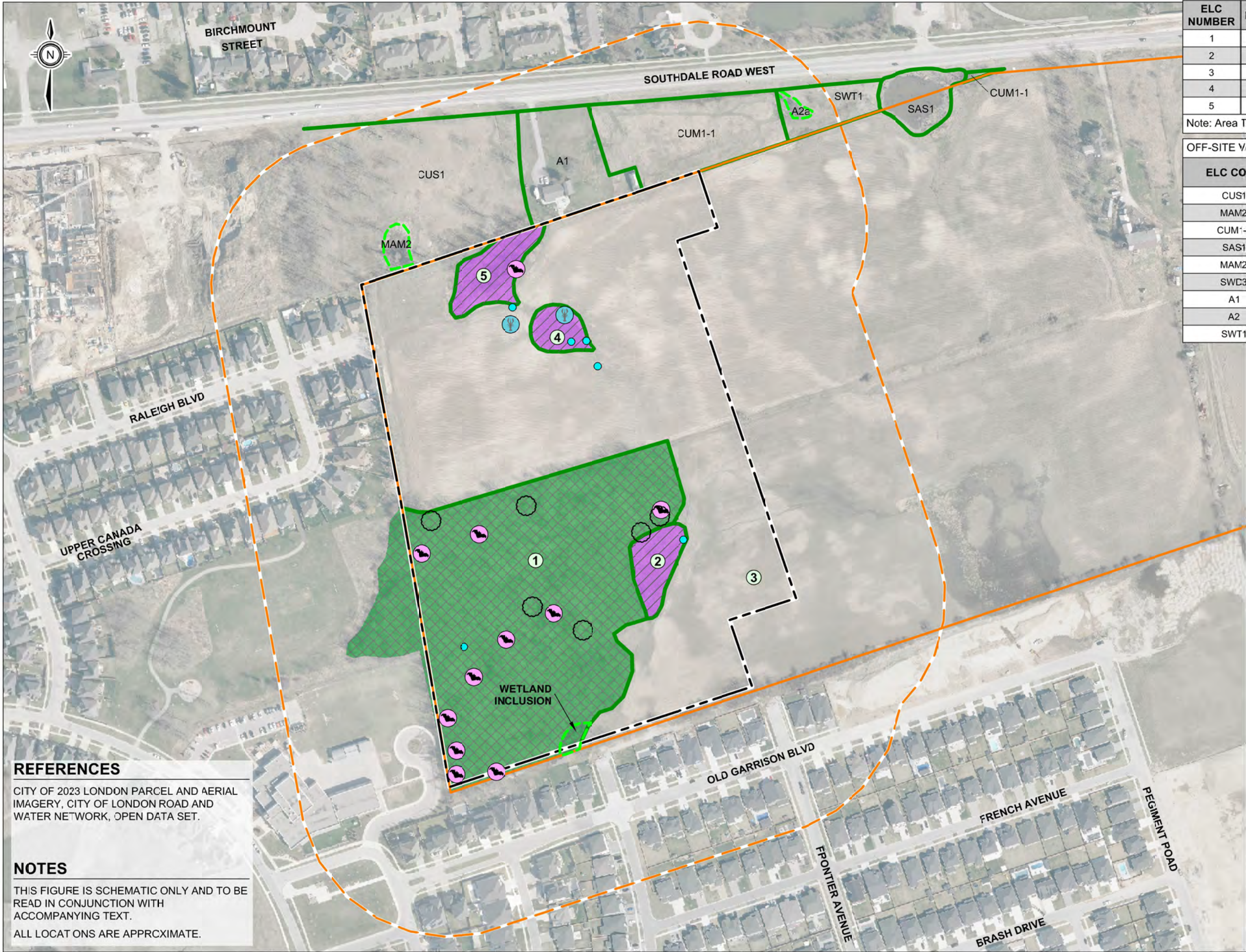
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ALL LOCATIONS ARE APPROXIMATE.

MTE
Engineers, Scientists, Surveyors

PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
SURVEY LOCATIONS

Drawn	DCH	Scale	1:3,000	Figure	8
Checked		Project No.	46666-100		
Date	2024-08-14	Rev No.	0		



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	SWD3	Maple Mineral Deciduous Swamp (0.27ha)

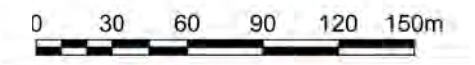
Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
SWC3	Maple Mineral Deciduous Swamp Ecosite (0.28ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)

LEGEND

- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- 1 VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)
- APPROXIMATE NATURAL HERITAGE TREE
- BAT HABITAT TREE
- TERRESTRIAL CRAYFISH
- TERRESTRIAL CRAYFISH CHIMNEYS
- SIGNIFICANT WOODLAND
- TERRESTRIAL CRAYFISH SWH
- CANDIDATE SNAPPING TURTLE SWH
- EASTERN WOOD-PEWEE SWH



PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

TITLE
SIGNIFICANT NATURAL HERITAGE FEATURES AND KEY FINDINGS

Drawn	DCH	Scale	Figure
Checked		Project No. 3000	9
Date		46666-100	
2024-08-16		Rev No. 0	

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

NOTES

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 ALL LOCATIONS ARE APPROXIMATE.



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	SWD3	Maple Mineral Deciduous Swamp (0.27ha)

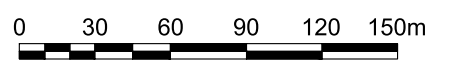
Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
SWD3	Maple Mineral Deciduous Swamp Ecosite (0.28ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)

LEGEND

- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- ① VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)
- DRAINAGE FEATURE
- REACH BREAK < FLOW DIRECTION



REFERENCES
 CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET.

NOTES
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 ALL LOCATIONS ARE APPROXIMATE.

Reach HDF1-8 was not defined within the woodland and no downstream connection was confirmed.

WETLAND INCLUSION

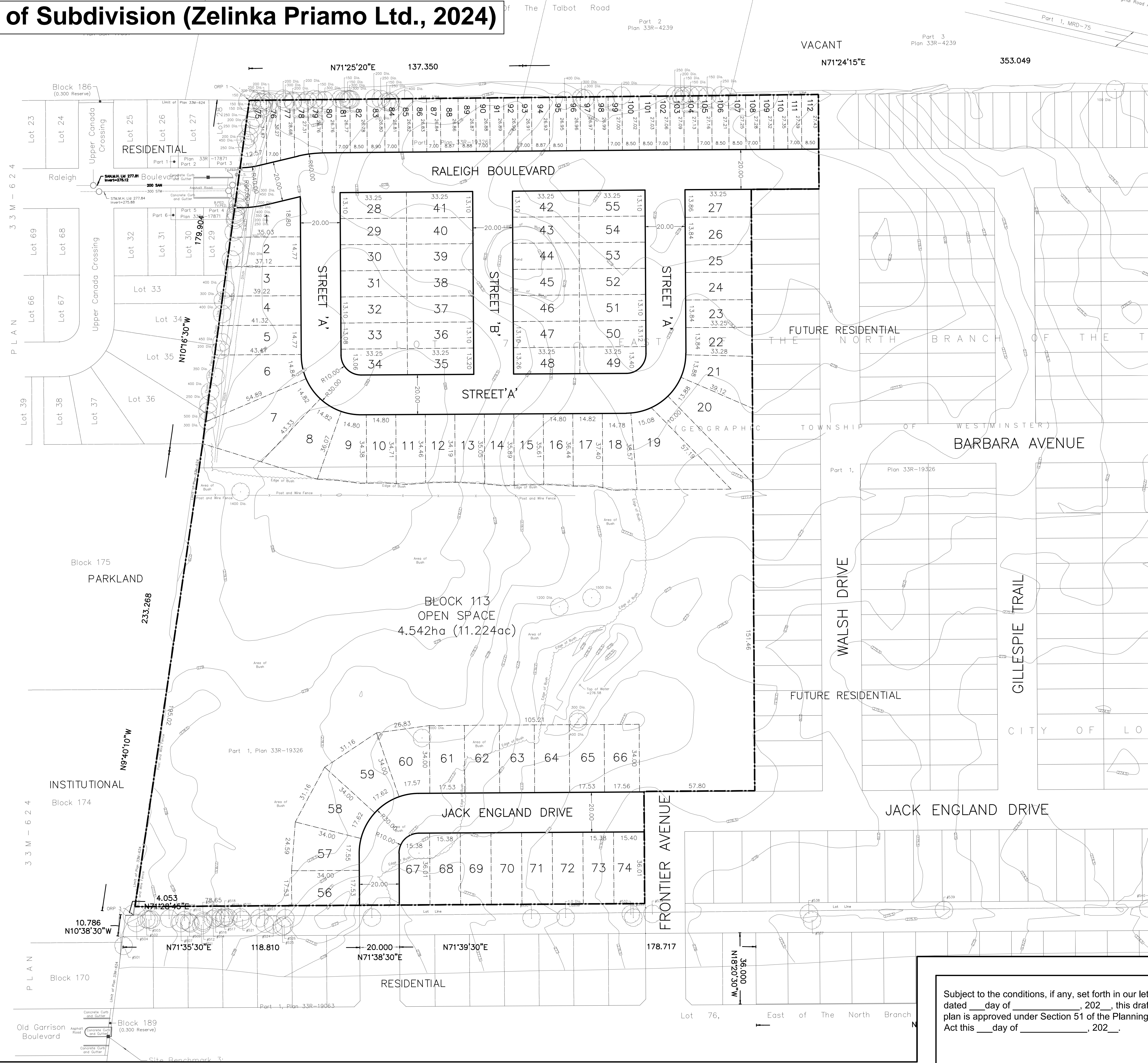
MTE
 Engineers, Scientists, Surveyors

PROJECT
ENVIRONMENTAL IMPACT STUDY
 3095 BOSTWICK ROAD
 LONDON, ONTARIO

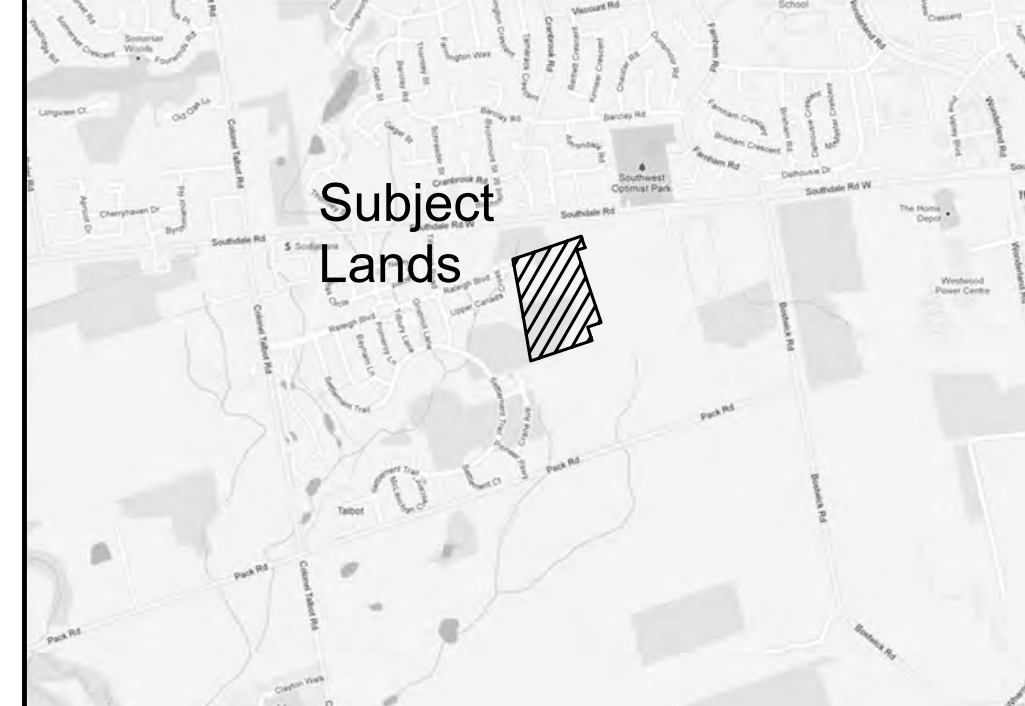
TITLE
HEADWATER DRAINAGE FEATURE ASSESSMENT

Drawn DCH	Scale 1:3,000	Figure 10
Checked	Project No. 46666-100	
Date 2024-08-14	Rev No. 0	

Figure 11: Draft Plan of Subdivision (Zelinka Priamo Ltd., 2024)



KEY PLAN



DRAFT PLAN OF SUBDIVISION
OF PART OF
LOT 76, CONCESSION EAST OF THE NORTH BRANCH OF THE TALBOT ROAD
(GEOGRAPHIC TOWNSHIP OF WESTMINSTER)
AND ALL OF
BLOCK 172, PLAN 33M-562
CITY OF LONDON
COUNTY OF MIDDLESEX

INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

A) As shown	G) As shown
B) As shown	H) Municipal water supply available
C) As shown	I) Mix of Silty Sand & Silty Clay
D) As listed above	J) As shown
E) As shown	K) All municipal services to be available
F) As shown	L) As shown

PROPOSED LAND USES AND AREAS

RESIDENTIAL, SINGLE DETACHED (LOTS 1-74)	4,060 ha
RESIDENTIAL, STREET TOWNHOUSE (LOTS 75-112)	0,799 ha
OPEN SPACE (BLOCK 113)	4,542 ha
PROPOSED ROADS	1,828 ha
TOTAL	11,219 ha

OWNER'S CERTIFICATE
TOPPING BROS. LAND CORP.
HEREBY CONSENTS TO THE FILING OF THIS PLAN IN DRAFT FORM

Topping Bros. Land Corp., Authorized Signature DATED _____

OWNER'S CERTIFICATE
TOPPING FAMILY FARM INC.
HEREBY CONSENTS TO THE FILING OF THIS PLAN IN DRAFT FORM

Topping Family Farm Inc., Authorized Signature DATED _____

SURVEYOR'S CERTIFICATE
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO THE ADJACENT LANDS ARE ACCURATELY SHOWN ON THIS PLAN.

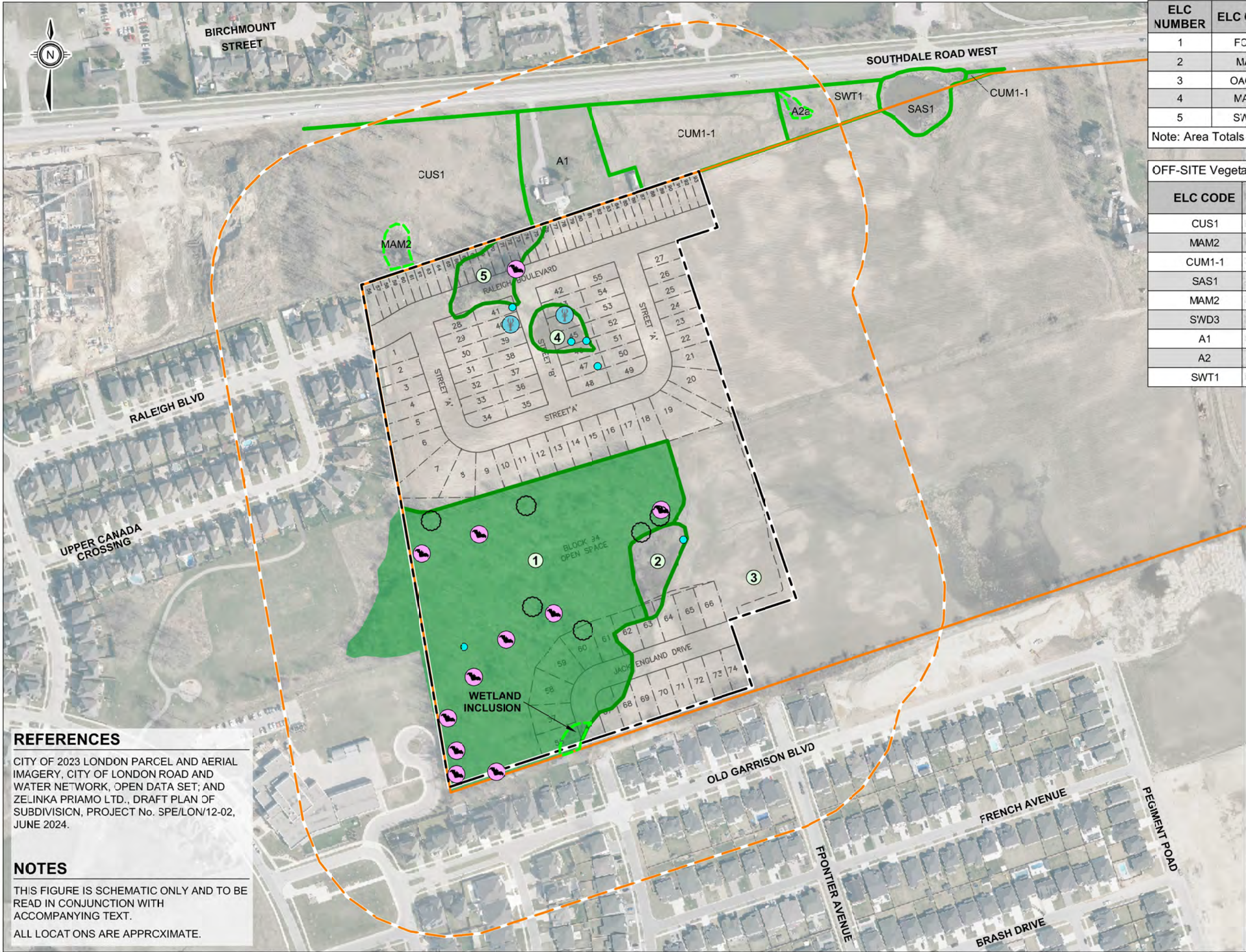
Jason Wilband, ONTARIO LAND SURVEYOR for Archibald, Gray & McKay Ltd. DATED _____

NO.	REVISION	DATE	INITIAL

ZELINKA PRIAMO LTD
A Professional Planning Practice
318 Wellington Road, London, Ontario N6C 4P4
Tel: (519) 474-7137 Fax: (519) 474-2284 e-mail: zp@zplan.com

DRAWN BY	PROJECT NO.
CTK	SPE/LON/12-02
DATE	SCALE
JULY 2024	1:1,000

Subject to the conditions, if any, set forth in our letter dated ___ day of ___, 202___, this draft plan is approved under Section 51 of the Planning Act this ___ day of ___, 202___.



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	S'WD3	Maple Mineral Deciduous Swamp (0.27ha)

Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
S'WD3	Maple Mineral Deciduous Swamp Ecosite (0.28ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)

LEGEND

- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- 1 VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)
- APPROXIMATE NATURAL HERITAGE TREE
- BAT HABITAT TREE
- TERRESTRIAL CRAYFISH
- TERRESTRIAL CRAYFISH CHIMNEYS
- SIGNIFICANT WOODLAND

0 30 60 90 120 150m

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET; AND ZELINKA PRIMO LTD., DRAFT PLAN OF SUBDIVISION, PROJECT No. SPE/LON/12-02, JUNE 2024.

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

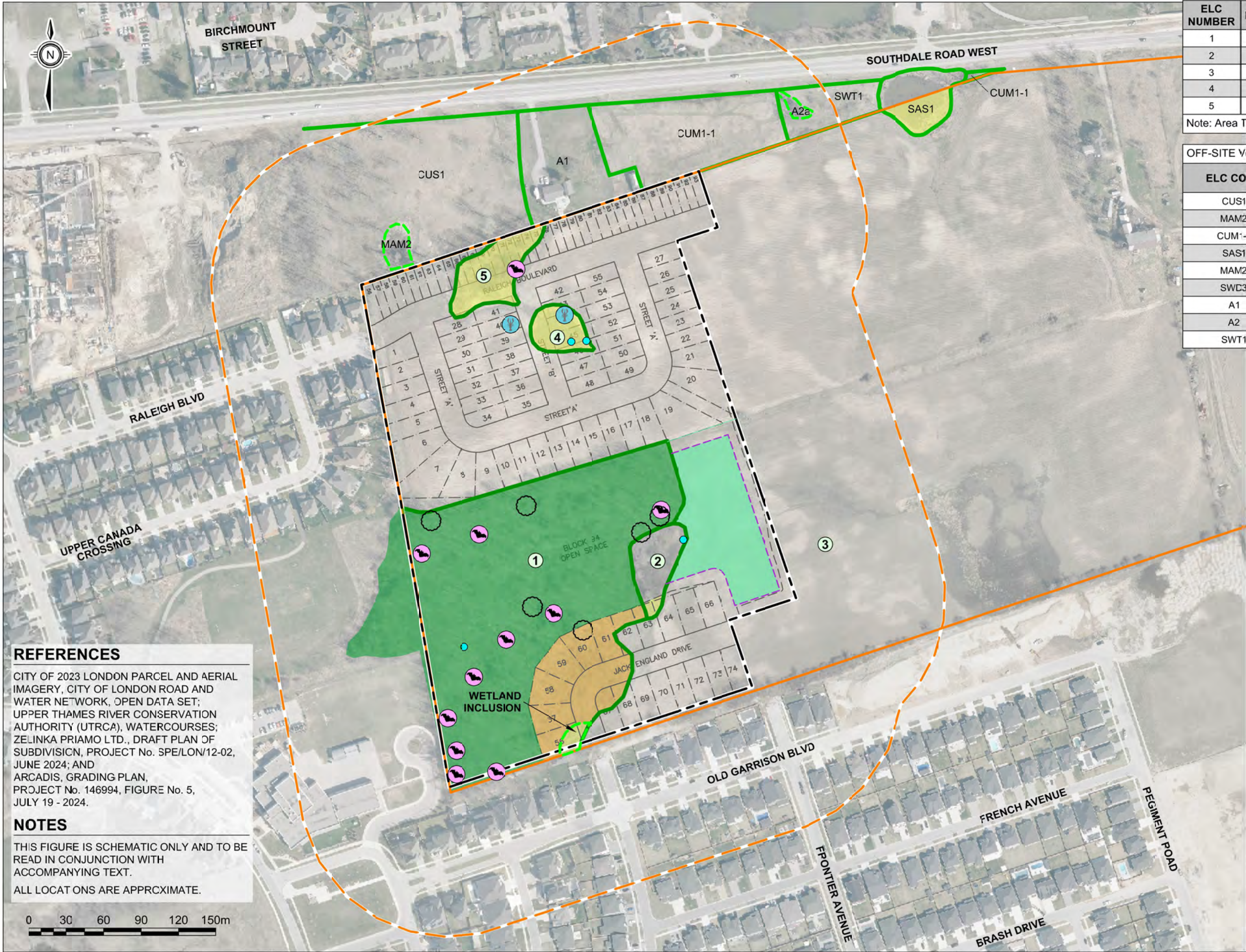
ALL LOCATIONS ARE APPROXIMATE.

MTE
Engineers, Scientists, Surveyors

PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
DEVELOPMENT OVERLAY

Drawn: DCH	Scale: 1:3,000	Figure: 12
Checked:	Project No.: 46666-100	
Date: 2024-08-16	Rev No.: 0	



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	SWD3	Maple Mineral Deciduous Swamp (0.27ha)

Note: Area Totals (ha) are within the Subject Lands only.

OFF-SITE Vegetation Communities:

ELC CODE	Description
CUS1	Mineral Cultural Savannah
MAM2	Mineral Meadow Marsh Ecosite inclusion (0.06ha)
CUM1-1	Dry-Moist Old Field Meadow (0.85ha)
SAS1	Submerged Shallow Aquatic Ecosite (0.26ha)
MAM2	Mineral Shallow Aquatic Ecosite (0.12ha)
SWC3	Maple Mineral Deciduous Swamp Ecosite (0.26ha)
A1	Residential Home and Yard (0.61ha)
A2	Active Horse Pasture (0.27ha)
SWT1	Mineral Swamp Thicket Ecosite (0.03ha)

LEGEND

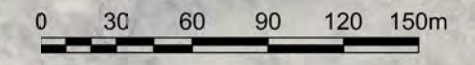
- SUBJECT LANDS
- STUDY AREA (120m from Subject Lands)
- LEGAL PARCEL
- VEGETATION COMMUNITY
- VEGETATION COMMUNITY (Inclusion)
- APPROXIMATE NATURAL HERITAGE TREE
- BAT HABITAT TREE
- TERRESTRIAL CRAYFISH
- TERRESTRIAL CRAYFISH CHIMNEYS
- SIGNIFICANT WOODLAND
- WOODLAND REMOVAL AREA
- WETLAND REMOVAL AREA
- WETLAND COMPENSATION AREA
- 10m BUFFER FROM DEVELOPMENT AREA

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET; UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSES; ZELINKA PRIMO LTD., DRAFT PLAN OF SUBDIVISION, PROJECT No. SPE/LON/12-02, JUNE 2024; AND ARCADIS, GRADING PLAN, PROJECT No. 146994, FIGURE No. 5, JULY 19 - 2024.

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT. ALL LOCATIONS ARE APPROXIMATE.

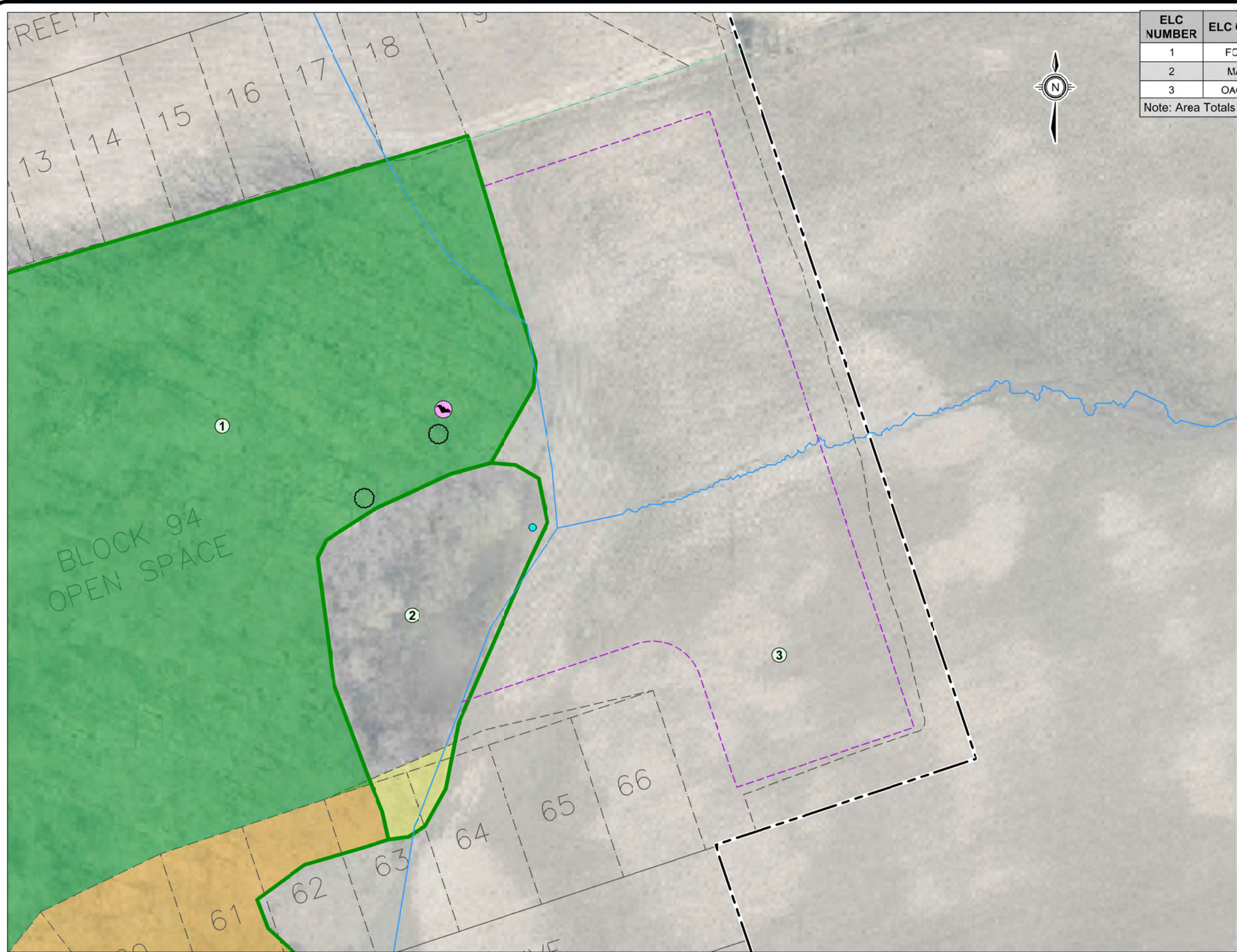


MTE
Engineers, Scientists, Surveyors

PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
MITIGATION AND COMPENSATION MEASURES

Drawn	DCH	Scale	1:3,000	Figure	13
Checked		Project No.	46666-100		
Date	2024-08-16	Rev No.	0		



ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	Annual Row Crops (7.14ha)

Note: Area Totals (ha) are within the Subject Lands only.

LEGEND

- SUBJECT LANDS
- WATERCOURSE (UTRCA)
- ① VEGETATION COMMUNITY
- APPROXIMATE NATURAL HERITAGE TREE
- BAT HABITAT TREE
- TERRESTRIAL CRAYFISH CHIMNEYS
- SIGNIFICANT WOODLAND
- WOODLAND REMOVAL AREA
- WETLAND REMOVAL AREA
- 10m BUFFER FROM DEVELOPMENT AREA

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET; UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSES; ZELINKA PRIMO LTD., DRAFT PLAN OF SUBDIVISION, PROJECT No. SPE/LON/12-02, JUNE 2024; AND ARCADIS, GRADING PLAN, PROJECT No. 146994, FIGURE No. 5, JULY 19 - 2024.

NOTES

THIS FIGURE IS SCHEMATIC ONLY AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

0 7.5 15 22.5 30m

MTE
Engineers, Scientists, Surveyors

PROJECT
ENVIRONMENTAL IMPACT STUDY
3095 BOSTWICK ROAD
LONDON, ONTARIO

TITLE
**WETLAND
COMPENSATION CONCEPT**

Drawn	DCH	Scale	1:750	Figure 14
Checked		Project No.	46666-100	
Date	2024-08-14	Rev No.	0	

Appendix A

Record of Pre-application Consultation

APPENDIX A

Environmental Impact Study ISSUES SUMMARY CHECKLIST REPORT

Application Title: Topping Lands
Date Submitted: April 6, 2020
Proponent: Southside Construction Limited

Qualifications

Primary Consultant: Southside Construction Limited
Key Contact Person: Michael Frija
Other Consultants/ field personnel:
Hydrogeology/ Hydrology: exp.
Biological – Flora: MTE Consultants
Biological – Fauna: MTE Consultants
Other: Zelinka Priamo & IBI Group

Context for Background Information

Subwatershed: Dingman Creek
Tributary Fact Sheet Number:
Planning / Policy Area: North Talbot Village

Technical Advisory Review Team

Ecologist Planner James MacKay
 Planner for File Nancy Pasato (new planner to be identified)
 EEPAC Sandy Levin
 Conservation Authority UTRCA
 Ministry of Natural Resources N/A & MELP
 Ministry of Municipal Affairs and
 Ministry of Agriculture and

Other Review Groups (e.g., Community Associations, Field

1.0 DESCRIPTION OF THE ENVIRONMENT (Features)

Purpose: To have a clear understanding of the current status of the land, and the proposed "development" or land use change.

1.1 Mapping (Location and Context)

Current aerial photography

- Land Use – Excerpts of the Official Plan for the City of London Ontario Schedules A, B, showing a 5-10 km radius of subject site
- Terrain setting @ 1:10,000 – 1:15,000 scale showing landscape features, subwatershed divides
- Existing Environmental Resources showing @1:2,000 – 1:5,000 showing Vegetation, Hydrology, contours, linages.
- Environmental Plan or Strategy from Subwatershed reports (tributary fact sheet), Community (Area) Plans, or other

1.2 Description of Site, Adjacent lands, Linage with Natural Heritage System

List all supporting studies and reports available to provide background summary (e.g. subwatershed, hydrological, geo-technical, natural heritage etc.).

- North Talot Village Community Plan Area Ecological Inventory and Analysis 1998.
- *Pingman Creek Subwatershed Study (2005)*
- *Southwest Area Plan (SWAP)*
- *Southdale Road Widening (2018)*

Check the first box if the information is relevant and required as part of this study. Check the second box if sufficient data is available.

1.2.1 Terrain Setting

- | | | |
|-------------------------------------|-------------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Soils (surface and subsurface) |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Glacial geomorphology – landform type |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | Subwatershed |

- Topographic features
- Ground water discharge
- Shallow ground water/baseflow
- Ground water discharge/aquifer
- Aggregate resources

1.2.2 **Hydrology**

- Hydrological catchment boundary *+ determine catchment areas of all wetlands.*
- Surface drainage pattern
- Watercourses (Permanent, Intermittent)
- Stream order (Headwater, 1st, 2nd, 3rd or higher)
- Agricultural Drains
- Downstream receiving watercourse
- Hazard Line (Map 6)

1.2.3 **Natural Hazards**

- 100 year Erosion Line
- Floodline mapping
- Max line mapping - *WTRCA mapping & text based regulated areas*

1.2.4 **Vegetation**

- Vegetation Patch Number | 10054
- System (Terrestrial, Wetland, Aquatic)
- Cover (Open, Shrub, Treed)
- Community Type(s)
- ELC Community Class (Bluff, Forest, Swamp, Tallgrass Prairie, Savannah & Woodland, Fen, Bog, Marsh, Open Water, Shallow Water)
- ELC Community Series
- Rare Vegetation Communities |

1.2.5

Flora

Flora (inventory dates, source)

3-season - Aug 25, 28, Nov 8, 2017
May 9, June 11, June 28, July 28, 2018

Rare flora (National, Provincial, Regional)

NHIC databases, MNRF/MECP,
Oldham (2017)

1.2.6

Fauna

Fauna (Inventory dates; sources)

Bat habitat and acoustic survey patch 10054
MECP/MNRF protocols

Breeding Birds *+ MECP/MNRF protocols if required.*
June 11, June 28 2018

Migratory Birds | May 9, 2018

Amphibians | Apr 21, May 10, June 18 2018

Reptiles
Cover boards, wetlands+patch 10054 *and Turtle basking surveys, wetlands.*

Mammals | other incidental

Butterflies | incidental

Odonata | incidental

Other |

Bird Species of Conservation Priority *PIF birds*

Rare Fauna

1.2.7

Wildlife Habitat - as per MNRF 2015 criteria, as amended from time to time, and all applicable official plan policies

- Species-At-Risk Regulated Habitat critical habitat mapping
- Winter habitat for deer, wild turkey
- Waterfowl Habitat (wetlands, poorly drained landscape – bottomlands, beaver ponds, seasonally flooded areas, staging areas, feeding areas)
- Colonial Birds Habitat
- Hibernacula
- Habitat for Raptors
- Forests with springs or seeps
- Ephemeral ponds
- Wildlife trees (snags, cavities, x-large trees > 65 cm DBH)
- Forest Interior Birds
- Area-sensitive birds

1.2.8

Aquatic Habitat
(SWS Aquatic Resources Management Reports)

- Fish communities
- Fish spawning areas
- Fish migration routes
- Thermal refuge for fish

Not required,
UTRCA to
confirm

- Benthic inventory
- Substrate
- Riparian habitat (extent and type)

1.2.9

Linkages and Corridors

(The diversity of natural features in an area, and the natural connections between them should be maintained, and improved where possible. PPS 2.3.3)

- Valleylands
- Significant Watercourses (Thames River, Stoney Creek, Medway Creek, Dingman Creek, Pottersburg Creek, Wabuno Creek, Mud Creek, Stanton Creek (Drain), Kelly Creek (Drain))
- Upland Corridors / species migration routes
- Big Picture Cores and Corridors
- Linkages between aquatic and terrestrial areas (riparian habitat, runoff)
- Groundwater connections
- Patch clusters (mosaic of patches in the landscape)

1.3 Social Values

1.3.1

Human Use Values

- Recreational linkages for hiking, walking
- Nature appreciation, aesthetics
- Education, research
- Cultural / traditional heritage
- Social (parks and open space)
- Resources Products (e.g. timber, fish, furbearers, peat)
- Aggregate Resources

1.3.2

Land Use - Cultural

- Archaeological (pre 1500)
- Historical (post 1500 – present)
- Adjacent historical and archeological
- Future

*Archaeological Studies
as required*

1.3.3

Land Use - Active

- Archaeological (pre 1500)
- Historical (post 1500 – present)
- Adjacent historical and archeological
- Future

1.3.4

Other

2.0 EVALUATION OF SIGNIFICANCE

Components of the Natural Heritage System

The policies in Section 15.4 apply to recognized and potential components of the natural heritage system as delineated on Schedule 'B' or features that may be considered for inclusion on Schedule 'B'. They also address the protection of environmental quality and ecological function with respect to water quality, fish habitat, groundwater recharge, headwaters and aquifers.

- A component of a Subject Lands Status Report that is required to be included in the EIS is the evaluation of significance of all potential natural heritage features and areas recognized by In-force London Plan policies and/ or Official Plan policies.**
- A component of a Subject Lands Status Report that is required to be included in the EIS is the confirmation and mapping of boundaries of all natural heritage features and areas.**

2.1 Environmentally Significant Areas

- Identified Environmentally Significant Areas (ESA)

Name

Potential ESAs – Expansion of an Existing ESA

Name

Potential ESA – Area not associated with an existing ESA

Name

2.2 Wetlands

Provincially Significant Wetlands

Name North Talbot PSW complex

Wetlands

Name

Unevaluated Wetlands

2.3 Areas of Natural and Scientific Interest

Provincial Life Science ANSI

Regional Life Science ANSI

Earth Science ANSI

2.4 Habitat of Species-At-Risk (SAR)

Endangered

Threatened

Vulnerable / Special Concern

2.5 Woodlands and Vegetation Patches

Significant Woodlands

Unevaluated Vegetation Patches and/ or other patches > 0.5ha

2.6 Corridors and Linkages

River, Stream and Ravine Corridors

Upland Corridors

Naturalization and Anti-fragmentation Areas

3.0 IDENTIFICATION AND DESCRIPTION OF FUNCTIONS

Ecological Functions the natural processes, products or services that species and non-living environments provide or perform within or between ecosystems and landscapes. Check those functions that will be required to assess for the study (key and supporting functions).

3.1 Biological Functions

Habitat (provision of food, shelter for species)

Limiting habitat

- Species life histories (reproduction and dispersal)
- Habitat guilds
- Indicator species
- Keystone species
- Introduced species
- Predation / parasitism
- Population dynamics
- Vegetation structure, density and diversity
- Food chain support
- Productivity
- Diversity
- Carbon cycle
- Energy cycling
- Succession and disturbance processes
- Relationships between species and communities

3.2 Hydrological and Wetland Functions

- Groundwater recharge and discharge (hydrogeology)
- Water storage and release (fluvial geomorphology)
- Maintaining water cycles (water balance)
- Water quality improvement
- Flood damage reduction
- Shoreline stabilization / erosion control
- Sediment trapping
- Nutrient retention and removal / biochemical cycling
- Aquatic habitat (fish, macroinvertebrates)

3.3 Landscape Features and Functions

- Size
- Connections, corridors and linkages
- Proximity to other areas / natural heritage features (e.g. woodlands, wetlands, valleylands, water, etc.)
- Fragmentation

3.4 Functions, Benefits and Values of Importance to Humans

- Contributing to healthy and productive landscapes
- Improving air quality by supplying oxygen and absorbing carbon dioxide
- Converting and storing atmospheric carbon
- Providing natural resources for economic benefit
- Providing green space for human activities
- Aesthetic and quality-of-life benefit
- Environmental targets and/or environmental management strategies

4.0 ADDITIONAL COMPONENTS AND NOTES

- EIS to show and demonstrate conformity with the Provincial Policy Statement (2020), in-force London Plan (as of Nov. 2019) policies, and current Official Plan policies (1989), Environmental Management Guidelines (2006).
- Full Hydrogeological study and water balance for all features – scope to be determined through discussions with the UTRCA and approved by the UTRCA and City of London.
- EIS to integrate and speak to Hydrogeological study and water balance findings and recommendations for the short and long-term protection of the features and functions.
- EIS to address Section 28 regulated areas requirements that are present on the subject site as confirmed by the UTRCA.
- Natural heritage features and areas boundaries to be staked and GPS located in the field with City of London and UTRCA staff.
- EIS to address buffers, additional mitigation and/or compensation based on the proposed development.
- See City of London Proposal Review Meeting Summary & Record of Consultation (January 22, 2020).

Elise Roth

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: Wednesday, February 17, 2021 12:03 PM
To: Lindsay McKay
Cc: Dave Hayman
Subject: RE: Preliminary Screening Request

Hello Lindsay,

RE: Residential Development – Topping Family Farm Inc. (Southside Group), City of London, Middlesex County and the Endangered Species Act, 2007

The Ministry of the Environment, Conservation and Parks (MECP) Species at Risk Branch (SARB) has reviewed the documentation provided on August 13th, 2020 and February 12th, 2021 regarding the proposed residential development on the Topping Lands south of Southdale Road and west of Bostwick Road in the City of London, Middlesex County to assess the potential impacts of the project on endangered and threatened species at risk (SAR) protected under the *Endangered Species Act, 2007* (ESA 2007).

MECP has reviewed the record for Eastern Hog-nosed Snake submitted to NHIC through the Ontario Reptile and Amphibian Atlas. An individual was observed in Springbank Park. However, aerial photography shows no connection between Springbank Park/Thames River corridor and the Topping Lands (e.g. there is no naturalized corridor between the two sites, travel between the sites would require crossing numerous roads and areas of extensive development).

Based on SARB's review of the project documentation and information that has been provided, MECP is of the opinion that neither section 9 (species protection) nor section 10 (habitat protection) of the ESA 2007 will be contravened for endangered and threatened SAR **as long as the proposed mitigation measures identified in the preliminary screening document (e.g. timing of vegetation removal, etc.) are implemented.**

Should any of the project activities change from what has been presented to MECP, please notify SARB immediately (SAROntario@ontario.ca) to obtain guidance on whether the changes require authorization under the ESA 2007 in order to remain in compliance with the Act. Failure to carry out the project as described to MECP could potentially result in contravention of the ESA 2007. Please be advised that it is the proponent's responsibility to be aware of and comply with all other relevant provincial or federal requirements, municipal by-laws or required approvals from other agencies.

MECP notes that the client has committed to mitigation measures being implemented as part of the project to ensure that unanticipated impacts to SAR do not occur. We encourage the proponent to carry out these mitigation measures. Further, it is recommended that you continue to monitor for SAR activity during the course of the project to document changes, in the event that there should be any.

The position of SARB is based on the information that has been provided for this project. Please contact SARB as soon as possible (SAROntario@ontario.ca) to discuss next steps should any of the following situations arise:

- Information has not been made available and considered in MECP's review;
- New information comes to light that changes the conclusions;
- If on-site conditions and circumstances change so as to alter the basis for the conclusions; or,
- If any of the mitigation measures cannot be completed.

Regards,

Kathryn Markham

Management Biologist
Permissions and Compliance Section, Species at Risk Branch
Ministry of the Environment, Conservation and Parks

From: Lindsay McKay
Sent: February 12, 2021 3:56 PM
To: Species at Risk (MECP)
Cc: Dave Hayman
Subject: RE: Preliminary Screening Request

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Hello Kathryn,
For the Topping Lands project (MTE#46666-100), the Eastern Hog-nosed Snake observation was recorded in the Ontario Reptile and Amphibian Atlas. Within the 10km map square (17MH75) that contains the subject property, this species was recorded most recently in 2017.

The list of observations can be found here:

<https://www.ontarioinsects.org/herp/php/SQLname.php?name=all&records=all&char1=&lowYear=1333&highYear=9999&spIndex=13&areaID=17MH75&areaName=undefined&type=recordsAll&sp=one&area=squares&order=date>

Let me know if I can provide any other information,

Lindsay

Lindsay McKay, B.Sc., M.E.S. | Biologist
MTE Consultants Inc.
T: 519-204-6510 x2244 | LMcKay@mte85.com

From: Species at Risk (MECP) <SAROntario@ontario.ca>
Sent: Friday, February 12, 2021 3:31 PM
To: Lindsay McKay <LMcKay@mte85.com>
Cc: Dave Hayman <DHayman@mte85.com>
Subject: RE: Preliminary Screening Request

Hello Lindsay,

The Ministry of Environment, Conservation and Parks (MECP) has reviewed the information provided on the Topping development in the City of London. The preliminary screening report references an observation of Eastern Hog-nosed Snake on or near the subject property. Could you provide the observation information or the citizen science database where the observation has been recorded?

Thank you,

Kathryn Markham

Management Biologist

Permissions and Compliance Section, Species at Risk Branch

Ministry of Environment, Conservation and Parks

From: Lindsay McKay <LMcKay@mte85.com>
Sent: August 13, 2020 2:54 PM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Dave Hayman <DHayman@mte85.com>
Subject: Preliminary Screening Request

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

To Whom it May Concern,

Please find attached the Preliminary Screening Request for a proposed residential development in London, ON.

The attached documents are submitted as part of our discussions with MECP with respect to the Endangered Species Act. Until a final decision has been reached with respect to this application, it is our expectation these documents will be treated as Personal and Confidential.

Kind regards,

Lindsay McKay, B.Sc., M.E.S. | Junior Terrestrial Biologist
MTE Consultants Inc.

T: 519-204-6510 x2244 | LMcKay@mte85.com

123 St George St., London, Ontario N6A 3A1

www.mte85.com | [Twitter](#) | [LinkedIn](#) | [Instagram](#) | [Facebook](#)

COVID-19 Update: We remain operational and are currently available by email and phone, however, our offices are closed. Staff that are required to visit job sites or perform field work are required to follow MTE health and safety policies and procedures, as well as additional COVID-19 protocols, which can be viewed [here](#).

Notice: The electronic information provided is confidential and privileged, and may not be used for purposes other than work related to the subject project. Redistribution or copies to others made without written permission from MTE Consultants Inc. is strictly prohibited. MTE assumes no liability or responsibility, and makes no guarantee or warranty with respect to the data contained, either expressed or implied.

Appendix B

Species at Risk Screening Tables

**Table B1. Habitat potential for Threatened and Endangered species
based on satellite photo interpretation, background data review and MTE field investigations.**

Common Name	Scientific Name	SARO	Source	Habitat Requirements and Range (MECP, 2018)	Potential Habitat on Subject Lands?	Potential Habitat on Adjacent Lands?	Rationale
Birds	-	-	-	-	-	-	-
Bank Swallow	<i>Riparia riparia</i>	THR	OBBA, eBird	Nests in natural and disturbed settings where there are vertical faces in silt and sand deposits. Many found along rivers and lakes, but also in active sand and gravel pits. Range: Found across southern Ontario, sparse in northern Ontario. Largest populations found along Lake Erie and Lake Ontario shorelines, and along the Saugeen River.	No	No	There are no vertical silt or sand deposits or tall watercourse banks to provide suitable nesting opportunities for this species within the Study Area.
Bobolink	<i>Dolichonyx oryzivorus</i>	THR	OBBA, eBird	Found in large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields, marshes. Grasslands size requirements have been reported to range from 5 ha to 50 ha depending on the study (MNR, n.d.). Range: Widely distributed throughout most of the province south of the boreal forest. May be found in the north where suitable habitat exists.	No	No	There is no suitable grassland, meadow or open habitat to support nesting of this species within the Study Area.
Chimney Swift	<i>Chaetura pelagica</i>	THR	OBBA	Found in urban and rural areas near buildings. Nest and roosts in hollow trees, crevices of rock cliffs and, most commonly, in unlined chimneys. Suitable sites are reused annually. Range: Estimated 7500 breeding individuals in Ontario; most widely distributed in the Carolinian south and southwest.	No	No	There are no suitable structures such as chimneys or large hollow trees to provide suitable roosting habitat for this species within the Study Area.
Eastern Meadowlark	<i>Sturnella magna</i>	THR	OBBA	Breeds mostly in moderately tall grasslands (native prairies and savannahs), also pastures, hayfields, herbaceous fencerows, roadsides, orchards, airports, shrubby overgrown fields, or other open areas. Eastern Meadowlarks may not be strongly area-sensitive (McCracken et al. 2013), however large tracts of grasslands (5 ha or greater) are preferred over smaller fragments (Herkert 1991, Vickery et al. 1994). Range: Primarily found south	No	No	There is no suitable grassland, meadow or open habitat to support nesting of this species within the Study Area.

Common Name	Scientific Name	SARO	Source	Habitat Requirements and Range (MECP, 2018)	Potential Habitat on Subject Lands?	Potential Habitat on Adjacent Lands?	Rationale
				of the Canadian Shield, but also inhabits Lake Nipissing, Timiskaming, and Lake of Woods areas.			
Reptiles	-	-	-	-	-	-	-
Eastern Foxsnake (Carolinian Population)	<i>Patherophis gloydi</i>	END	ORAA	Mainly unforested, early successional vegetation communities during active season. Eastern Foxsnakes in the Carolinian population are usually found in old fields, marshes, along hedgerows, drainage canals and shorelines. Females lay their eggs in rotting logs, manure or compost piles, which naturally incubate the eggs until they hatch. During the winter, Eastern Foxsnakes hibernate in groups in deep cracks in the bedrock and in some man-made structures. Range: Restricted to two discrete regions in Essex-Kent and Haldimand-Norfolk. 70% of species range is in Ontario.	No	No	While there may be suitable forested foraging and nesting habitat for this species, the Study Area is outside of the known range of this species.
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	THR	ORAA	Prefer habitats with sandy, well-drained soil and open vegetative cover such as woods, brushland, fields, forests, edges, and disturbed sites; often near water where amphibian prey are abundant. Generally avoids dense or dark moist forest (Rowell, 2012). Roads are considered a barrier to movement, however if suitable habitat is present on both sides the barrier may be considered incomplete (Kraus, 2011). Range: Isolated populations in along southern Lake Huron, Lake Erie and eastern Georgian Bay.	No	No	The Subject Lands and adjacent lands include forest habitat, but it is moist (not preferred) and isolated by surrounding major roads and residential developments. Much of the area is also active agriculture and no loose sandy soils are present to support critical life processes (i.e., nesting and overwintering). No Eastern Hog-nosed were observed during any field investigations, including snake coverboards surveys, though it is acknowledged they are a cryptic species. It should also be noted that this species is not typically found within central London. Overall, this species is not considered likely to be present within the Study Area.
Mammals	-	-	-	-	-	-	-
Eastern Small-footed Myotis	<i>Myotis leibii</i>	END	SARO	Roosts in caves, mine shafts, crevices, or buildings in or near a woodland. Hibernates in cold dry caves or mines. Range: From south of Georgian Bay to Lake Erie, east to Pembroke.	No	No	There are no caves, mines or shafts within the Study Area to support roosting habitat for this species.
Little Brown Myotis	<i>Myotis lucifugus</i>	END	SARO	Little Brown Myotis roosts in caves, quarries, tunnels, hollow trees, or buildings. Little Brown	No	No	There is forest and swamp habitat that may support roosting habitat for this species.

Common Name	Scientific Name	SARO	Source	Habitat Requirements and Range (MECP, 2018)	Potential Habitat on Subject Lands?	Potential Habitat on Adjacent Lands?	Rationale
				Myotis typically prefer buildings or building-associated features for maternity roosting rather than natural features (Gerson, 1984; Humphrey & Fotherby, 2019). This species hibernates in humid caves and forages in wetlands and forest edges. Range: Widespread across southern Ontario.			Acoustic monitoring on site in 2020 confirmed this species is absent from the Subject Lands.
Northern Myotis	<i>Myotis septentrionalis</i>	END	SARO	Roosts in houses, manmade structures, but prefers hollow trees or under loose bark. Hunts in forests. Range: Throughout forested areas in southern Ontario.	Yes	No	There is forest and swamp habitat that may support roosting habitat for this species. Acoustic monitoring on site in 2020 confirmed this species is absent from the Subject Lands.
Tri-colored Bat	<i>Perimyotis subflavus</i>	END	SARO	Roosts in older forests and occasionally barns/structures. Hibernates in damp, draft-free caves. Hunt over water and along streams in a forest.	Yes	No	There is forest and swamp habitat that may support roosting habitat for this species. Acoustic monitoring on site in 2020 confirmed this species is absent from the Subject Lands.

**Table B2. Habitat potential for Species of Conservation Concern (SOCC)
based on satellite photo interpretation, background data review and MTE field investigations.**

Common Name	Scientific Name	Source	Habitat Requirements (MECP, 2018)	Potential Habitat on Subject Lands?	Potential Habitat on Adjacent Lands?	Rationale
Plants	-	-	-	-	-	-
Green Dragon	<i>Arisaema dracontium</i>	NHIC	Grows in moderate to wet deciduous forests along streams, associated highly with maple forests and forests dominated by Red Ash and White Elm. Range: Great Lakes Region; specifically, southwestern Ontario.	Yes	Yes	The Study Area contains wetland and forest habitat with embedded wetlands that may provide suitable growing habitat for this species.
Birds	-	-	-	-	-	-
Bald Eagle	<i>Haliaeetus leucocephalus</i>	eBird	Nest in a variety of habitats and forests in close proximity to a major lake or river. Range: Higher density of nesting in northwest Ontario, with successful reintroductions in southern Ontario.	No	No	There is no forest habitat in proximity to a major body of water as preferred by this species.
Barn Swallow	<i>Hirundo rustica</i>	OBBA, eBird	Barn Swallows are typically found nesting in close association with human rural settlements, such as in old sheds, barns, and under bridges or culverts. This species forages for aerial insects in open habitats including grassy fields, pastures, agricultural fields and farms, lake and river shorelines, wetlands, and clearings. Range: Throughout southern Ontario and as far north as Hudson Bay.	No	No	There are no old sheds, barns or culverts within the Study Area to support nesting habitat of this species.
Common Nighthawk	<i>Chordeiles minor</i>	OBBA	Lives in open areas with little to no ground vegetation. Tend to occupy natural sites. Range: All over the province, except James and Hudson Bay regions.	No	No	There is no open habitat within the Study Area to support this species as the forest is likely too dense and the remaining open lands are active agricultural lands.
Eastern Wood-Pewee	<i>Contopus virens</i>	OBBA	Lives in mid-canopy layer of forest clearings and the edges of deciduous and mixed forests. Abundant in middle-aged forests with little understory. Range: Found across most of southern and central Ontario.	Yes	No	There is forest habitat present within the Subject Lands that may support nesting habitat for this species. Breeding bird surveys in 2024 confirmed this species is present in the woodland and likely breeding.
Peregrine Falcon	<i>Falco peregrinus</i>	eBird	Nests on tall, steep cliff ledges close to large bodies of water. Also adapted to city life using tall buildings and ledges. Range: Nest in and around Toronto and other southern Ontario cities, majority of breeding is found around Lake Superior.	No	No	There are no tall, steep cliff edges close to large bodies of water within the Study Area nor are there tall buildings and ledges that may be used for nesting.

Common Name	Scientific Name	Source	Habitat Requirements (MECP, 2018)	Potential Habitat on Subject Lands?	Potential Habitat on Adjacent Lands?	Rationale
Wood Thrush	<i>Hylocichla mustelina</i>	OBBA	Lives in mature deciduous and mixed forests, seeking moist stands with well-developed undergrowth. Prefer large forests but will use smaller. Range: Across southern Ontario, less common up north to Lake Superior.	Yes	No	There is forest habitat within the Subject Lands that may support nesting habitat for this species. Breeding bird surveys in 2024 confirmed this species is absent.
Reptiles	-	-	-	-	-	-
Northern Map Turtle	<i>Graptemys geographica</i>	ORAA	Lives in rivers and lakeshores. Basks on emergent rocks and fallen trees, and hibernates in deeps, slow-moving sections of the river. Range: Great Lakes region and west. Primarily on shores of Georgian Bay, Lake St. Clair, Lake Erie, and Lake Ontario. River includes the Thames, Grand, and Ottawa.	No	No	The Study Area is not in close proximity to a major river or lake as preferred by this species.
Snapping Turtle	<i>Chelydra serpentina</i>	ORAA	Spend most of their time in water, preferring shallow waters to hide in soft mud and leaf litter. Nest in gravelly or sandy areas along streams, taking advantage of man-made structures for nesting sites, including roads, dams, and aggregate pits. Range: Limited to southern part of Ontario.	Yes	No	The Study Area contains several wetland pockets, though the water levels were relatively low based on 2020 EXP measurements, and they dried out in August 2020. No turtles have been observed incidentally during any site visit, though no targeted surveys have been completed. Spring/summer habitat may be suitable.

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Appendix C

Ecological Land Classification Data

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <i>Sneathside - Toppis Lnds</i>		POLYGON: <i>1</i>	
	SURVEYOR(S): <i>WH</i>		DATE: <i>Aug 25</i>	TIME: <i>start</i>
			<i>Nov 8</i>	<i>finish</i>
	UTMZ: <i>17</i>	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input checked="" type="checkbox"/> TERRESTRIAL <input type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input checked="" type="checkbox"/> VALLEY SLOPE <input type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input checked="" type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> PEN <input type="checkbox"/> BOG <input type="checkbox"/> BARRON <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> BAVANIAN WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE			COVER		
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK			<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED		

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY	2 4	TILamer = JUBnigr = ACEsasa = QUEmbr
2	SUB-CANOPY	3 3	TILamer = JUBnigr = ACEsasa = QUEmbr
3	UNDERSTOREY	2 3	CRAT sp. > RHAM cat = CORNrac = LON / Fat
4	GRD. LAYER	5 4	ALLIpet = GEUMcan > RUBUacc > ARCTmin

HT CODES: 1 = >25m 2 = 10<HT 25m 3 = 2<HT 10m 4 = 1<HT 2m 5 = 0.5<HT 1m 0 = 0<HT 0.0m 7 = HT > 0.2m
CVR CODES 0 = NONE 1 = 0% < CVR 10% 2 = 10 < CVR 25% 3 = 25 < CVR 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	0	< 10	0	10-24	A	25-50	0	> 50
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STANDING SNAGS:	0	< 10	0	10-24	R	25-50	R	> 50
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DEADFALL / LOGS:	0	< 10	0	10-24	R	25-50	R	> 50
------------------	---	------	---	-------	---	-------	---	------

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE:	<input type="checkbox"/> PIONEER	<input type="checkbox"/> YOUNG	<input type="checkbox"/> MID-AGE	<input checked="" type="checkbox"/> MATURE	<input type="checkbox"/> OLD GROWTH
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SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	<input type="checkbox"/> 0	<input type="checkbox"/> 0
MOISTURE:	DEPTH OF ORGANICS:	(mm)	
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	(mm)	

COMMUNITY CLASSIFICATION:

COMMUNITY CLASS:	FOREST	RL0 00DR
COMMUNITY SERIES:	DECIDUOUS	RL0 00
ECOSITE:	FRESH-MOIST LOWLAND	RL0 00
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC MANAGEMENT / DISTURBANCE	SITE: <i>Toppis</i>				
	POLYGON: <i>1</i>				
	DATE: <i>Aug 25</i>				
	SURVEYOR(S): <i>WH</i>				
DISTURBANCE EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	3
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	6
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	2
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	4
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	0
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	2
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	2
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	0
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	2
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	2
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	6
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	1
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	0
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

ELC SOILS ONTARIO

SITE: Topping

POLYGON: 1

DATE: July 18

SURVEYOR(S): W/H, EB

Slope UTM

P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1	A		2	160	3			17	475.117	475.3248
2	A		5	200	2				475.195	475.3322
3										
4										
5										

SOIL	1	2	3	4	5
TEXTURE x HORIZON	A	A			
	vfscl 25	ufscL 25			
	Sic 52	Sic B 56			

A	TEXTURE	vfscl	ufscL			
	COURSE FRAGMENTS	999	999			
B	TEXTURE	Sic	Sic			
	COURSE FRAGMENTS	999	322			
C	TEXTURE	999	999			
	COURSE FRAGMENTS	999	999			
	EFFECTIVE TEXTURE	Sic	Sic			
	SURFACE STONINESS	no	no			
	SURFACE ROCKINESS	no	no			

DEPTH TO / OF					
MOTTLES	25	999			
GLEYS	999	999			
BEOROCK	999	999			
WATER TABLE	999	999			
CARBONATES	999	999			
DEPTH OF ORGANICS	1	2			
PORE SIZE DISC #1	999	999			
PORE SIZE DISC #2	999	999			
MOISTURE REGIME					
SOIL SURVEY MAP					
LEGEND CLASS					

ELC STAND CHARACTERISTICS

SITE: Topping

POLYGON: 1

DATE: Aug 25

SURVEYOR(S): W/H

TREE TALLY BY SPECIES:

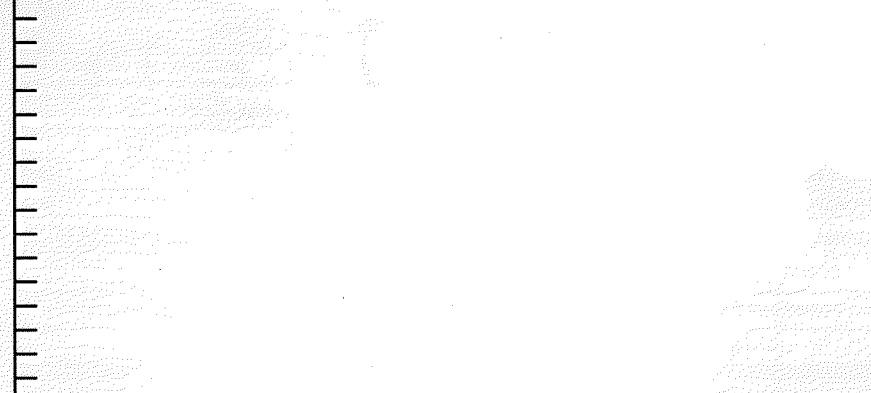
PRISM FACTOR 2m

SPECIES	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5	TOTAL	REL. AVG
TILamer	4	1.5	3	3.5		12	31
ACEsasa	4.5	0	1	0		5.5	14
OSTvirg	2.5	0	1	0		3.5	9
QUErubr	1	0	2	2.5		4.5	12
JUGnigr	0	0	0	5		11	29
FRApenn	0	0	1	0		1	3
QUAalba	0	0	0	1		1	3
TOTAL	12	7.5	8	11		38.5	100
BASAL AREA (BA)	24	15	16	22		77	19
DEAD	0	0	1.5	0		1.5	4

STAND COMPOSITION:

TILamer 31 JUGnigr 29 ACEsasa 14 QUErubr 12

COMMUNITY PROFILE DIAGRAM



Notes:

Point beside 1

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <u>Topping lands</u>		POLYGON: <u>2</u>	
	SURVEYOR(S): <u>WH</u>		DATE: <u>Nov 8</u>	TIME: start finish
	UTMZ:	UTME:	UTMN:	

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input checked="" type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL <input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREED	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input checked="" type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECIDUOUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input checked="" type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE		COVER			
<input type="checkbox"/> OPEN WATER <input checked="" type="checkbox"/> SHALLOW WATER <input type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK					

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1	CANOPY		
2	SUB-CANOPY		
3	UNDERSTOREY	3	<u>CER pacci = SAL alba = COR serri</u>
4	GRD. LAYER		<u>PER seeds = PER lapa</u>

HT CODES: 1=>25m 2=10<HT 25m 3=2<HT 10m 4=1<HT 2m 5=0.5<HT 1m 6=0.2<HT 0.5m 7=HT<0.2m
 CVR CODES 0=NONE 1=0%<CVR 10% 2=10<CVR 25% 3=25<CVR 60% 4=CVR>60%

STAND COMPOSITION: BA: _____

SIZE CLASS ANALYSIS: < 10 10 - 24 25 - 50 > 50

STANDING SNAGS: < 10 10 - 24 25 - 50 > 50

DEADFALL / LOGS: < 10 10 - 24 25 - 50 > 50

ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE: PIONEER YOUNG MID-AGE MATURE OLD GROWTH

SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G =
MOISTURE:	DEPTH OF ORGANICS: (cm)		
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: (cm)		

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<u>MARSH</u>	<u>MA</u>
COMMUNITY SERIES:	<u>MEADOW</u>	<u>MAM</u>
ECOSITE:		
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC MANAGEMENT / DISTURBANCE	SITE:				SCORE †
	POLYGON:				
DATE:					
SURVEYOR(S):					
DISTURBANCE EXTENT	0	1	2	3	
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

ELC SOILS ONTARIO	SITE: <u>Tapping 2</u>
	POLYGON: <u>2</u>
	DATE: <u>Aug 25</u>
	SURVEYOR(S): <u>SWH</u>

Slope							UTM			
P/A	PP	Dr	Position	Aspect	%	Type	Class	Z	EASTING	NORTHING
1	A		5	10	2			17	475385	4753521
2										
3										
4										
5										

SOIL TEXTURE x HORIZON	1	2	3	4	5
	<u>Oh</u>				

A	TEXTURE					
	COURSE FRAGMENTS					
B	TEXTURE					
	COURSE FRAGMENTS					
C	TEXTURE					
	COURSE FRAGMENTS					
	EFFECTIVE TEXTURE					
	SURFACE STONINESS					
	SURFACE ROCKINESS					

DEPTH TO / OF		1	2	3	4	5
MOTTLES		0				
GLEYS		0				
BEDROCK						
WATER TABLE						
CARBONATES						
DEPTH OF ORGANICS		38				
PORE SIZE DISC #1						
PORE SIZE DISC #2						
MOISTURE REGIME						
SOIL SURVEY MAP						
LEGEND CLASS						

ELC STAND CHARACTERISTICS	SITE: <u>Tapping 2</u>
	POLYGON: <u>2</u>
	DATE:
	SURVEYOR(S):

TREE TALLY BY SPECIES:

SPECIES	PRISM FACTOR <input type="text"/>					TOTAL	REL. AVG
	TALLY 1	TALLY 2	TALLY 3	TALLY 4	TALLY 5		
TOTAL							100
BASAL AREA (BA)							
DEAD							

STAND COMPOSITION:

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COMMUNITY PROFILE DIAGRAM

Notes:

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <i>Topping</i>	POLYGON: <i>4</i>	
	SURVEYOR(S): <i>WB</i>	DATE: <i>NOV 8</i>	TIME: start
	UTMZ: <i>17</i>	UTME:	UTMN:
			finish

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input checked="" type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL. UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input type="checkbox"/> NATURAL <input checked="" type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input checked="" type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input checked="" type="checkbox"/> MARSH <input type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE		COVER			
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK		<input checked="" type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input type="checkbox"/> TREED			

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	4	4	<i>TYPlate</i>
2 SUB-CANOPY			
3 UNDERSTOREY			
4 GRD. LAYER	5	3	<i>AGR stol > APOcann = BID Iron = PENselo</i>

HT CODES: 1 => >25 m 2 = 10<HT 25 m 3 = 2<HT 10 m 4 = 1<HT 2 m 5 = 0.5<HT 1 m 6 = 0.2<HT 0.5 m 7 = HT<0.2 m

CVR CODES 0 = NONE 1 = 0% < CVR 10% 2 = 10 < CVR 25% 3 = 25 < CVR 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
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STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
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DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH
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SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G =
MOISTURE:	DEPTH OF ORGANICS:	(cm)	
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK:	(cm)	

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<i>MARSH</i>	<i>MA</i>
COMMUNITY SERIES:	<i>SHALLOW</i>	<i>MAS</i>
ECOSITE:	<i>MINERAL</i>	<i>MAS2</i>
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes: *DRY IN AUGUST*

ELC MANAGEMENT / DISTURBANCE	SITE: <i>Topping</i>				
	POLYGON: <i>4</i>				
	DATE:				
	SURVEYOR(S):				
DISTURBANCE EXTENT	0	1	2	3	SCORE †
TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
NOISE	NONE	SLIGHT	MODERATE	INTENSE	
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
FIRE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE	
OTHER	NONE	LIGHT	MODERATE	HEAVY	
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE	

† INTENSITY x EXTENT = SCORE

ELC COMMUNITY DESCRIPTION & CLASSIFICATION	SITE: <i>Topping</i>	POLYGON: <i>5</i>	
	SURVEYOR(S): <i>WN</i>	DATE: <i>Aug 25 1998</i>	TIME: start finish
	UTMZ:	UTME:	UTMN:

POLYGON DESCRIPTION

SYSTEM	SUBSTRATE	TOPOGRAPHIC FEATURE	HISTORY	PLANT FORM	COMMUNITY
<input type="checkbox"/> TERRESTRIAL <input checked="" type="checkbox"/> WETLAND <input type="checkbox"/> AQUATIC	<input type="checkbox"/> ORGANIC <input checked="" type="checkbox"/> MINERAL SOIL <input type="checkbox"/> PARENT MIN. <input type="checkbox"/> ACIDIC BEDRK. <input type="checkbox"/> BASIC BEDRK. <input type="checkbox"/> CARB. BEDRK.	<input type="checkbox"/> LACUSTRINE <input type="checkbox"/> RIVERINE <input type="checkbox"/> BOTTOMLAND <input type="checkbox"/> TERRACE <input type="checkbox"/> VALLEY SLOPE <input checked="" type="checkbox"/> TABLELAND <input type="checkbox"/> ROLL UPLAND <input type="checkbox"/> CLIFF <input type="checkbox"/> TALUS <input type="checkbox"/> CREVICE / CAVE <input type="checkbox"/> ALVAR <input type="checkbox"/> ROCKLAND <input type="checkbox"/> BEACH / BAR <input type="checkbox"/> SAND DUNE <input type="checkbox"/> BLUFF	<input checked="" type="checkbox"/> NATURAL <input type="checkbox"/> CULTURAL	<input type="checkbox"/> PLANKTON <input type="checkbox"/> SUBMERGED <input type="checkbox"/> FLOATING-LVD. <input type="checkbox"/> GRAMINOID <input type="checkbox"/> FORB <input type="checkbox"/> LICHEN <input type="checkbox"/> BRYOPHYTE <input checked="" type="checkbox"/> DECIDUOUS <input type="checkbox"/> CONIFEROUS <input type="checkbox"/> MIXED	<input type="checkbox"/> LAKE <input type="checkbox"/> POND <input type="checkbox"/> RIVER <input type="checkbox"/> STREAM <input type="checkbox"/> MARSH <input checked="" type="checkbox"/> SWAMP <input type="checkbox"/> FEN <input type="checkbox"/> BOG <input type="checkbox"/> BARREN <input type="checkbox"/> MEADOW <input type="checkbox"/> PRAIRIE <input type="checkbox"/> THICKET <input type="checkbox"/> SAVANNAH <input type="checkbox"/> WOODLAND <input type="checkbox"/> FOREST <input type="checkbox"/> PLANTATION
SITE		COVER			
<input type="checkbox"/> OPEN WATER <input type="checkbox"/> SHALLOW WATER <input checked="" type="checkbox"/> SURFICIAL DEP. <input type="checkbox"/> BEDROCK		<input type="checkbox"/> OPEN <input type="checkbox"/> SHRUB <input checked="" type="checkbox"/> TREED			

STAND DESCRIPTION:

LAYER	HT	CVR	SPECIES IN ORDER OF DECREASING DOMINANCE (up to 4 sp) (>> MUCH GREATER THAN; > GREATER THAN; = ABOUT EQUAL TO)
1 CANOPY	2	4	<i>ACEsacc >> SALalba</i>
2 SUB-CANOPY			
3 UNDERSTOREY	4	3	<i>CEpocci = RTRcatn = CORrace</i>
4 GRD. LAYER			

HT CODES: 1 = >25m 2 = 10<HT 25m 3 = 2<HT 10m 4 = 1<HT 2m 5 = 0.5<HT 1m 6 = 0.2<HT 0.5m 7 = HT<0.2m
 CVR CODES 0 = NONE 1 = 0% < CVR 10% 2 = 10 < CVR 25% 3 = 25 < CVR 60% 4 = CVR > 60%

STAND COMPOSITION:	BA:
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SIZE CLASS ANALYSIS:	< 10	10 - 24	25 - 50	> 50
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STANDING SNAGS:	< 10	10 - 24	25 - 50	> 50
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DEADFALL / LOGS:	< 10	10 - 24	25 - 50	> 50
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ABUNDANCE CODES: N = NONE R = RARE O = OCCASIONAL A = ABUNDANT

COMM. AGE :	PIONEER	YOUNG	MID-AGE	MATURE	OLD GROWTH
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SOIL ANALYSIS:

TEXTURE:	DEPTH TO MOTTLES / GLEY	g =	G =
MOISTURE:	DEPTH OF ORGANICS: (cm)		
HOMOGENEOUS / VARIABLE	DEPTH TO BEDROCK: (cm)		

COMMUNITY CLASSIFICATION:

ELC CODE

COMMUNITY CLASS:	<i>SWAMP</i>	<i>SW</i>
COMMUNITY SERIES:	<i>DECIDUOUS</i>	<i>SWD</i>
ECOSITE:	<i>MAPLE MINERAL</i>	<i>SWD3</i>
VEGETATION TYPE:		
INCLUSION		
COMPLEX		

Notes:

ELC MANAGEMENT / DISTURBANCE	SITE: <i>Topping</i>	POLYGON: <i>5</i>				
	DATE: <i>Aug 25</i>	SURVEYOR(S): <i>WN</i>				
	DISTURBANCE EXTENT	0	1	2	3	SCORE ↑
	TIME SINCE LOGGING	> 30 YRS	15 - 30 YRS	5 - 15 YRS	0 - 5 YEARS	0
INTENSITY OF LOGGING	NONE	FUEL WOOD	SELECTIVE	DIAMETER LIMIT	0	
EXTENT OF LOGGING	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
SUGAR BUSH OPERATIONS	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF OPERATIONS	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
GAPS IN FOREST CANOPY	NONE	SMALL	INTERMEDIATE	LARGE	6	
EXTENT OF GAPS	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
LIVESTOCK (GRAZING)	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF LIVESTOCK	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
ALIEN SPECIES	NONE	OCCASIONAL	ABUNDANT	DOMINANT	2	
EXTENT OF ALIEN SPECIES	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
PLANTING (PLANTATION)	NONE	OCCASIONAL	ABUNDANT	DOMINANT	0	
EXTENT OF PLANTING	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
TRACKS AND TRAILS	NONE	FAINT TRAILS	WELL MARKED	TRACKS OR	6	
EXTENT OF TRACKS/TRAILS	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
DUMPING (RUBBISH)	NONE	LIGHT	MODERATE	HEAVY	1	
EXTENT OF DUMPING	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
EARTH DISPLACEMENT	NONE	LIGHT	MODERATE	HEAVY	2	
EXTENT OF DISPLACEMENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
RECREATIONAL USE	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF RECR. USE	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
NOISE	NONE	SLIGHT	MODERATE	INTENSE	0	
EXTENT OF NOISE	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
DISEASE/DEATH OF TREES	NONE	LIGHT	MODERATE	HEAVY	1	
EXTENT OF DISEASE / DEATH	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
WIND THROW (BLOW DOWN)	NONE	LIGHT	MODERATE	HEAVY	4	
EXTENT OF WIND THROW	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
BROWSE (e.g. DEER)	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF BROWSE	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
BEAVER ACTIVITY	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF BEAVER	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
FLOODING (pools & puddling)	NONE	LIGHT	MODERATE	HEAVY	6	
EXTENT OF FLOODING	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
FIRE	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF FIRE	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
ICE DAMAGE	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT OF ICE DAMAGE	NONE	LOCAL	WIDESPREAD	EXTENSIVE		
OTHER	NONE	LIGHT	MODERATE	HEAVY	0	
EXTENT	NONE	LOCAL	WIDESPREAD	EXTENSIVE		

↑ INTENSITY x EXTENT = SCORE

Appendix D

Significant Wildlife Habitat Table

Seasonal Concentration Areas of Animals

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Waterfowl Stopover and Staging Areas (Terrestrial)	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Waterfowl Stopover and Staging Areas (Aquatic)	Yes – MAS2 and SWD3 vegetation communities are present in the Study Area.	Although suitable ecosites are present in the Study Area, they are likely not large enough to support large aggregations of listed species.	No	N/A	No
Shorebird Migratory Stopover Area	Yes – a MAM vegetation community is present in the Study Area.	No shorelines of lakes, rivers or wetlands, including beach areas, bars, seasonally flooded, muddy and un-vegetated shoreline habitat are present within the Study Area.	No	N/A	No
Raptor Wintering Area	No – Although a FOD7 vegetation community is present on the Subject Lands, suitable upland ecosites are absent from the Study Area.	Natural areas in the vicinity of the Study Areas are less than 20 ha in size and do not support a combination of forested and upland ecosites.	No	N/A	No
Bat Hibernacula	No – Suitable ecosites are absent from the Study Area.	No caves, mine shafts, underground foundations or Karsts were identified within the Study Area.	No	N/A	No
Bat Maternity Colonies	Yes – A FOD7 and a SWD3 vegetation community is present on the Subject Lands.	<p>Polygon 1 (FOD7) is a mature deciduous forest stand containing large diameter snag trees (i.e., >25 cm DBH), although these were not identified at sufficient densities (i.e., >10 snags/ha) to support maternity colonies SWH. Although a significant density was not identified, Polygon 1 will be analyzed using acoustic data as well.</p> <p>Polygon 5 (SWD3) is likely too small to provide bat maternity colony</p>	Yes – Polygon 1 (FOD7)	<p>Maternity Colonies with confirmed use by;</p> <ul style="list-style-type: none"> • >10 Big Brown Bats • >5 Adult Female Silver-haired Bats • The area of the habitat includes the entire woodland or a forest stand ELC Ecosite or an Ecoelement containing the maternity colonies. • Evaluation methods for maternity colonies should be conducted following methods outlined in the “Bats and Bat Habitats: Guidelines for Wind Power Projects” <p><i>Acoustic monitoring surveys were conducted from June 4-18, 2020, at two survey locations</i></p>	No

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
		SWH, and only one potential roost tree was identified.		<p><i>within Polygon 1 (FOD7) on the Subject Lands. Station 1 (located near the north forest edge) had a total of 42 passes by Big Brown Bat, 2 passes by Silver-haired Bat and 1 pass by Northern Myotis. Station 2 (located in the southwest forest) had a total of 433 passes by Big Brown Bat over the two weeks and 28 passes by Silver-haired Bat. Both stations had additional passes by Silver-haired Bats/Big Brown Bats and Hoary Bats/Silver-haired Bats (species uncertain). These numbers correlate to between 0 and 4 passes by Big Brown Bat, and 0 to 2 passes by Silver-haired Bat per evening at Station 1. At Station 2, they correlate to 1 to 139 passes by Big Brown Bat and 1 to 10 passes by Silver-haired Bat per evening. These data were not divided by time of night, but only passes recorded at dawn or dusk would be indicative of maternity roost habitat. As acoustic monitoring does not allow for a direct estimate of species abundance, the number of passes does not correlate with the number of individuals present (i.e., it is not possible to distinguish between several passes by one individual or a single pass by multiple individuals). Given the limited amount of candidate habitat present (i.e., less than 10 large diameter wildlife trees per hectare) and relatively low passes overall by Silver-haired and Big Brown Bats, Polygon 1 (FOD7) will not be considered SWH.</i></p>	
Turtle Wintering Areas	Yes – SWD3, MAM and MAS2 vegetation communities are present on the Subject Lands.	The north wetland (Polygons 4/5 – MAS2/SWD3) and Polygon 2 (MAM) were recorded to have no standing water on August 26, 2020, and then 10 cm or less from September to November 14 when turtles would be choosing overwintering habitat. Water levels may not be deep enough for overwintering turtles, although no	No	N/A	No

46666-100 & Topping Lands MECP Report & EIS

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
		updated 2024 surface water measurements are available. In addition, no turtles have been observed on site since 2017, though targeted surveys have not been completed. Permanent wintering habitat for turtles is considered unlikely to be present.			
Reptile Hibernaculum	Yes – Suitable ecosites are present on the Study Area.	No hibernacula features (e.g., rock piles, old foundations or rock crevices) were observed within the Subject Lands.	No	N/A	No
Colonially-Nesting Bird Breeding Habitat (Bank/Cliff)	No – Suitable ecosites are absent from the Study Area.	No suitable exposed soil banks, cliff faces, sandy hills, borrow pits, steep slopes, or other suitable habitat are present.	No	N/A	No
Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs)	Yes – A SWD3 vegetation community is present on the Subject Lands.	Swamp habitat is available on the Subject Lands to support nesting in live or dead wetland trees.	Yes – Polygon 5 (SWD3)	<p>Studies confirm:</p> <ul style="list-style-type: none"> • Presence of 2 or more active nests of Great Blue Heron or other listed species. • The habitat extends from the edge of the colony and a minimum 300m radius or extent of the Forest Ecosite containing the colony or any island <15.0ha with a colony is the SWH. • Confirmation of active heronries are to be achieved through site visits conducted during the nesting season (April to August) or by evidence such as the presence of fresh guano, dead young and/or eggshells. <p><i>Targeted breeding bird surveys in 2024 did not observe any listed species within the Study Area.</i></p>	No
Colonially-Nesting Bird Breeding Habitat (Ground)	Yes – MAM and MAS2 vegetation communities are present on the Site.	No islands, peninsulas associated with open water or marshy areas occur within the Study Area.	No	N/A	No

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Migratory Butterfly Stopover Areas	No – Although a FOD7 vegetation community is present on the Subject Lands, suitable field ecosites are absent from the Study Area.	A butterfly stopover area will be >10 ha in size, with a combination of forest and field ecosites, and be located within 5 km of Lake Erie or Lake Ontario. Criteria are not met due to the lack of field ecosites within the Study Area. Furthermore, the Study Area is located greater than 5 km from Lake Ontario and Lake Erie.	No	N/A	No
Land Bird Migratory Stopover Areas	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands.	No – The Subject Lands are located greater than 5 km Lake Ontario and Lake Erie.	No	N/A	No
Deer Winter Congregation Areas	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands.	No – Mapping from the MNR LIO database does not identify any deer wintering areas within the Study Area.	No	N/A	No

Rare Vegetation Communities

Rare Vegetation Community	Suitable ELC Ecosite Code	Habitat Description	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Cliffs and Talus Slopes	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Sand Barren	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Alvar	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Old Growth Forest	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Savannah	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Tallgrass Prairie	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Other Rare Vegetation	No – Vegetation community types present within the Study Area are common and secure.	N/A	No	N/A	No

Specialized Habitats of Wildlife considered SWH

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Waterfowl Nesting Area	Yes – MAM, MAS2 and SWD3 vegetation communities are present on the Subject Lands.	No suitable upland habitat occurs on, or within 120 m of, the Study Area to support waterfowl nesting.	No	N/A	No
Bald Eagle and Osprey Nesting, Foraging, Perching	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands.	Lakes, ponds, rivers and wetlands along forested shorelines, islands are absent from the Study Area.	No	N/A	No
Woodland Raptor Nesting Habitat	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands.	No – Forested ecosites within the Study Area are not >30 ha in size with >4 ha of interior habitat.	No	N/A	No
Turtle Nesting Areas	Yes – MAS2 vegetation community is present on the Subject Lands.	No exposed mineral soil such as sand or gravel areas adjacent to the MAS2 community were observed.	No	N/A	No
Springs and Seeps	Yes – Forested ecosites are present within the Study Area.	No – Headwater drainage features are present within the Subject Lands, but no springs or seeps were observed on the Subject Lands.	No	N/A	No
Amphibian Breeding Habitat (Woodland)	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands. MAM is within 120 m of FOD7.	Yes, there is a swamp community wetland present along the northern boundary of the Subject Lands and a small pond feature within the woodland (FOD7). Polygons 4 (MAS2) and 2 (MAM) are also wetlands greater than 0.05 ha in size that are less than 120 m from a woodland.	Yes – Polygon 1 (FOD7), Polygon 2 (MAM), Polygon 4 (MAS2), and Polygon 5 (SWD3)	Studies confirm: <ul style="list-style-type: none"> • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to 	No

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Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
				the woodland is to be included in the habitat. <i>During targeted amphibian calling surveys in 2024, only Spring Peeper was heard at Call Code 3. No other listed species were observed.</i>	
Amphibian Breeding Habitat (Wetlands)	Yes – MAM, MAS2 and SWD3 vegetation communities are present on the Subject Lands.	The wetland communities are not isolated from the woodland community (i.e., not greater than 120 m away).	No	N/A	No
Woodland Area-Sensitive Bird Breeding Habitat	Yes – FOD7 and SWD3 vegetation communities are present on the Subject Lands.	The vegetation communities are not greater than 30 ha with interior forest habitat.	No	N/A	No

Habitats of Species of Conservation Concern

Wildlife Habitat	Suitable ELC Ecosite Code	Candidate Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Marsh Breeding Bird Habitat	Yes – MAM and SWD3 vegetation communities are present on the Subject Lands.	There is wetland habitat within the Subject Lands to support nesting as there is shallow water with emergent aquatic vegetation.	Yes – Polygon 2 (MAM) and Polygon 5 (SWD3)	Studies confirm: <ul style="list-style-type: none"> • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or breeding by any combination of 4 or more of the listed species. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow “Bird and Bird Habitats: Guidelines for Wind Power Projects. Targeted breeding bird surveys in 2024 did not observe any of the listed species. 	No
Open Country Bird Breeding Habitat	No – Suitable ecosites are absent from the Study Area. A portion of the Subject Lands previously was a CUM1-1 used for pasture; however, since then the pasture has been annexed into rotational crops.	N/A	No	N/A	No
Shrub/Early Successional Bird Breeding Habitat	No – Suitable ecosites are absent from the Study Area.	N/A	No	N/A	No
Terrestrial Crayfish	Yes – MAM, MAS2 and SWD3 vegetation communities are present on the Subject Lands.	There is meadow marsh edge habitat present within the Subject Lands to support terrestrial crayfish.	Yes - Polygon 2 (MAM), Polygon 4 (MAS2), and Polygon 5 (SWD3)	Studies confirm: <ul style="list-style-type: none"> • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites. • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of 	Yes - Polygon 2 (MAM), Polygon 4 (MAS2), Polygon 5 (SWD3), and Polygon 1 (FOD7)

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Wildlife Habitat	Suitable ELC Ecosite Code	Candidate Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
				burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult. <i>Terrestrial Crayfish chimneys and individuals were observed within the Subject Lands during site investigations. Although Polygon 1 is not considered a triggering ELC community terrestrial crayfish/burrows were still observed within the Polygon as the woodland contains low wet spots.</i>	
Special Concern and Rare Wildlife Species	-	-	-	-	-
Green Dragon (SC)	N/A	The Study Area contains wetland and forest habitat with embedded wetlands that may provide suitable growing habitat for this species.	Yes - Polygon 5 (SWD3) and Polygon 1 (FOD7)	No floral inventories conducted on the Subject Lands recorded Green Dragon.	No
Eastern Wood-Pewee (SC)	N/A	There is forest habitat present within the Subject Lands that may support nesting habitat for this species.	Yes – Polygon 5 (SWD3) and Polygon 1 (FOD7)	Two rounds of breeding bird surveys were conducted on the Subject Lands. Suitable breeding forest habitat for Eastern Wood-Pewee is present within vegetation communities FOD7 (Polygon 1). Two singing males were observed during both the first and second visits.	Yes – Polygon 1 (FOD7)
Wood Thrush (SC)	N/A	There is forest habitat present within the Subject Lands that may support nesting habitat for this species.	Yes - Polygon 5 (SWD3) and Polygon 1 (FOD7)	Two rounds of breeding bird surveys were conducted on the Subject Lands. Suitable breeding habitat for Wood Thrush was observed within the FOD7 and SWD3 communities, though it should be noted they prefer large forests. Despite survey effort, this species was not detected on the Subject Lands.	No
Snapping Turtle (SC)	N/A	The Study Area contains several wetland pockets that may support this species. No wetlands on site are connected to permanent watercourses and Polygons 4, 5, and 2 were dry in August in 2020. However, the wetlands are wet most of the year and therefore may offer spring/summer habitat for Snapping Turtles.	Yes – Polygon 2 (MAM), Polygon 4 (MAS2), and Polygon 5 (SWD3)	Targeted surveys were not conducted to confirm the presence or absence of this species, but no individuals were observed during any site investigation 2017-2024. SWH for Snapping Turtle will conservatively remain candidate in Polygon 2 (MAM), Polygon 4 (MAS2), and Polygon 5 (SWD3).	Unconfirmed – Polygon 2 (MAM), Polygon 4 (MAS2), and Polygon 5 (SWD3)

Animal Movement Corridors

Wildlife Habitat	Suitable ELC Ecosite Code	Additional Habitat Criteria	Candidate SWH	SWH Defining Criteria	Confirmed SWH
Amphibian Movement Corridors	No – Suitable ecosites associated with water are absent from the Study Area.	Movement corridors are identified where is confirmed amphibian breeding habitat is present within wetlands. No confirmed wetland amphibian breeding was identified within the Study Area.	No	N/A	No

Appendix E

Floral Inventory Data

Floral Inventory (2024 06 07, 2024 06 21)														
1	2	3	4	5	Scientific Name	Common Name	CW	GRank	COSEWIC	SARO	SRank	Type	Invasive	
X					<i>Acer negundo</i>	Manitoba Maple		G5			S5	C	TR	Y
X					<i>Acer saccharum</i>	Sugar Maple	3.0	G5			S5	C	TR	
			X		<i>Acer x freemanii</i>	(<i>Acer rubrum</i> X <i>Acer saccharinum</i>)	0.0	GNA			SNA	hyb	TR	
X					<i>Agrimonia gryposepala</i>	Hooked Agrimony		G5			S5	C	FO	
X			X		<i>Agrostis stolonifera</i>	Creeping Bentgrass	-3.0	G5			SE5	IC	GR	
	X	X	X		<i>Alisma subcordatum</i>	Southern Water-plantain	-5.0	G5			S4?	X	FO	
X					<i>Alliaria petiolata</i>	Garlic Mustard		GNR			SE5	IC	FO	Y
X					<i>Allium sativum</i>	Cultivated Garlic	5.0	GNR			SE2	IR	FO	
X					<i>Ambrosia artemisiifolia</i>	Common Ragweed	3.0	G5			S5	C	FO	
			X		<i>Apocynum cannabinum</i>	Hemp Dogbane		G5			S5		FO	
X					<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	-3.0	G5			S5	C	FO	
			X		<i>Asclepias incarnata</i>	Swamp Milkweed	-5.0	G5			S5	C	FO	
X					<i>Asclepias syriaca</i>	Common Milkweed	5.0	G5			S5	C	FO	
X					<i>Athyrium filix-femina</i>	Common Lady Fern	0.0	G5			S5		FE	
X	X				<i>Barbarea vulgaris</i>	Bitter Wintercress	0.0	GNR			SE5	IC	FO	
X					<i>Betula papyrifera</i>	Paper Birch		G5			S5	X	TR	
X	X				<i>Bidens frondosa</i>	Devil's Beggarticks	-3.0	G5			S5	X	FO	
X	X		X		<i>Boehmeria cylindrica</i>	False Nettle	-5.0	G5			S5	X	FO	
X	X		X		<i>Carduus acanthoides</i>	Spiny Plumeless Thistle	5.0	GNR			SE5	IR	FO	
X					<i>Carex blanda</i>	Woodland Sedge		G5			S5	C	SE	
X			X		<i>Carex crinita</i>	Fringed Sedge	-5.0	G5			S5	C	SE	
X	X				<i>Carex gracillima</i>	Graceful Sedge		G5			S5	C	SE	
X					<i>Carex granularis</i>	Limestone Meadow Sedge	-3.0	G5			S5	C	SE	
X	X				<i>Carex lupulina</i>	Hop Sedge	-5.0	G5			S5	C	SE	
X					<i>Carex normalis</i>	Larger Straw Sedge	-3.0	G5			S4		SE	
X					<i>Carex pensylvanica</i>	Pennsylvania Sedge	5.0	G5			S5	C	SE	
X					<i>Carex radiata</i>	Eastern Star Sedge		G5			S5	C	SE	
X	X				<i>Carex retrorsa</i>	Retorse Sedge	-5.0	G5			S5	C	SE	
X					<i>Carex sparganioides</i>	Burreed Sedge	3.0	G5			S4S5	U	SE	
X					<i>Carex tenera</i>	Tender Sedge		G5			S5	U	SE	
			X		<i>Carex vulpinoidea</i>	Fox Sedge	-5.0	G5			S5	C	SE	
X					<i>Carpinus caroliniana</i>	Blue-beech		G5			S5	C	TR	
X					<i>Carya cordiformis</i>	Bitternut Hickory		G5			S5	X	TR	
X					<i>Celtis occidentalis</i>	Common Hackberry		G5			S4	X	TR	
X					<i>Centaurea jacea</i>	Brown Knapweed	5.0	GNR			SE5	IX	FO	
	X		X		<i>Cephalanthus occidentalis</i>	Eastern Buttonbush	-5.0	G5			S5	X	SH	
			X		<i>Chelone glabra</i>	White Turtlehead	-5.0	G5			S5	X	FO	
			X		<i>Cicuta maculata</i>	Spotted Water-hemlock	-5.0	G5			S5		FO	
X	X				<i>Circaea canadensis</i>	Broad-leaved Enchanter's Nightshade		G5			S5	X	FO	
X	X				<i>Cirsium arvense</i>	Canada Thistle		G5			SE5	IC	FO	Y
X	X				<i>Cirsium vulgare</i>	Bull Thistle	3.0	GNR			SE5	IX	FO	
X					<i>Claytonia virginica</i>	Narrow-leaved Spring Beauty	3.0	G5			S5	C	FO	
X			X		<i>Cornus racemosa</i>	Gray Dogwood		G5			S5	X	SH	
			X		<i>Cornus sericea</i>	Red-osier Dogwood	-3.0	G5			S5	C	SH	
X					<i>Crataegus punctata</i>	Dotted Hawthorn	5.0	G5			S5	C	SH	
			X		<i>Cyperus odoratus</i>	Rusty Flatsedge	-5.0	G5			S4		SE	
X					<i>Dactylis glomerata</i>	Orchard Grass		GNR			SE5	IC	GR	
X					<i>Daucus carota</i>	Wild Carrot	5.0	GNR			SE5	IC	FO	
X					<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	-3.0	G5			S5	X	FE	
			X		<i>Echinochloa crus-galli</i>	Large Barnyard Grass	-3.0	GNR			SE5	IC	GR	
			X		<i>Eleocharis obtusa</i>	Blunt Spikerush	-5.0	G5			S5	C	SE	
X					<i>Elymus hystrix</i>	Bottlebrush Grass	5.0	G5			S5	X	GR	

Floral Inventory (2024 06 07, 2024 06 21)														
1	2	3	4	5	Scientific Name	Common Name	CW	GRank	COSEWIC	SARO	SRank	MD	Type	Invasive
X					<i>Epipactis helleborine</i>	Eastern Helleborine	3.0	GNR			SE5	IX	FO	Y
X					<i>Erigeron annuus</i>	Annual Fleabane	3.0	G5			S5	C	FO	
X					<i>Erigeron canadensis</i>	Canada Horseweed	3.0	G5			S5	C	FO	
X	X				<i>Erigeron philadelphicus</i>	Philadelphia Fleabane	-3.0	G5			S5	C	FO	
X					<i>Erythronium americanum</i>	Yellow Trout-lily	5.0	G5			S5	X	FO	
X					<i>Euonymus obovatus</i>	Running Strawberry Bush	3.0	G5			S4	C	SH	
X	X	X			<i>Eupatorium perfoliatum</i>	Common Boneset	-3.0	G5			S5	C	FO	
X	X				<i>Euthamia graminifolia</i>	Grass-leaved Goldenrod	0.0	G5			S5	C	FO	
			X		<i>Eutrochium maculatum</i>	Spotted Joe Pye Weed	-5.0	G5			S5		FO	
X					<i>Fagus grandifolia</i>	American Beech	3.0	G5			S4	C	TR	
X					<i>Fragaria virginiana</i>	Wild Strawberry	3.0	G5			S5		FO	
X					<i>Fraxinus americana</i>	White Ash	3.0	G5			S4	C	TR	
X					<i>Fraxinus pennsylvanica</i>	Green Ash	-3.0	G5			S4	C	TR	
X					<i>Galium aparine</i>	Cleavers	3.0	G5			S5	X	FO	
X		X			<i>Galium mollugo</i>	Smooth Bedstraw	5.0	GNR			SE5	IX	FO	Y
X					<i>Geranium maculatum</i>	Spotted Geranium	3.0	G5			S5	X	FO	
X					<i>Geranium robertianum</i>	Herb-Robert	3.0	G5			S5	C	FO	
X					<i>Geum canadense</i>	White Avens	0.0	G5			S5	X	FO	
X					<i>Glechoma hederacea</i>	Ground Ivy	3.0	GNR			SE5	IX	FO	
X	X	X			<i>Glyceria striata</i>	Fowl Mannagrass	-5.0	G5			S5	X	GR	
X					<i>Hackelia virginiana</i>	Virginia Stickseed	3.0	G5			S5	U	FO	
X					<i>Hydrophyllum virginianum</i>	Virginia Waterleaf	0.0	G5			S5	C	FO	
X					<i>Hypericum punctatum</i>	Spotted St. John's-wort	0.0	G5			S5	X	FO	
X	X	X			<i>Impatiens capensis</i>	Spotted Jewelweed	-3.0	G5			S5	C	FO	
			X		<i>Iris sibirica</i>	Siberian Iris	5.0	GNR			SE1		FO	
X			X		<i>Juglans nigra</i>	Black Walnut	3.0	G5			S4?	X	TR	
		X	X		<i>Juncus effusus</i>	Soft Rush	-5.0	G5			S5		RU	
X	X	X			<i>Juncus tenuis</i>	Path Rush	0.0	G5			S5	X	RU	
X	X				<i>Lapsana communis</i>	Common Nipplewort	3.0	GNR			SE5	IR	FO	
			X		<i>Leersia oryzoides</i>	Rice Cutgrass	-5.0	G5			S5	X	GR	
X	X				<i>Leersia virginica</i>	Virginia Cutgrass	-3.0	G5			S4	X	GR	
		X	X		<i>Lemna minor</i>	Lesser Duckweed	-5.0	G5			S5?	X	FO	
X					<i>Leucanthemum vulgare</i>	Oxeye Daisy	5.0	GNR			SE5	IC	FO	
X					<i>Ligustrum vulgare</i>	European Privet	3.0	GNR			SE5	IX	SH	Y
X	X				<i>Lindera benzoin</i>	Spicebush	-3.0	G5			S4	X	SH	
X	X				<i>Lobelia inflata</i>	Indian-tobacco	3.0	G5			S5	X	FO	
X					<i>Lolium arundinaceum</i>	Tall Fescue	3.0	GNR			SE5	IC	GR	
X	X	X			<i>Lycopus americanus</i>	American Water-horehound	-5.0	G5			S5	C	FO	
			X		<i>Lysimachia thysiflora</i>	Water Loosestrife	-5.0	G5			S5	X	FO	
X	X	X	X		<i>Lythrum salicaria</i>	Purple Loosestrife	-5.0	G5			SE5	IC	FO	Y
X					<i>Malus pumila</i>	Common Apple	5.0	G5			SE4	IX	SH	
			X		<i>Mimulus ringens</i>	Square-stemmed Monkeyflower	-5.0	G5			S5	X	FO	
			X		<i>Myosotis scorpioides</i>	True Forget-me-not	-5.0	G5			SE5	IX	FO	
X	X	X			<i>Onoclea sensibilis</i>	Sensitive Fern	-3.0	G5			S5	X	FE	
X					<i>Ostrya virginiana</i>	Eastern Hop-hornbeam	3.0	G5			S5	C	TR	
X					<i>Oxalis stricta</i>	Upright Yellow Wood-sorrel	3.0	G5			S5	X	FO	
X			X		<i>Parthenocissus vitacea</i>	Thicket Creeper	3.0	G5			S5	X	VW	
X	X	X	X		<i>Penthorum sedoides</i>	Ditch-stonecrop	-5.0	G5			S5	X	FO	
X	X				<i>Persicaria amphibia</i>	Water Smartweed	-5.0	G5			S5	X	FO	
X	X				<i>Persicaria lapathifolia</i>	Pale Smartweed	-3.0	G5			S5	X	FO	
X		X	X		<i>Persicaria maculosa</i>	Spotted Lady's-thumb	-3.0	G3G5			SE5	IX	FO	
			X		<i>Phalaris arundinacea</i>	Reed Canary Grass	-3.0	G5			S5	X	GR	Y
X					<i>Phleum pratense</i>	Common Timothy	3.0	GNR			SE5	IC	GR	

Floral Inventory (2024 06 07, 2024 06 21)														
1	2	3	4	5	Scientific Name	Common Name	CW	GRank	COSEWIC	SARO	SRank	MD	Type	Invasive
X					<i>Plantago major</i>	Common Plantain	3.0	G5			SE5	IC	FO	
X	X				<i>Poa palustris</i>	Fowl Bluegrass	-3.0	G5			S5	X	GR	
X					<i>Poa pratensis</i>	Kentucky Bluegrass	3.0	G5			S5		GR	
X					<i>Podophyllum peltatum</i>	May-apple	3.0	G5			S5	X	FO	
X					<i>Polypodium virginianum</i>	Rock Polypody	5.0	G5			S5	R	FE	
X					<i>Populus deltoides</i>	Eastern Cottonwood	0.0	G5			S5		TR	
X					<i>Prunella vulgaris ssp. lanceolata</i>	Lance-leaved Self-heal	0.0	G5T5			S5	C	FO	
X					<i>Prunus serotina</i>	Black Cherry	3.0	G5			S5	C	TR	
X					<i>Prunus virginiana</i>	Choke Cherry	3.0	G5			S5	C	TR	
X					<i>Quercus alba</i>	White Oak	3.0	G5			S5	C	TR	
X					<i>Quercus rubra</i>	Northern Red Oak	3.0	G5			S5	C	TR	
X					<i>Ranunculus pensylvanicus</i>	Pennsylvania Buttercup	-5.0	G5			S5	X	FO	
X	X		X		<i>Rhamnus cathartica</i>	Common Buckthorn	0.0	GNR			SE5	IC	SH	Y
X	X		X		<i>Rosa multiflora</i>	Multiflora Rose	3.0	GNR			SE5	IX	SH	Y
X					<i>Rubus allegheniensis</i>	Allegheny Blackberry	3.0	G5			S5	C	SH	
X		X			<i>Rubus occidentalis</i>	Black Raspberry	5.0	G5			S5	C	SH	
X		X			<i>Rumex acetosella</i>	Sheep Sorrel	3.0	GNR			SE5	IC	FO	
			X		<i>Rumex crispus</i>	Curly Dock	0.0	GNR			SE5	IC	FO	
X	X		X		<i>Salix alba</i>	White Willow	-3.0	G5			SE4	IX	TR	
			X		<i>Salix amygdaloides</i>	Peach-leaved Willow	-3.0	G5			S5	X	TR	
X	X				<i>Schoenoplectus tabernaemontani</i>	Soft-stemmed Bulrush	-5.0	G5			S5	C	SE	
		X	X		<i>Scirpus atrovirens</i>	Dark-green Bulrush	-5.0	G5			S5	C	SE	
X	X				<i>Scirpus pendulus</i>	Rufous Bulrush	-5.0	G5			S5	C	SE	
			X		<i>Scutellaria galericulata</i>	Hooded Skullcap	-5.0	G5			S5	X	FO	
			X		<i>Scutellaria lateriflora</i>	Mad Dog Skullcap	-5.0	G5			S5	X	FO	
			X		<i>Sium suave</i>	Hemlock Water-parsnip	-5.0	G5			S5	C	FO	
			X		<i>Solanum dulcamara</i>	Bittersweet Nightshade	0.0	GNR			SE5	IC	VW	Y
X			X		<i>Solidago canadensis</i>	Canada Goldenrod	3.0	G5			S5		FO	
X					<i>Symphotrichum lateriflorum var. lateriflorum</i>	Calico Aster	0.0	G5T5			S5		FO	
X					<i>Tanacetum vulgare</i>	Common Tansy	5.0	GNR			SE5	IX	FO	
X					<i>Taraxacum officinale</i>	Common Dandelion	3.0	G5			SE5	IC	FO	
X	X				<i>Thelypteris palustris</i>	Marsh Fern	-3.0	G5			S5	X	FE	
X					<i>Tilia americana</i>	American Basswood	3.0	G5			S5	C	TR	
X					<i>Toxicodendron radicans</i>	Poison Ivy	0.0	G5			S5		VW	
X					<i>Trillium grandiflorum</i>	White Trillium	3.0	G5			S5	X	FO	
X	X				<i>Tussilago farfara</i>	Colt's-foot	3.0	GNR			SE5	IC	FO	Y
		X	X		<i>Typha angustifolia</i>	Narrow-leaved Cattail	-5.0	G5			SE5	IX	FO	Y
X	X				<i>Verbena urticifolia</i>	White Vervain	0.0	G5			S5	X	FO	
X			X		<i>Veronica officinalis</i>	Common Speedwell	5.0	G5			SE5	IX	FO	
X					<i>Veronica serpyllifolia</i>	Thyme-leaved Speedwell	0.0	G5			SE5?	IX	FO	
X					<i>Viola pubescens</i>	Yellow Violet	3.0	G5			S5	C	FO	
X					<i>Viola sororia</i>	Woolly Blue Violet	0.0	G5			S5	X	FO	
X			X		<i>Vitis riparia</i>	Riverbank Grape	0.0	G5			S5	C	VW	
X	X		X		<i>Xanthium strumarium</i>	Rough Cocklebur	0.0	G5			S5	C	FO	

Appendix F

Breeding Bird Survey Data



AVIFAUNAL SURVEY INFORMATION SUMMARY SHEET

Project Name: Topping Lands

MTE File No.: 46666-100

Collector(s): WH

Date	Start	Finish	Weather
7-Jun-24	6:30am	7:45am	warm, mainly sunny
21-Jun-24	6:45am	7:45am	warm, sunny

Species Abbr.	Species Name	Polygons 1 & 2				Polygons 4 & 5				S Rank	ESA Status	Notes
		Visit 1		Visit 2		Visit 1		Visit 2				
		Code	No.	Code	No.	Code	No.	Code	No.			
MALL	Mallard							SH	1	S5		
RTHA	Red-tailed Hawk	VO	1	T						S5	-	Seen every visit, suspect male
SPSA	Spotted Sandpiper	VO	1							S5		
MODO	Mourning Dove							P	2	S5		
RBWO	Red-bellied Woodpecker	VO	1							S4	-	
DOWO	Downy Woodpecker			VO	1	NB	2			S5		
HAWO	Hairy Woodpecker					NB, P	2			S5		
NOFL	Northern Flicker					VO	3			S4		
EAWP	Eastern Wood-Pewee	SM	1	SM	2					S4	SC	
WAVI	Warbling Vireo							SM	1	S5		
BLJA	Blue Jay	VO	3	VO	3					S5		
BCCH	Black-capped Chickadee			P	3					S5	-	
HOWR	House Wren	SM	1	SM	1					S5		
AMRO	American Robin	VO	2	FY	5					S5		
GRCA	Gray Catbird					SM	1			S4		
EUST	European Starling			VO	3					SNA		
SOSP	Song Sparrow	SM	3	P	5	SM	2	SM	3	S5		
NOCA	Northern Cardinal	SM	2	P	3			SM	2	S5		
RBGR	Rose-breasted Grosbeak	P	2	P	3					S4		
INBU	Indigo Bunting			SM	2					S4		
RWBL	Red-winged Blackbird	VO	3			P, T	6	FY, P	9	S4		
COGR	Common Grackle	VO	2					FY	6	S5		
BHCO	Brown-headed Cowbird	OB	2							S4		
BAOR	Baltimore Oriole	SM	3			P	2			S4		
AMGO	American Goldfinch	VO	1	P	7					S5		

Evidence Codes:

Breeding Bird - Possible

SH=Suitable Habitat SM=Singing Male

Breeding Bird - Probable

T=Territory A=Anxiety Behaviour D=Display N=Nest Building P=Pair V=Visiting Nest

Breeding Bird - Confirmed

DD=Distraction NE=Eggs AE=Nest Entry NU=Nest Used NY=Nest Young FY=Fledged Young FS=Food/Faecal Sack

Other Wildlife Evidence

OB=Observed DP=Distinctive Parts TK=Tracks VO=Vocalization HO=House/Den FE=Feeding Evidence CA=Carcass

Fy=Eggs or Young SC=Scat SI=Other Signs (specify)

Appendix G

Amphibian Breeding Survey Data



AMPHIBIAN MONITORING FIELD SHEET

Project: 46666-100 TOPPING LANDA

Date: APR 9, 2024
 Collector(s): WH

Project Manager: DH
 Visit #: 1

WEATHER CONDITIONS				WIND SCALE	
Temp: 16C	Wind: 3	Cloud Cover (%): 40	Precipitation: <input checked="" type="checkbox"/> None/Dry <input type="checkbox"/> Drizzle <input type="checkbox"/> Damp/Fog <input type="checkbox"/> Rain	0	Calm
Direction: S				1	Smoke Drifts
				2	Wind Felt on Face
				3	Leaves in constant motion
				4	Wind raises dust and paper

Reference Site: No Yes UTM

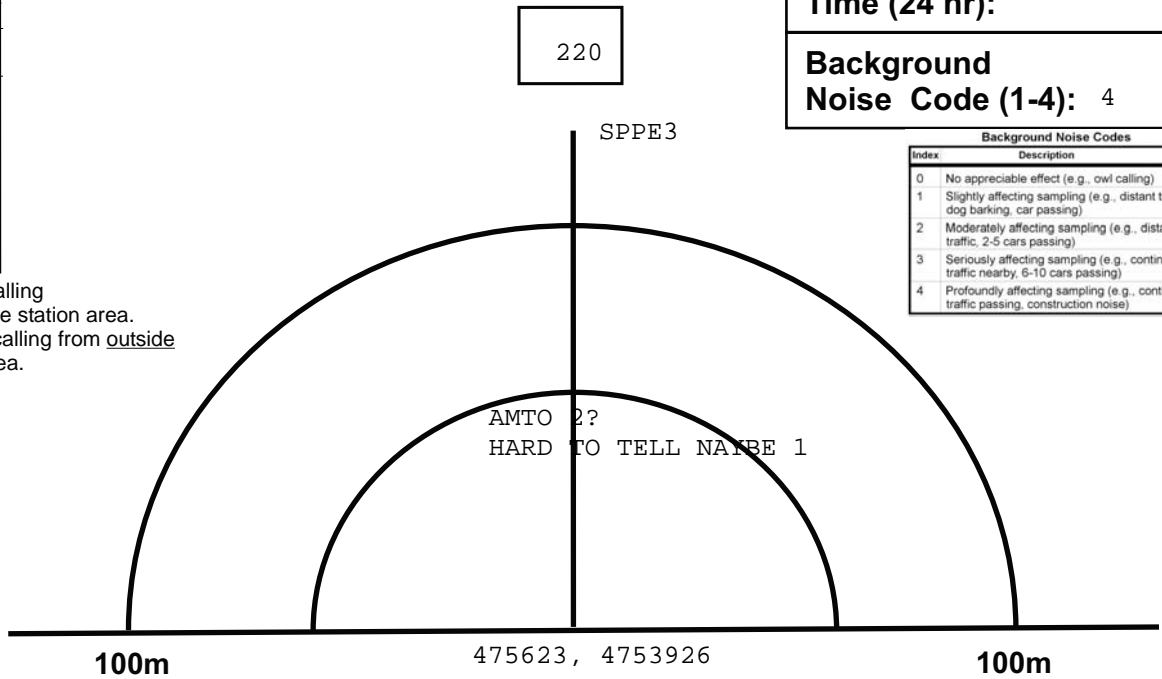
Species	In*	Out**
AMTO	X	
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		X
WOFR		

Station: 1

Station Start Time (24 hr):	23:16
Background Noise Code (1-4):	4

Index	Description
0	No appreciable effect (e.g., owl calling)
1	Slightly affecting sampling (e.g., distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g., continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.

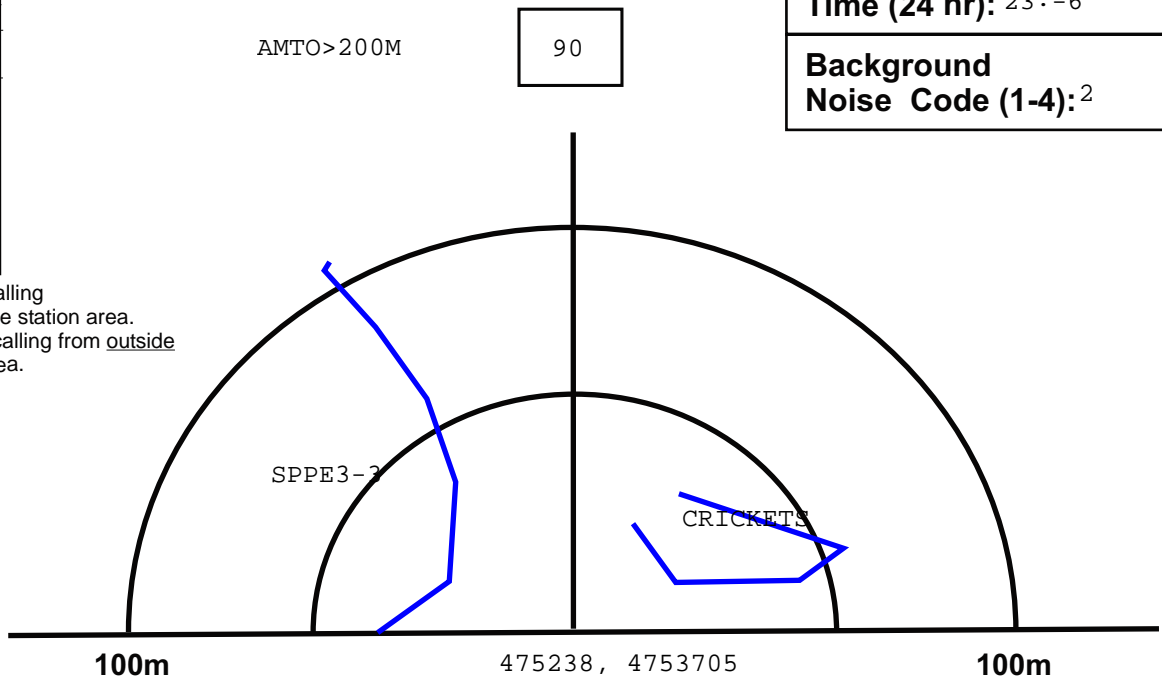


Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE	X	X
WOFR		

Station: 2

Station Start Time (24 hr):	23:-6
Background Noise Code (1-4):	2

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.





AMPHIBIAN MONITORING FIELD SHEET

Project: 46666-100 Topping Lands Phase 8
 Date: April 9, 2024 Project Manager: DH
 Collector(s): WH Visit #: _____

WEATHER CONDITIONS				WIND SCALE	
Temp: 16C	Wind: 3	Cloud Cover (%): 40%	Precipitation: <input checked="" type="checkbox"/> None/Dry <input type="checkbox"/> Drizzle <input type="checkbox"/> Damp/Fog <input type="checkbox"/> Rain	0	Calm
Direction: S				1	Smoke Drifts
				2	Wind Felt on Face
CALL LEVEL CODES				3	Leaves in constant motion
Code 1: Calls not simultaneous, number of individuals can be accurately counted				4	Wind raises dust and paper
Code 2: Some calls simultaneous, number of individuals can be reliably estimated					
Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated					

Reference Site: No Yes UTM _____

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE	X	X
WOFR		

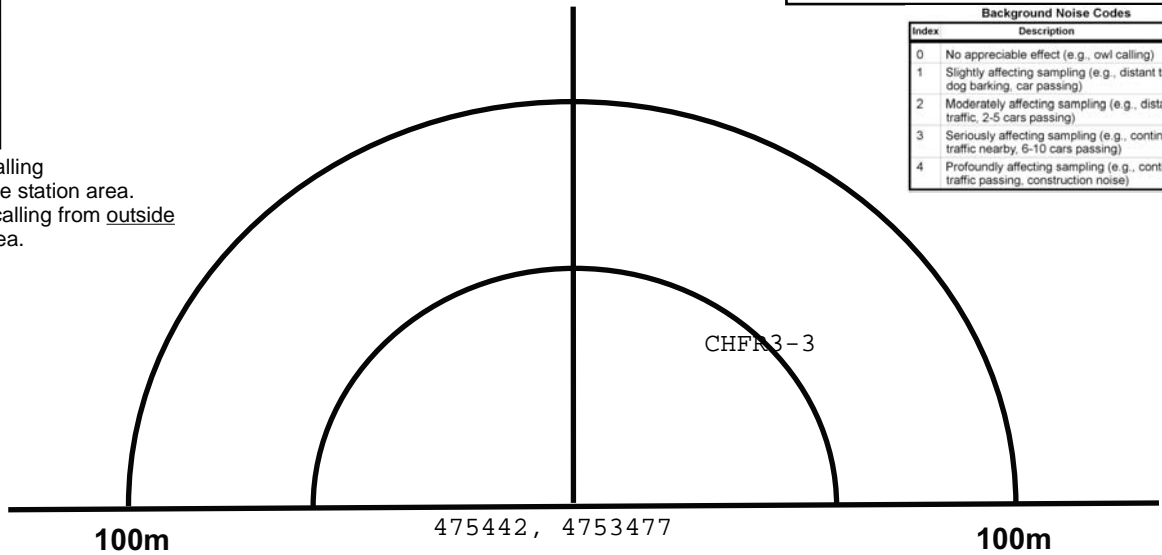
Station: 3

270

Station Start Time (24 hr):	22:48
Background Noise Code (1-4):	1

Index	Description
0	No appreciable effect (e.g., owl calling)
1	Slightly affecting sampling (e.g., distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g., continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.

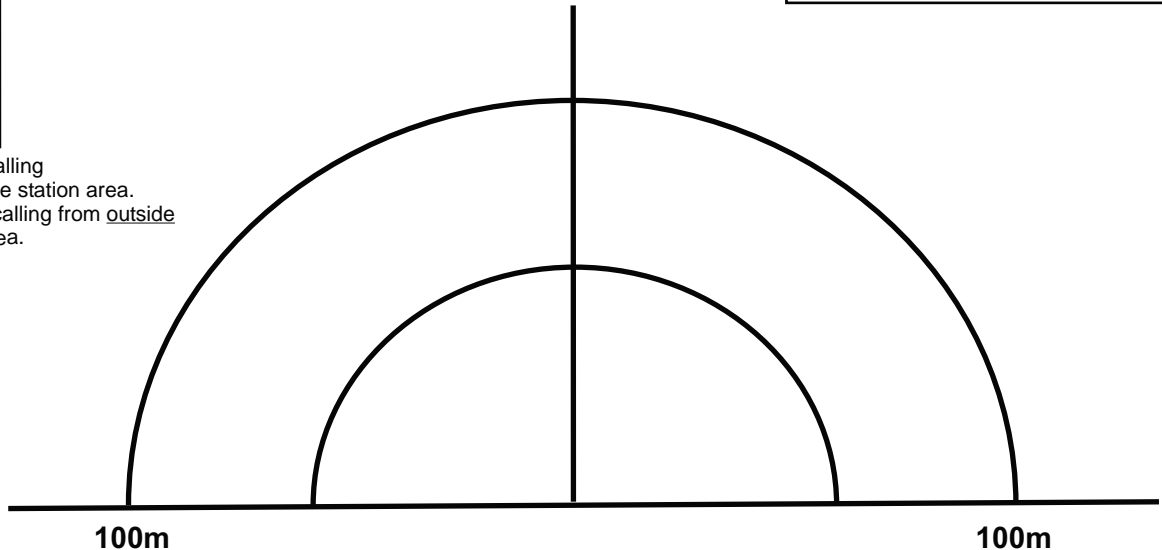


Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

Station:

Station Start Time (24 hr):	
Background Noise Code (1-4):	

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.





AMPHIBIAN MONITORING FIELD SHEET

Project: 46666-100 TOPPING LANDA

Date: MAY 7, 2024
 Collector(s): WH

Project Manager: DH
 Visit #: 1

WEATHER CONDITIONS				WIND SCALE	
Temp:	Wind:	1	Cloud Cover (%)	Precipitation	0
19C	Direction:	-	60	<input checked="" type="checkbox"/> None/Dry <input type="checkbox"/> Drizzle	1
				<input type="checkbox"/> Damp/Fog <input type="checkbox"/> Rain	2
CALL LEVEL CODES				3	Leaves in constant motion
Code 1: Calls not simultaneous, number of individuals can be accurately counted				4	Wind raises dust and paper
Code 2: Some calls simultaneous, number of individuals can be reliably estimated					
Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated					

Reference Site: No Yes UTM _____

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

Station: 1

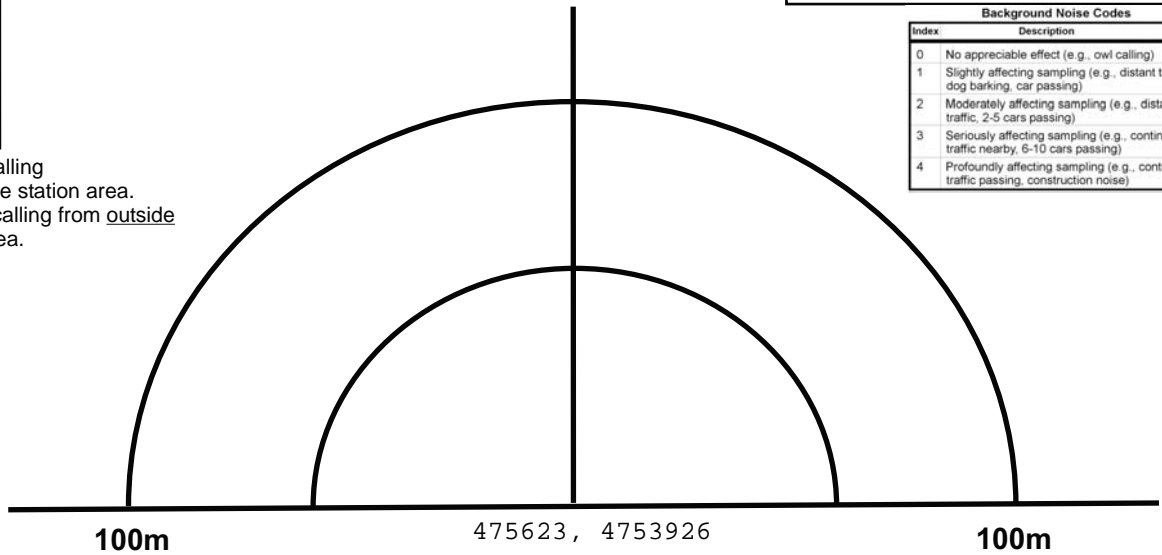
220

Station Start Time (24 hr): 21:45

Background Noise Code (1-4): 3

Index	Description
0	No appreciable effect (e.g., owl calling)
1	Slightly affecting sampling (e.g., distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g., continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.



Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR	X	
GRFR		
MIFR		
NLFR		
PIFR		
SPPE	X	
WOFR		

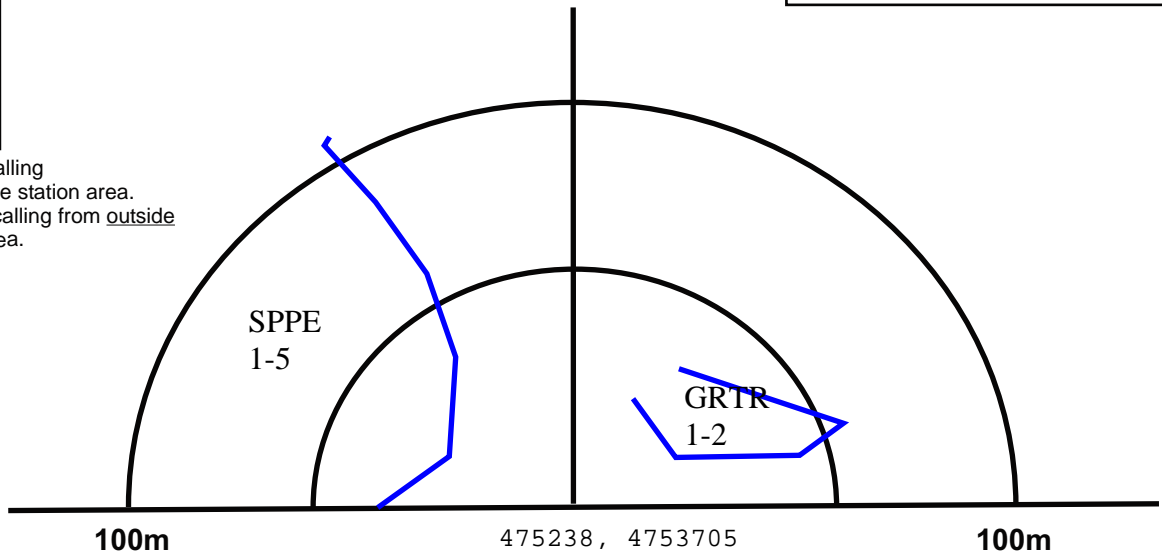
Station: 2

90

Station Start Time (24 hr): 21:36

Background Noise Code (1-4): 2

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.





AMPHIBIAN MONITORING FIELD SHEET

Project: _____
 Date: _____ Project Manager: _____
 Collector(s): _____ Visit #: _____

WEATHER CONDITIONS				WIND SCALE	
Temp.	Wind:	Cloud Cover (%)	Precipitation	0	Calm
	Direction:		<input type="checkbox"/> None/Dry <input type="checkbox"/> Drizzle <input type="checkbox"/> Damp/Fog <input type="checkbox"/> Rain	1	Smoke Drifts
				2	Wind Felt on Face
				3	Leaves in constant motion
				4	Wind raises dust and paper

Reference Site: No Yes UTM _____

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		X
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

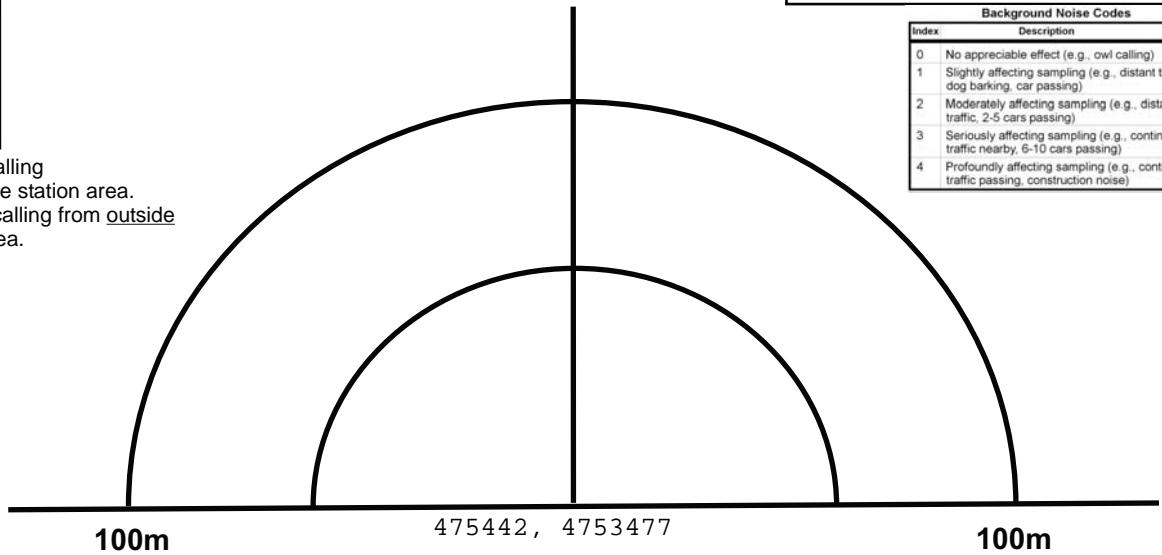
Station: 3

270

Station Start Time (24 hr):	21:03
Background Noise Code (1-4):	1

Index	Description
0	No appreciable effect (e.g., owl calling)
1	Slightly affecting sampling (e.g., distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g., distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g., continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g., continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.

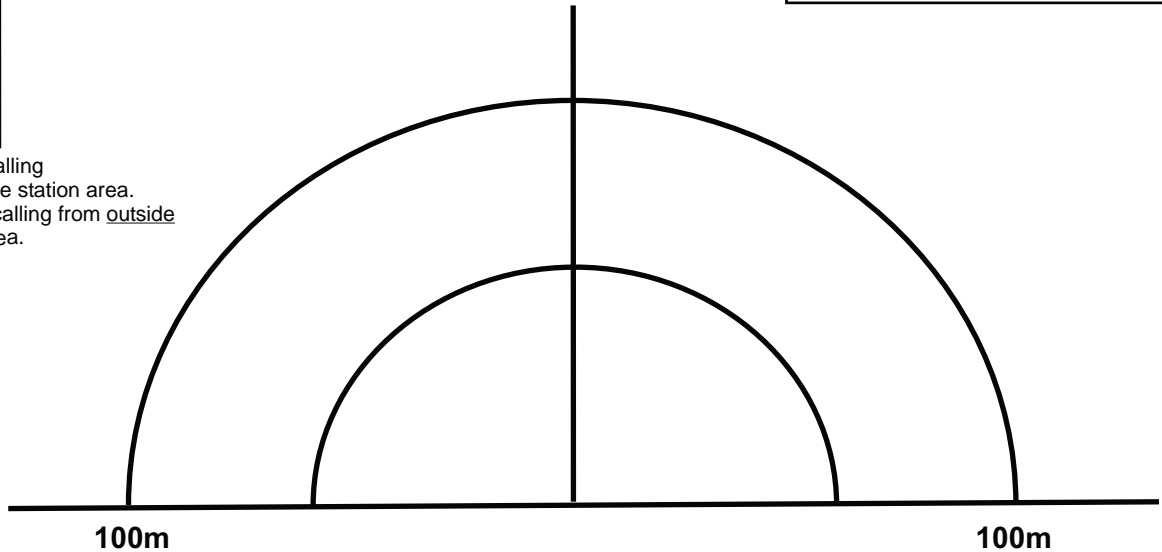


Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

Station:

Station Start Time (24 hr):	
Background Noise Code (1-4):	

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.





GENERAL SITE INFORMATION FIELD SHEET

Project: 46666-100 Topping Lands
 Date: June 20, 2024 Project Manager: DH
 Collector(s): AL CG Visit #: _____
 Time started: 10:45 PM Time finished: 11:32 PM Combined collectors' hours: _____
 NHIC List MNR EO's none not provided to collector

WEATHER CONDITIONS				WIND SCALE			
Temp: <u>22°C</u>	Wind: <u>2</u>	Cloud Cover (%): <u>40%</u>	Precipitation: Today: <u>Yes</u> Yesterday: <u>Yes</u>	0	Calm		
	Direction: <u>N</u>			1	Smoke Drifts		
DATA FOCUS				2	Wind Felt on Face		
<input type="checkbox"/>	Birds 1__2__ Mig__	<input type="checkbox"/>	ELC's	<input type="checkbox"/>	Dripline/Tree Survey		
<input type="checkbox"/>	Mammals	<input type="checkbox"/>	Floral V__S__A__	<input type="checkbox"/>	Aquatic - Physical		
<input checked="" type="checkbox"/>	Amphibians 1_2_3	<input type="checkbox"/>	Wetland	<input type="checkbox"/>	Aquatic - Biological		
<input type="checkbox"/>	Reptiles	<input type="checkbox"/>	Butternut (BHA)	<input type="checkbox"/>	Faunal Habitat		
<input type="checkbox"/>	Invertebrates	<input type="checkbox"/>	other SAR	<input type="checkbox"/>	Other - see notes		
FEATURES (with GPS co-ordinates where applicable)				Mapped		Follow-up Req'd	
Man-made Structures: <input type="checkbox"/> None observed				UTM	Yes	No	Who
Yes No							
<input type="checkbox"/>	<input type="checkbox"/>	Barns/Footings/Wells/other(list)					
<input type="checkbox"/>	<input type="checkbox"/>	Rock Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Garbage					
Natural Vegetation: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Fallen Logs outside woods (#s)					
<input type="checkbox"/>	<input type="checkbox"/>	Brush Piles					
<input type="checkbox"/>	<input type="checkbox"/>	Snags (raptor perch)					
<input type="checkbox"/>	<input type="checkbox"/>	Tree Cavities (nesting)					
<input type="checkbox"/>	<input type="checkbox"/>	Sentinel Trees					
<input type="checkbox"/>	<input type="checkbox"/>	Butternut Identified					
<input type="checkbox"/>	<input type="checkbox"/>	Mast Trees (6E)	<input type="checkbox"/> Berry Shrubs (6E)				
Wildlife Features: <input type="checkbox"/> None observed							
<input type="checkbox"/>	<input type="checkbox"/>	Waterfowl nesting (large #'s, # of species)					
<input type="checkbox"/>	<input type="checkbox"/>	Exposed Banks (nesting swallows)					
<input type="checkbox"/>	<input type="checkbox"/>	Stick Nests					
<input type="checkbox"/>	<input type="checkbox"/>	Animal Burrows (>10cm)					
<input type="checkbox"/>	<input type="checkbox"/>	Heronry					
<input type="checkbox"/>	<input type="checkbox"/>	Crayfish mounds					
<input type="checkbox"/>	<input type="checkbox"/>	Sand/gravel on site					
<input type="checkbox"/>	<input type="checkbox"/>	Marsh/open country/shrub					
<input type="checkbox"/>	<input type="checkbox"/>	Winter Deer yards					
<input type="checkbox"/>	<input type="checkbox"/>	Corridor from pond to woods (ampibian movement)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat corridor (shorelines, escarpments)					
<input type="checkbox"/>	<input type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)					
Aquatic Features:							
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input type="checkbox"/> pools <input type="checkbox"/> flowing <input type="checkbox"/> dry				
<input type="checkbox"/>	<input type="checkbox"/>	Waterways	flowing dry pools				
<input type="checkbox"/>	<input type="checkbox"/>	natural stream	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	swale	<input type="checkbox"/>	<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input type="checkbox"/>	open drain	<input type="checkbox"/>	<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/>	<input type="checkbox"/>			
Incidental Observations/Notes:							



AMPHIBIAN MONITORING FIELD SHEET

Project: 46666-100 Topping Lands
 Date: June 20, 2024 Project Manager: DH
 Collector(s): AL CG Visit #: _____

Humid

WEATHER CONDITIONS				WIND SCALE	
Temp. <u>22°C</u>	Wind: <u>2</u>	Cloud Cover (%) <u>40%</u>	Precipitation	0	Calm
	Direction: <u>N</u>		<input checked="" type="checkbox"/> None/Dry <input type="checkbox"/> Damp/Fog	1	Smoke Drifts
			<input type="checkbox"/> Drizzle <input type="checkbox"/> Rain	2	Wind Felt on Face
CALL LEVEL CODES				3	Leaves in constant motion
Code 1: Calls not simultaneous, number of individuals can be accurately counted				4	Wind raises dust and paper
Code 2: Some calls simultaneous, number of individuals can be reliably estimated					
Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated					

Reference Site: No Yes UTM _____

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

Station: 1 (NE pond wetland)
 (475594 4753926)

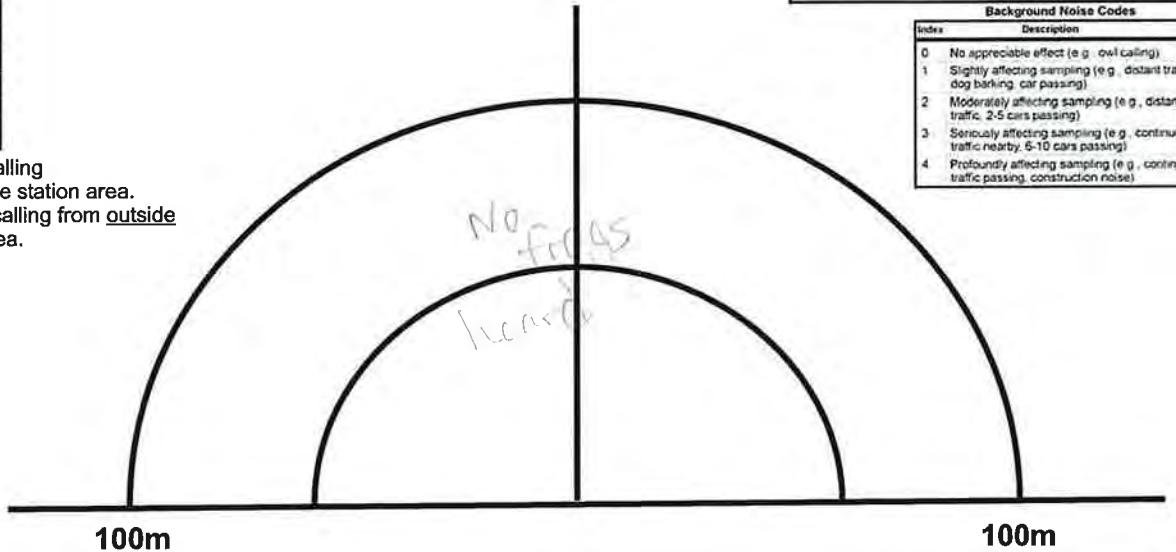
SW

Station Start Time (24 hr): 10:49 PM

Background Noise Code (1-4): 3

Index	Description
0	No appreciable effect (e.g. owl calling)
1	Slightly affecting sampling (e.g. distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g. distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g. continuous traffic nearby, 5-10 cars passing)
4	Profoundly affecting sampling (e.g. continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.



Species	In*	Out**
AMTO	<input checked="" type="checkbox"/>	
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

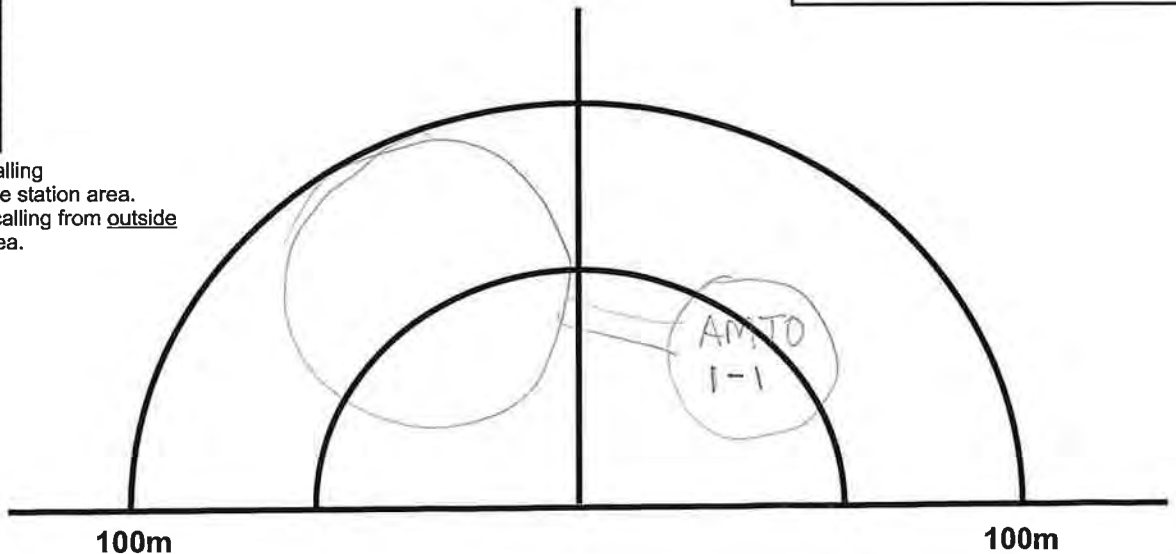
Station: 2 (previous PSW)
 475251 4758714

E

Station Start Time (24 hr): 11:05 AM

Background Noise Code (1-4): 2

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.





AMPHIBIAN MONITORING FIELD SHEET

Project: 46666-100 Topping Lands
 Date: June 20, 2024 Project Manager: DH
 Collector(s): AL CG Visit #: _____

WEATHER CONDITIONS				WIND SCALE	
Temp: <u>22°C</u>	Wind: <u>1</u>	Cloud Cover (%): <u>30%</u>	Precipitation: <input checked="" type="checkbox"/> None/Dry <input type="checkbox"/> Drizzle	0	Calm
	Direction: <u>N</u>		<input type="checkbox"/> Damp/Fog <input type="checkbox"/> Rain	1	Smoke Drifts
CALL LEVEL CODES				2	Wind Felt on Face
Code 1: Calls not simultaneous, number of individuals can be accurately counted				3	Leaves in constant motion
Code 2: Some calls simultaneous, number of individuals can be reliably estimated				4	Wind raises dust and paper
Code 3: Full chorus, calls continuous and overlapping, number of individuals cannot be reliably estimated					

Reference Site: No Yes UTM _____

Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

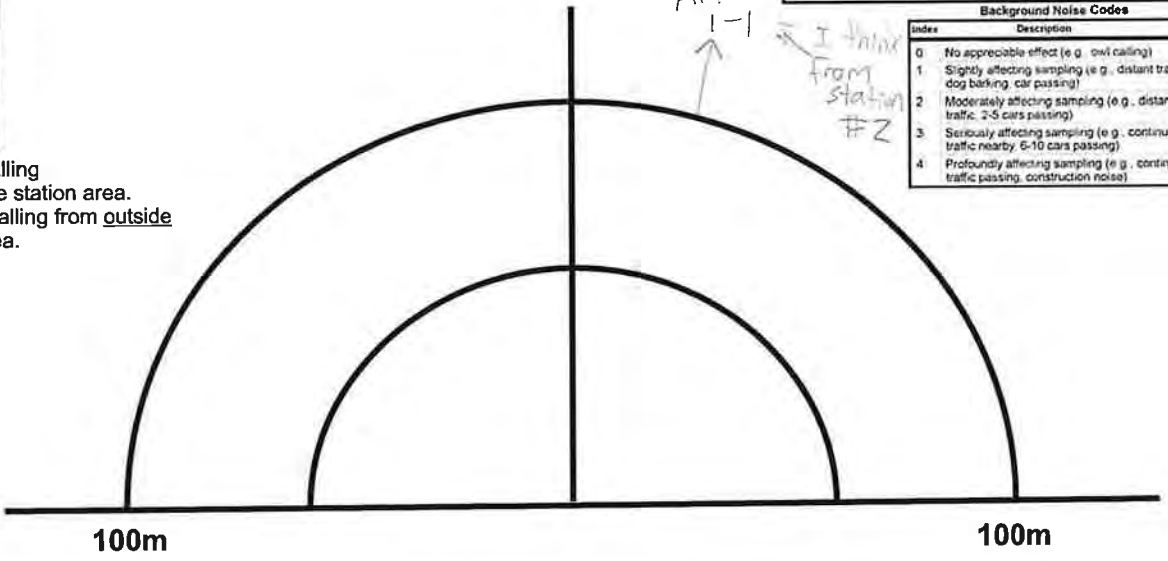
Station: 3 (pond by woodland)
(47574S 4752798)

NW

Station Start Time (24 hr): 1:24
 Background Noise Code (1-4): 0

Index	Description
0	No appreciable effect (e.g. owl calling)
1	Slightly affecting sampling (e.g. distant traffic, dog barking, car passing)
2	Moderately affecting sampling (e.g. distant traffic, 2-5 cars passing)
3	Seriously affecting sampling (e.g. continuous traffic nearby, 6-10 cars passing)
4	Profoundly affecting sampling (e.g. continuous traffic passing, construction noise)

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.

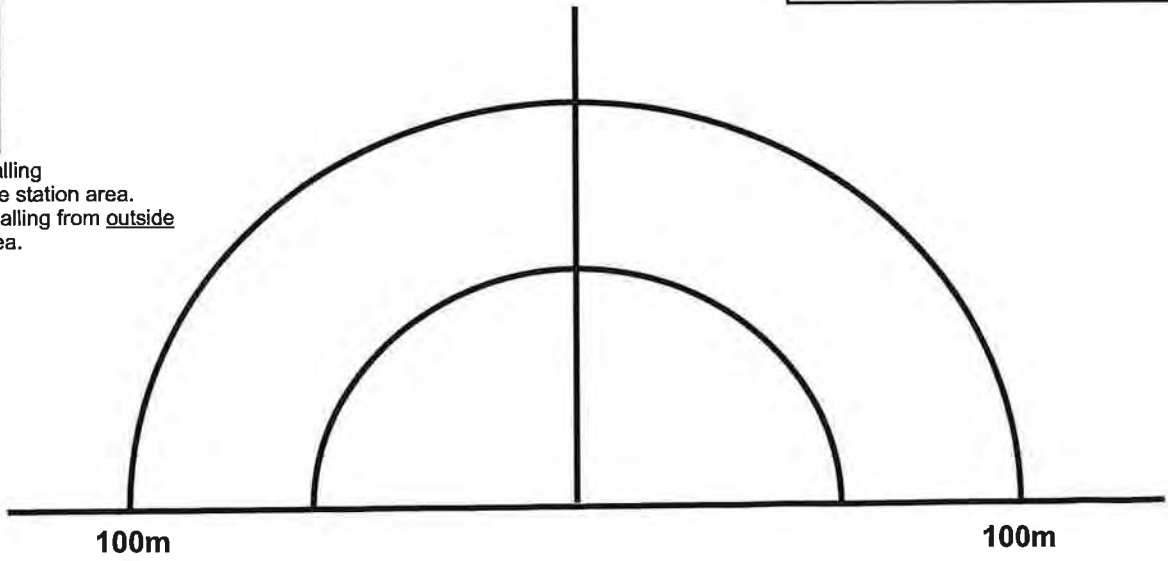


Species	In*	Out**
AMTO		
BCFR		
BULL		
CHFR		
CGTR		
FOTO		
GRTR		
GRFR		
MIFR		
NLFR		
PIFR		
SPPE		
WOFR		

Station:

Station Start Time (24 hr): _____
 Background Noise Code (1-4): _____

* Check if species is calling from inside 100-metre station area.
 ** Check if species is calling from outside 100-metre station area.



Appendix H

Snake Survey Data

Table 1: 46666-100 Topping Lands 2020 Common Snake Board study

20-May		Temp: 14		Wind: ~35km/hr S		Clouds (%): 20		Time: 10:15-11:15		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
20/5/2020	E Milksnake															0	Large E. Gartersnake incidentally encountered in the field near board 14. Crayfish under board 5
	Dekay's															0	
	E Gartersnake															0	
	Mammals	1	1											1	4	7	
	Other					1										1	

25-May		Temp: 23		Wind: ~10km/hr E		Clouds (%): 20		Time: 9:15-10:00		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
25/5/2020	E Milksnake															0	
	Dekay's															0	
	E Gartersnake															0	
	Mammals	1						1								2	
	Other															0	

28-May		Temp: 22		Wind: ~25km/hr S		Clouds (%): 35		Time: 17:20-18:05		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
28/5/2020	E Milksnake															0	
	Dekay's															0	
	E Gartersnake															0	
	Mammals												1	3	4		
	Other															0	

2-Jun		Temp: 16		Wind: ~15km/hr S		Clouds (%): 0		Time: 10:30-11:15		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
2/6/2020	E Milksnake															0	No animals observed
	Dekay's															0	
	E Gartersnake															0	
	Mammals															0	
	Other															0	

4-Jun		Temp: 22		Wind: ~10km/hr W		Clouds (%): 0		Time: 9:30-11:00		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
4/6/2020	E Milksnake															0	
	Dekay's															0	
	E Gartersnake											1				1	
	Mammals					1										1	
	Other															0	

8-Jun		Temp: 24		Wind: ~10km/hr S		Clouds (%): 15		Time: 20:00-22:00		Observer: Imm							
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
8/6/2020	E Milksnake															0	One deceased eastern gartersnake observed under board 11
	Dekay's															0	
	E Gartersnake													2		2	
	Mammals															0	
	Other															0	

		11-Jun		Temp: 17		Wind: ~35km/hr W		Clouds (%): 60		Time: 9:20-9:55		Observer: Imm					
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
11/6/2020	E Milksnake															0	No Animals Observed
	Dekay's															0	
	<u>E Gartersnake</u>															0	
	Mammals															0	
	Other															0	

		15-Jun		Temp: 20		Wind: ~5km/hr E		Clouds (%): 0		Time: 17:00-18:15		Observer: Imm					
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
15/6/2020	E Milksnake					x										0	Board 5 destroyed by farm implement, not replaced
	Dekay's					x										0	
	<u>E Gartersnake</u>					x										0	
	Mammals		2	1	1	x	1	1						2		8	
	Other					x										0	

		18-Jun		Temp: 23		Wind: ~5km/hr E		Clouds (%): 0		Time: 9:45-11:15		Observer: Imm					
		Boards															
Date	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM	Comments
18/6/2020	E Milksnake					x										0	
	Dekay's					x										0	
	<u>E Gartersnake</u>					x										0	
	Mammals		1	1	1	x							1			4	
	Other					x										0	

Total Snakes	1	2	3	4	5	6	7	8	9	10	11	12	13	14	SUM
E Milksnake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dekay's	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
E Gartersnake	0	0	0	0	0	0	0	0	0	0	1	0	0	2	3

Appendix I

Bat Habitat Assessment Data

Appendix B – Suitable Maternity Roost Trees for Little Brown Myotis/Northern Myotis

Include all live and dead standing trees $\geq 10\text{cm}$ dbh with loose or naturally exfoliating bark, cavities, hollows or cracks.

Project Name: *Topping Lands*Survey Date(s): *May 7/18*

Site Name:

Observers(s): *LM WH*

ELC Ecosite:

Snag Density (snags/ha):

Tree #	Tree Species ID	dbh (cm)	Height Class ²	Snag attributes (check all that apply)	Easting	Northing	Notes
1	<i>Barnwood</i>	<i>65</i>	<i>2</i>	<input type="checkbox"/> cavity ³ <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3? ⁴	<i>475244</i>	<i>4753360</i>	
2	<i>Ash dead</i>	<i>45</i>	<i>3</i>	<input type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3? ⁴	<i>475212</i>	<i>4753358</i>	
3	<i>11</i>	<i>40</i>	<i>3</i>	<input type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3? ⁴	<i>475212</i>	<i>4753377</i>	
4	<i>red oak</i>	<i>123</i>	<i>2</i>	<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input checked="" type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?	<i>475205</i>	<i>4753403</i>	
5	<i>Sugar maple</i>	<i>100</i>	<i>4</i>	<input checked="" type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3? ⁴	<i>475226</i>	<i>4753436</i>	
6	<i>Beech</i>	<i>90</i>	<i>2</i>	<input type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3?	<i>475252</i>	<i>4753466</i>	
7	<i>Barnwood</i>	<i>55</i>	<i>3</i>	<input type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3?	<i>475290</i>	<i>4753487</i>	<i>AW ? butterfly</i>
8	<i>red oak</i>	<i>134</i>	<i>2</i>	<input checked="" type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3?	<i>475376</i>	<i>4753570</i>	
9	<i>silver maple</i>	<i>50+</i>	<i>2</i>	<input type="checkbox"/> cavity <input checked="" type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3?	<i>475260</i>	<i>4753763</i>	<i>in SWAMP off ISM</i>
10	<i>sweet maple</i>	<i>85</i>	<i>3</i>	<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3?	<i>475208</i>	<i>4753552</i>	

² **Height Class:** 1 = Dominant (above canopy); 2 = Co-dominant (canopy height); 3 = Intermediate (just below canopy); 4 = suppressed (well below canopy)

³ The approx. height of the cavity should be noted. Note that cavities with an entrance near the ground may also be used by bats if they are "chimney-like".

⁴ **Decay Class:** 1 = Healthy, live tree; 2 = Declining live tree, part of canopy lost; 3 = Very recently dead, bark intact, branches intact

*question mark
butterfly*

Appendix B – Suitable Maternity Roost Trees for Little Brown Myotis/Northern Myotis

Include all live and dead standing trees $\geq 10\text{cm}$ dbh with loose or naturally exfoliating bark, cavities, hollows or cracks.

Project Name: *Topping Lands*

Survey Date(s): *May 9/18*

Site Name:

Observers(s): *LM WT*

ELC Ecosite:

Snag Density (snags/ha):

Tree #	Tree Species ID	dbh (cm)	Height Class ²	Snag attributes (check all that apply)	Easting	Northing	Notes
11	<i>Sugar maple</i>	90	2	<input type="checkbox"/> cavity ³ <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input checked="" type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input checked="" type="checkbox"/> Decay Class 1-3? ⁴	<i>475184</i>	<i>4753535</i>	
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			
				<input type="checkbox"/> cavity <input type="checkbox"/> loose bark <input type="checkbox"/> crack <input type="checkbox"/> knot hole <input type="checkbox"/> other snag within 10m? <input type="checkbox"/> Decay Class 1-3?			

² **Height Class:** 1 = Dominant (above canopy); 2 = Co-dominant (canopy height); 3 = Intermediate (just below canopy); 4 = suppressed (well below canopy)

³ The approx. height of the cavity should be noted. Note that cavities with an entrance near the ground may also be used by bats if they are "chimney-like".

Decay Class: 1 = Healthy, live tree; 2 = Declining live tree, part of canopy lost; 3 = Very recently dead, bark intact, branches intact

Appendix J

Headwater Drainage Feature Assessment Data



GENERAL SITE INFORMATION FIELD SHEET

Project: 46666-100
 Date: April 22/24 Project Manager: _____
 Collector(s): YS+ER Visit #: _____
 Time started: 16:30 Time finished: 19:00 Combined collectors' hours: _____
 NHIC List MNR EO's none not provided to collector

WEATHER CONDITIONS					WIND SCALE			
Temp.	Wind:	19km/h	Cloud Cover (%)	Precipitation	0	Calm		
12	Direction:	S	50	Today: No Yesterday: Yes	1	Smoke Drifts		
DATA FOCUS					2	Wind Felt on Face		
<input type="checkbox"/>	Birds 1_2_Mig	<input type="checkbox"/>	ELC's	<input checked="" type="checkbox"/>	3	Leaves in constant motion		
<input type="checkbox"/>	Mammals	<input type="checkbox"/>	Floral V__S__A	<input checked="" type="checkbox"/>	4	Wind raises dust and paper		
<input type="checkbox"/>	Amphibians 1_2_3	<input type="checkbox"/>	Wetland	<input type="checkbox"/>	5	Small trees sway		
<input type="checkbox"/>	Reptiles	<input type="checkbox"/>	Butternut (BHA)	<input type="checkbox"/>	6	Large branches sway		
<input type="checkbox"/>	Invertebrates	<input type="checkbox"/>	other SAR	<input type="checkbox"/>	7	Lots of resistance when walking into		
FEATURES (with GPS co-ordinates where applicable)					8	Limbs breaking off trees		
Man-made Structures:					Mapped		Follow-up Req'd	
					UTM		Yes No Who	
<input type="checkbox"/> None observed								
Yes No								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Barns/Footings/Wells/other(list)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Rock Piles						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Garbage						
Natural Vegetation:								
<input type="checkbox"/> None observed								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Fallen Logs outside woods (#s)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Brush Piles						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Snags (raptor perch)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Tree Cavities (nesting)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sentinel Trees						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Butternut Identified						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mast Trees (6E) <input type="checkbox"/> Berry Shrubs (6E)						
Wildlife Features:								
<input type="checkbox"/> None observed								
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Waterfowl nesting (large #s, # of species)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Exposed Banks (nesting swallows)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Stick Nests						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Animal Burrows (>10cm)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Heronry						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Crayfish mounds						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Sand/gravel on site						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Marsh/open country/shrub						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Winter Deer yards						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Corridor from pond to woods (ampbian movement)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Bat corridor (shorelines, escarpments)						
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)						
Aquatic Features:								
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/> temp.				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/> emergents/submergents/logs	<input type="checkbox"/> temp.				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input checked="" type="checkbox"/> pools <input type="checkbox"/> flowing <input type="checkbox"/> dry					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Waterways	flowing dry pools					
	<input type="checkbox"/>	natural stream	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
	<input checked="" type="checkbox"/>	swale	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> None observed				
	<input checked="" type="checkbox"/>	open drain	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>					
	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>					
Incidental Observations/Notes:								
<u>IDEA Visit 1</u>								
<u>- Saw a male mallard</u>								

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240422 Project #: 46666-100 Recorder/Crew: V.S + E.H
 Stream Name: _____ Stream Code: HDP-1 Site Code: Reach 1
 Site Limits: Upstream 17 WP# 475257 Field Assessment: Sample 1 Unconnected HDF: _____
 Downstream _____ WP# 4753737 Sample 2 Not connected to
 Direction of Assessment: Upstream → Downstream Sample 3 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	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 5 _____ Elevation (cm): _____ Gradient (°): _____

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

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
<u>9.3</u>	<u>78 83 97</u>	<u>0 0 0</u> No flow	_____	_____	_____

Sediment Transport

Adjacent	<input checked="" type="checkbox"/> None (1)	<input type="checkbox"/> Rill (2)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Gully (4)	<input type="checkbox"/> Outlet Scour (5)
Feature	<input type="checkbox"/> Sheet Erosion (6)	<input type="checkbox"/> Rill (2)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Gully (4)	<input type="checkbox"/> Outlet Scour (5)
	<input type="checkbox"/> Sheet Erosion (6)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Instream Bank Erosion (7)	<input type="checkbox"/> Other (8)	<input type="checkbox"/> 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

Date: 20240427 Project #: 46666-100 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:

- Water coming from Swamp community that's completely flooded
 - Water meanders down to next point and narrows to 150mm

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

Trigger: Other: Comments Upstream Location

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

Category: 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20260422 Project #: 46606-α Recorder/Crew: VS + ER
 Stream Name: _____ Stream Code: HDF1 Site Code: Reach 2

Site Limits: Upstream WP# 475-274 E Field Assessment: Sample 1 Unconnected HDF: _____
 Downstream 17 WP# 475-372 N Sample 2 Not connected to
 Direction of Assessment: Upstream Downstream Sample 3 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

Distance	Bank	None (1)	Lawn (2)	Cropped (3)	Meadow (4)	Scrubland (5)	Wetland (6)	Forest (7)
0 - 1.5 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 - 10 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 - 30 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Distance (m): 5 — — Elevation (cm): — — — Gradient (°): 1°

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

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): ~45m Bankfull Depth (mm) -99 (too much sediment)

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
<u>-99</u>	<u>75</u>	<u>80</u>													

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

Date: 20240425 Project #: 46666-101 Field Assessment Sample # 1 Sample # 2 Sample # 3

POINT FEATURE DATA

Fish Barrier Measurements: WP# [] Perched Height (mm): [] Jumping Height (mm): []
Groundwater Indicators: None Watercress Seepage Bubbling Stained Other: []
Fish Collection: Absent Present Comment: []

Table with 5 columns: WP#, Photo #, Code, Category, Description. Multiple empty rows for data entry.

Additional Notes:

Site Break: Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
Trigger: Other: Comments []

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream Downstream WP# E N
 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 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) 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

Distance (m)	Bank	None (1)	Lawn (2)	Cropped (3)	Meadow (4)	Scrubland (5)	Wetland (6)	Forest (7)
0 - 1.5 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 - 10 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 - 30 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Distance (m): Elevation (cm): Gradient (°):

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

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

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
<input type="text" value="No Water"/>	<input type="text" value="No Water"/>	<input type="text" value="No Water"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sediment Transport

Adjacent	None (1)	Rill (2)	Rill and Gully (3)	Gully (4)	Outlet Scour (5)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feature	None (1)	Rill (2)	Rill and Gully (3)	Gully (4)	Outlet Scour (5)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sheet Erosion (6)	Instream Bank Erosion (7)	Other (8)			
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			

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: / / / / Project #: 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 Water but had moist soils

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

Trigger Other: Comments Ag Field - No water

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)

Category 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240427 Project #: 46606-100 Recorder/Crew: VS + ER
 Stream Name: _____ Stream Code: HDF1 Site Code: Region 4

Site Limits: Upstream 17 WP# 475367 E Field Assessment: Sample 1 Unconnected HDF: _____
 Downstream WP# 475368 F Sample 2 Not connected to
 Direction of Assessment: Upstream Downstream Sample 3 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

Distance	Bank	None (1)	Lawn (2)	Cropped (3)	Meadow (4)	Scrubland (5)	Wetland (6)	Forest (7)
0 - 1.5 m	Left Bank	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 - 10 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 - 30 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Distance (m): 5 Elevation (cm): Gradient (°): 1°

Dominant Substrate (S2.M3) Clay (Hard Pan) Silt Sand (0.06-2 mm) Gravel (22-66 mm) Cobble (67-249 mm) Boulder (250 mm) Bedrock
 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): 0.7m Bankfull Depth (mm) 150

Entrenchment Total: >40 m <40 m Left Bank No m Right Bank No 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
<u>No Water</u>	<u>No Water</u>	<u>No Water</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>

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

Date: / / Project #: 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:

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments No Water - Forest / Meadow Vegetation

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: 46666-100 Recorder/Crew: Vs + FR
 Stream Name: Stream Code: HDF-1 Site Code: Reach 5

Site Limits: Upstream 17 WP# 475399 E Downstream WP# 475358 N
 Direction of Assessment: Upstream Downstream
 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network

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) 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

Distance	Bank	None (1)	Lawn (2)	Cropped (3)	Meadow (4)	Scrubland (5)	Wetland (6)	Forest (7)
0 - 1.5 m	Left Bank	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 - 10 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 - 30 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Distance (m): Elevation (cm): Gradient (°):

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

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): No defined feature Bankfull Depth (mm): No defined feature

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):

Sediment Transport: Adjacent: None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)
 Feature: Sheet Erosion (6) 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

Date: Project #: 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 water along woodland
 - Low spot in feature from Ag field that's holding water

Site Break: Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger: Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): <input type="text" value="20240424"/>		Project #: <input type="text" value="46666-100"/>		Recorder/Crew: <input type="text" value="VJ + ER"/>	
Stream Name: <input type="text"/>		Stream Code: <input type="text" value="HDF-1"/>		Site Code: <input type="text" value="Reach-1"/>	
Site Limits: Upstream <input type="text" value="17"/> WP# <input type="text"/>		Downstream <input type="text"/> WP# <input type="text"/>		Field Assessment: <input checked="" type="checkbox"/> Sample 1 <input type="checkbox"/> Sample 2 <input type="checkbox"/> Sample 3	
Direction of Assessment: <input type="checkbox"/> Upstream <input type="checkbox"/> Downstream		Unconnected HDF: <input type="checkbox"/> Not connected to downstream network			
Flow Influence: <input type="checkbox"/> Freshet (1) <input type="checkbox"/> Spate (2) <input checked="" type="checkbox"/> Baseflow (3)					
Flow Condition: <input type="checkbox"/> Dry (1) <input type="checkbox"/> Standing Water (2) <input type="checkbox"/> Interstitial Flow (3) <input type="checkbox"/> Minimal Flow (4) <input type="checkbox"/> Substantial Flow (5)					
Feature Type: <input type="checkbox"/> Defined Natural Channel (1) <input type="checkbox"/> Channelized or Constrained (2) <input type="checkbox"/> Multi-thread (3) <input type="checkbox"/> No Defined Feature (4) <input type="checkbox"/> Tiled Feature (5) <input checked="" type="checkbox"/> Wetland (6) <input type="checkbox"/> Swale (7) <input type="checkbox"/> Roadside Ditch (8) <input type="checkbox"/> Pond (9)					
Feature Vegetation: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input checked="" type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input type="checkbox"/> Forest (7)					
Riparian Vegetation					
0 - 1.5 m Left Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input checked="" type="checkbox"/> Forest (7)					
Right Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input checked="" type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input type="checkbox"/> Forest (7)					
1.5 - 10 m Left Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input checked="" type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input checked="" type="checkbox"/> Forest (7)					
Right Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input checked="" type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input type="checkbox"/> Forest (7)					
10 - 30 m Left Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input checked="" type="checkbox"/> Forest (7)					
Right Bank: <input type="checkbox"/> None (1) <input type="checkbox"/> Lawn (2) <input checked="" type="checkbox"/> Cropped (3) <input type="checkbox"/> Meadow (4) <input type="checkbox"/> Scrubland (5) <input type="checkbox"/> Wetland (6) <input type="checkbox"/> Forest (7)					
Channel Gradient (S4.M7): <input type="checkbox"/> Visual (1) <input checked="" type="checkbox"/> Clinometer (2) <input type="checkbox"/> Laser Level (3) <input type="checkbox"/> Survey Level (4) <input type="checkbox"/> Other (5) <input type="checkbox"/> LiDAR (6)					
Distance (m): <input type="text" value="5"/> <input type="text" value="—"/> <input type="text" value="—"/>		Elevation (cm): <input type="text" value="—"/> <input type="text" value="—"/> <input type="text" value="—"/>		Gradient (°): <input type="text" value="1°"/>	
Dominant Substrate (S2.M3): <input checked="" type="checkbox"/> Clay (Hard Pan) <input type="checkbox"/> Silt <input type="checkbox"/> Sand (0.06-2 mm) <input type="checkbox"/> Gravel (22-66 mm) <input type="checkbox"/> Cobble (67-249 mm) <input type="checkbox"/> Boulder (250 mm) <input type="checkbox"/> Bedrock					
Sub-Dominant Substrate (S2.M3): <input type="checkbox"/> Clay (Hard Pan) <input checked="" type="checkbox"/> Silt <input type="checkbox"/> Sand (0.06-2 mm) <input type="checkbox"/> Gravel (22-66 mm) <input type="checkbox"/> Cobble (67-249 mm) <input type="checkbox"/> Boulder (250 mm) <input type="checkbox"/> Bedrock					
Feature Roughness: <input type="checkbox"/> < 10% Minimal (1) <input type="checkbox"/> 10 - 40% Moderate (2) <input type="checkbox"/> 40 - 60% High (3) <input type="checkbox"/> > 60% Extreme (4)					
Width Measurement: <input checked="" type="checkbox"/> Can't Measure (1) <input type="checkbox"/> Bankfull (2) <input type="checkbox"/> Mean Width (3) <input type="checkbox"/> Estimated (4) <input type="checkbox"/> GIS (5) <input checked="" type="checkbox"/> Measure/GIS (6)					
Channel Dimensions: Feature Width (m): <input type="text"/>		Bankfull Depth (mm): <input type="text"/>			
Entrenchment: Total: <input type="checkbox"/> >40 m <input checked="" type="checkbox"/> <40 m		Left Bank: <input type="text"/> m		Right Bank: <input type="text"/> m	
Total width: <input type="text"/> m					
Surface Flow Method: <input type="checkbox"/> Perched Culvert (1) <input checked="" type="checkbox"/> Hydraulic Head (2) <input type="checkbox"/> Distance by Time (3) <input type="checkbox"/> Estimated (4)					
Wetted Width (m): <input type="text"/>		Wetted Depth (mm): <input type="text" value="1: 270, 2: 310, 3: 240"/>		Hydraulic head (mm): <input type="text" value="No Flow"/>	
Volume (L): <input type="text"/>		Distance (m): <input type="text"/>		Time (s): <input type="text"/>	
Sediment Transport: Adjacent: <input checked="" type="checkbox"/> None (1) <input type="checkbox"/> Rill (2) <input type="checkbox"/> Rill and Gully (3) <input type="checkbox"/> Gully (4) <input type="checkbox"/> Outlet Scour (5)					
Feature: <input type="checkbox"/> Sheet Erosion (6) <input checked="" type="checkbox"/> None (1) <input type="checkbox"/> Rill (2) <input type="checkbox"/> Rill and Gully (3) <input type="checkbox"/> Gully (4) <input type="checkbox"/> Outlet Scour (5)					
Sediment Deposition: <input type="checkbox"/> Sheet Erosion (6) <input type="checkbox"/> Instream Bank Erosion (7) <input type="checkbox"/> Other (8)					
Measures (mm): <input type="text"/>					
<input checked="" type="checkbox"/> None (1) <input type="checkbox"/> Minimal: < 5 mm (2) <input type="checkbox"/> Moderate: 5-30 mm (3) <input type="checkbox"/> Substantial: 31-80 mm (4) <input type="checkbox"/> Extensive: > 80 mm (5)					

Unconstrained Headwater Drainage Feature Assessment

Date: / /

Project #:

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:

- online wetland feature w phrag + shrub

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

Trigger Other: Comments Wetland

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240422 Project #: Hdobe-100 Recorder/Crew: VJ + ER
 Stream Name: _____ Stream Code: HDF1 Site Code: Reach 7
 Site Limits: Upstream _____ Downstream _____ WP# 475366 E _____ Field Assessment: Sample 1 Unconnected HDF: _____
 WP# 475380 N _____ Sample 2 Not connected to
 Direction of Assessment: Upstream → Downstream Sample 3 _____ 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): 5 _____ _____ Elevation (cm): _____ _____ _____ Gradient (°): 10

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

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)** _____

No defined feature adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)

Sediment Transport Feature Sheet Erosion (6) 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

Date: 2024042 Project #: 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 definite feature - Some wetness along Ag field following Point 6

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

Trigger: Other: Comments No water - grass veg

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

Category: 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/I/F - 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240927 Project #: 46666-100 Recorder/Crew: VJ + ER
 Stream Name: _____ Stream Code: HDP1 Site Code: Reach 8
 Site Limits: Upstream _____ WP# 475337 E Field Assessment: Sample 1 Unconnected HDF: _____
 Downstream _____ WP# 4753948 N Sample 2 Not connected to
 Direction of Assessment: Upstream Downstream Sample 3 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 (°): _____

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

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) 1 2 3 **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
Dry Dry Dry _____ _____ _____

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

Date: / / Project #: 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:

- Unable to locate the mapped feature. Some wet low spots where the feature is supposed to be. No obvious connection

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

Trigger Other:

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)

Category 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

ELC NUMBER	ELC CODE	Description
1	FOD7	Fresh-Moist Deciduous Lowland (3.86ha)
2	MAM	Mineral Meadow Marsh (0.21ha)
3	OAGM1	(No longer a CLIM-1, ignore lines above): Annual Row Crops (4.27ha)
4	MAS2	Mineral Shallow Marsh (0.14ha)
5	SWDS	Maple Mineral Deciduous Swamp (0.27ha)

Note: Area Totals (1ha) are within the Study Area only.



- LEGEND**
- SUBJECT LANDS
 - - - STUDY AREA (120m from Subject Lands)
 - LEGAL PARCEL
 - WATERCOURSE (UTRCA)
 - ① VEGETATION COMMUNITY

REFERENCES

CITY OF 2023 LONDON PARCEL AND AERIAL IMAGERY, CITY OF LONDON ROAD AND WATER NETWORK, OPEN DATA SET, AND UPPER THAMES RIVER CONSERVATION AUTHORITY (UTRCA), WATERCOURSES.

NOTES

THIS FIGURE IS SCHEMATIC ONLY, AND TO BE READ IN CONJUNCTION WITH ACCOMPANYING TEXT.

ALL LOCATIONS ARE APPROXIMATE.

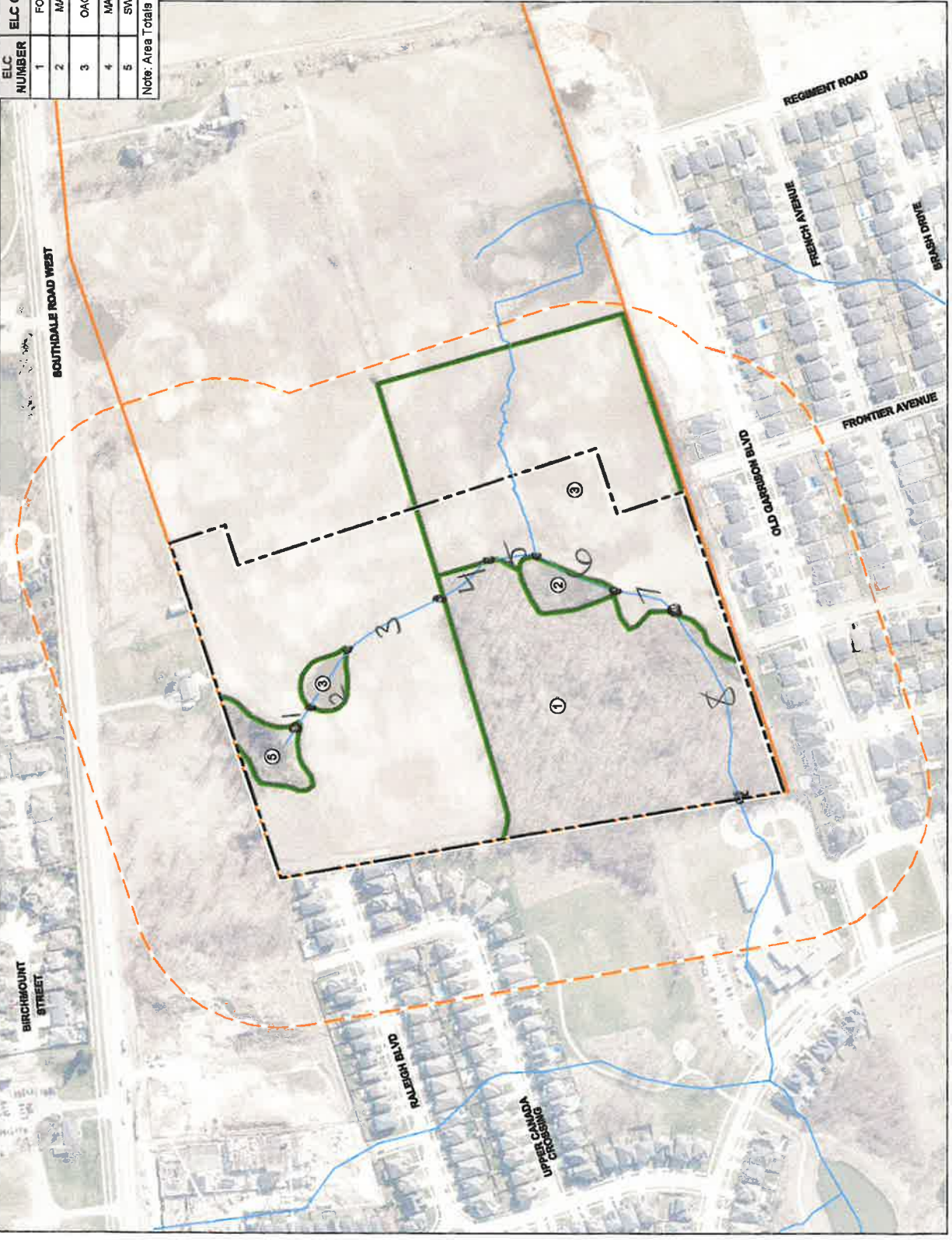


MTE
Engineers, Scientists, Surveyors

PROJECT: ENVIRONMENTAL IMPACT STUDY FOR THE CITY OF LONDON WEST LONDON, ONTARIO

TITLE: VEGETATION COMMUNITIES

DATE: 13.03.2024
PROJECT NO.: 46856-100
SHEET NO.: 6





GENERAL SITE INFORMATION FIELD SHEET

Project: 116610101 - 1100
 Date: 10-16-2010 Project Manager: _____
 Collector(s): FR Visit #: _____
 Time started: 8:46 Time finished: _____ Combined collectors' hours: _____
 NHIC List MNR EO's none not provided to collector

WEATHER CONDITIONS					WIND SCALE			
Temp.	Wind:	Cloud Cover (%)	Precipitation		0	Calm		
23	Direction: SW	15	Today: None	Yesterday: None	1	Smoke Drifts		
DATA FOCUS					2	Wind Felt on Face		
<input type="checkbox"/>	Birds 1__2__ Mig__	<input type="checkbox"/>	ELC's	<input type="checkbox"/>	3	Leaves in constant motion		
<input type="checkbox"/>	Mammals	<input type="checkbox"/>	Floral V__S__A__	<input checked="" type="checkbox"/>	4	Wind raises dust and paper		
<input type="checkbox"/>	Amphibians 1__2__3__	<input type="checkbox"/>	Wetland	<input type="checkbox"/>	5	Small trees sway		
<input type="checkbox"/>	Reptiles	<input type="checkbox"/>	Butternut (BHA)	<input type="checkbox"/>	6	Large branches sway		
<input type="checkbox"/>	Invertebrates	<input type="checkbox"/>	other SAR	<input type="checkbox"/>	7	Lots of resistance when walking into		
<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	8	Limbs breaking off trees		
FEATURES (with GPS co-ordinates where applicable)					Mapped	Follow-up Req'd		
Man-made Structures: <input type="checkbox"/> None observed					UTM	Yes	No	Who
Yes No								
<input type="checkbox"/>	<input type="checkbox"/>	Barns/Footings/Wells/other(list)						
<input type="checkbox"/>	<input type="checkbox"/>	Rock Piles						
<input type="checkbox"/>	<input type="checkbox"/>	Garbage						
Natural Vegetation: <input type="checkbox"/> None observed								
<input type="checkbox"/>	<input type="checkbox"/>	Fallen Logs outside woods (#s)						
<input type="checkbox"/>	<input type="checkbox"/>	Brush Piles						
<input type="checkbox"/>	<input type="checkbox"/>	Snags (raptor perch)						
<input type="checkbox"/>	<input type="checkbox"/>	Tree Cavities (nesting)						
<input type="checkbox"/>	<input type="checkbox"/>	Sentinel Trees						
<input type="checkbox"/>	<input type="checkbox"/>	Butternut Identified						
<input type="checkbox"/>	<input type="checkbox"/>	Mast Trees (6E)	<input type="checkbox"/>	Berry Shrubs (6E)				
Wildlife Features: <input type="checkbox"/> None observed								
<input type="checkbox"/>	<input type="checkbox"/>	Waterfowl nesting (large #s, # of species)						
<input type="checkbox"/>	<input type="checkbox"/>	Exposed Banks (nesting swallows)						
<input type="checkbox"/>	<input type="checkbox"/>	Stick Nests						
<input type="checkbox"/>	<input type="checkbox"/>	Animal Burrows (>10cm)						
<input type="checkbox"/>	<input type="checkbox"/>	Herony						
<input type="checkbox"/>	<input type="checkbox"/>	Crayfish mounds						
<input type="checkbox"/>	<input type="checkbox"/>	Sand/gravel on site						
<input type="checkbox"/>	<input type="checkbox"/>	Marsh/open country/shrub						
<input type="checkbox"/>	<input type="checkbox"/>	Winter Deer yards						
<input type="checkbox"/>	<input type="checkbox"/>	Corridor from pond to woods (ampibian movement)						
<input type="checkbox"/>	<input type="checkbox"/>	Bat corridor (shorelines, escarpments)						
<input type="checkbox"/>	<input type="checkbox"/>	Bat hibernacula (caves, mines, crevices, etc.)						
Aquatic Features:								
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in woodland	<input type="checkbox"/>	emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Perm. pond in open	<input type="checkbox"/>	emergents/submergents/logs	<input type="checkbox"/>	temp.		
<input type="checkbox"/>	<input type="checkbox"/>	Water in woodland	<input type="checkbox"/>	pools	<input type="checkbox"/>	flowing		
<input type="checkbox"/>	<input type="checkbox"/>	Waterways	<input type="checkbox"/>	flowing	<input type="checkbox"/>	dry		
<input type="checkbox"/>	<input type="checkbox"/>	natural stream	<input type="checkbox"/>		<input type="checkbox"/>	pools		
<input type="checkbox"/>	<input type="checkbox"/>	swale	<input type="checkbox"/>		<input type="checkbox"/>	None observed		
<input type="checkbox"/>	<input type="checkbox"/>	open drain	<input type="checkbox"/>		<input type="checkbox"/>			
<input type="checkbox"/>	<input type="checkbox"/>	Seeps/Springs	<input type="checkbox"/>		<input type="checkbox"/>			
Incidental Observations/Notes:								
<u>HDEA Visit #2</u>								
<u>Observed Red-tailed Hawk calling + flying in woodland</u>								

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream WPM# Field Assessment: Sample 1 Unconnected HDF: Not connected to
 Downstream WPM# Sample 2 Sample 3 downstream network
 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) 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 (°):

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

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
Not entrenched

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
<input type="text" value="2.98"/>	<input type="text" value="25"/>	<input type="text" value="15"/>	<input type="text" value="24"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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)

yyyy/mm/dd

Unconstrained Headwater Drainage Feature Assessment

Date:

Project #:

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:

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream WP# E Downstream WP# W
 Field Assessment: Sample 1 Unconnected HDF: Sample 2 Not connected to
 Direction of Assessment: Upstream Downstream Sample 3 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	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> 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 (°):

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

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

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)
<input type="text" value="99"/>	<input type="text" value="92 109 109"/>	<input type="text" value="0 0 0"/>	<input type="text" value="—"/>	<input type="text" value="—"/>	<input type="text" value="—"/>

standing water

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: 20240510 Project #: 46666-100 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:

on-line wetland features

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

Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream WP# Field Assessment: Sample 1 Unconnected HDF: Not connected to
 Downstream WP# Sample 2 Sample 3 downstream network
 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) 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 (°):

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

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
Not entrenched

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
<input type="text" value="Dry"/>	<input type="text" value="Dry"/>	<input type="text" value="Dry"/>	<input type="text" value="Dry"/>	<input type="text" value="No water"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sediment Transport
 Adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)
 Feature Sheet Erosion (6) 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

Date: yyyy/mm/dd 20240511 Project #: 46666-100 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 Ag field

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:

Stream Name: Stream Code: Site Code:

Site Limits: Upstream Downstream WP# Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network

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) 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

Distance	Bank	None (1)	Lawn (2)	Cropped (3)	Meadow (4)	Scrubland (5)	Wetland (6)	Forest (7)
0 - 1.5 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5 - 10 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10 - 30 m	Left Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	Right Bank	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Distance (m): Elevation (cm): Gradient (°):

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

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

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
<input type="text" value="No Water"/>	<input type="text"/>			<input type="text" value="Dry"/>			<input type="text"/>			<input type="text"/>			<input type="text"/>		

Sediment Transport

Adjacent	None (1)	Rill (2)	Rill and Gully (3)	Gully (4)	Outlet Scour (5)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Feature	None (1)	Rill (2)	Rill and Gully (3)	Gully (4)	Outlet Scour (5)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

Date: Project #: 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:

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits:
 -Upstream WP# E Field Assessment: Sample 1 Unconnected HDF:
 -Downstream WP# N Sample 2 Not connected to
 Direction of Assessment: Upstream Downstream Sample 3 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 (°):

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

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
Not entrenched

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
<input type="text" value="1.0 m"/>	<input type="text" value="45"/>	<input type="text" value="37"/>	<input type="text" value="49"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

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: Project #: 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 water on edge of woodland

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

Trigger Other: Comments

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)

Category 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240516 Project #: 46666-100 Recorder/Crew: VS + EP

Stream Name: _____ Stream Code: HDF1 Site Code: Reach 6

Site Limits: Upstream WP# _____ Downstream WP# _____ Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network

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) Wetland (6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 5 Elevation (cm): _____ Gradient (%): 1

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

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

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 <u>250 200 240</u>	1 2 3 <u>No flow</u>	1 2 3 _____	1 2 3 _____	1 2 3 _____

Can't measure safely

Sediment Transport Adjacent: None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)

Feature: Sheet Erosion (6) 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

Date: Project #: 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:

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

Trigger: Other: Comments

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

Category: 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:

Stream Name: Stream Code: Site Code:

Site Limits: Upstream UTM WP# E Downstream WP# N

Direction of Assessment: Upstream Downstream

Field Assessment: Sample 1 Sample 2 Sample 3

Unconnected HDF: Not connected to downstream network

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) 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	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> 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 (°):

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

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

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)
<input type="text"/>	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3
<input type="text"/>	<input type="text"/>	<input type="text" value="No Water"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sediment Transport Adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)

Feature Sheet Erosion (6) 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: 20240310 Project #: H6666-100 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 Meadow area

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments Dry Meadow

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: -Upstream VTM WP# Downstream 17 WP# Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 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) No Defined Feature (4) Channelized or Constrained (2) Tiled Feature (5) Multi-thread (3) Wetland (6) Swale (7) Roadside Ditch (8) 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 (°):

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

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
<input type="text" value="Dry"/>	<input type="text" value="Dry"/>	<input type="text" value="Dry"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sediment Transport Adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)
 Feature Sheet Erosion (6) 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

Date: Project #: 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 forested feature

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

Trigger Other: Comments

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)

Category 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream WP# Downstream WP# Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 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) 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 (°):
Dominant Substrate (S2.M3) Clay (Hard Pan) Silt Sand (0.06-2 mm) Gravel (22-66 mm) Cobble (67-249 mm) Boulder (250 mm) Bedrock
Sub-Dominant Substrate (S2.M3) Clay (Hard Pan) Silt Sand (0.06-2 mm) Gravel (22-66 mm) Cobble (67-249 mm) Boulder (250 mm) Bedrock
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)**
Sediment Transport Adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)
 Feature Sheet Erosion (6) 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)

yyyy/mm/dd

Unconstrained Headwater Drainage Feature Assessment

Pg. 2 of 2

Date: 20240704

Project #: 46666-100

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:

Feature has no water but lots of water in upstream wetland community
- Feature is moist but is not holding any water

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

Trigger Other:

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)

Category 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): Project #: Recorder/Crew:
 Stream Name: Stream Code: Site Code:
 Site Limits: Upstream Downstream WP# Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 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) 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 (°):

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

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

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
<input type="text"/>	<input type="text" value="20 25 24"/>	<input type="text" value="0 0 0"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Sediment Transport
 Adjacent None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)
 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

Date: yyyy/mm/dd

Project #:

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:

- is holding some water but relatively dry

Site Break Feature Type Feature Modifier Conditions Feature Vegetation Riparian Vegetation
Trigger Other: Comments:

Point Data Evidence (2) Reported but No Evidence (3)
Category (5)

Topping HPA
3rd
Visit

- POINT DATA KEY:**
- A Spring/upwelli
 - B Seepage area -
 - C Watercress - es
 - D Outlet (tile or oth
 - E Inlet (tile or other)
 - F Beaver dam - mea
 - G Manmade dam - m
 - H Other barrier to fish
 - I Potential contaminati
 - J Channel hardening - i
 - K Culvert - note type, siz
 - L Flow transition point D/
 - M Flow transition point M/S
 - N Flow transition point D-S
 - O Fish observed during non-
 - P Potential nutrient source
 - Q Dredging of channel
 - R Offline pond
 - S Other

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240704 Project #: 46666-100 Recorder/Crew: VS + ER
 Stream Name: _____ Stream Code: HDF1 Site Code: Reach 3
 Site Limits: Upstream WP# 475319 Field Assessment: Sample 1 Sample 2 Sample 3 Uncorrelated HDF: Not connected to downstream network
~~Downstream~~ 17 WP# 4753698
 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) Wetland(6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 1 — — Elevation (cm): 10 — — Gradient (°): —

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

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

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)
<u>—</u>	<u>—</u>	<u>No water</u>	<u>—</u>	<u>—</u>	<u>—</u>

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

Date: 20240407 Project #: L16666-100 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:

- Feature is bone dry

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

Trigger Other:

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240704 Project #: 466666-100 Recorder/Crew: Vr + FR
 Stream Name: _____ Stream Code: HDFI Site Code: Reach 4
 Site Limits: Upstream _____ WP# 475374 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 Downstream: 17 WP# 4753617
 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) Wetland (6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 11 — — Elevation (cm): 10 — — Gradient (°): —

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

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

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) No water **Wetted Depth (mm)** — **Hydraulic head (mm)** Dry **Volume (L)** — **Distance (m)** — **Time (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)

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

Date: Project #: 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:

- Very dry lots of gravel

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

Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240724 Project #: 466666-100 Recorder/Crew: Vs + Er
 Stream Name: _____ Stream Code: HDF1 Site Code: Reaches
 Site Limits: Upstream _____ WP# 475396 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 Downstream _____ WP# 4753581
 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) Wetland (6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 1 _____ Elevation (cm): 20 _____ Gradient (%): _____

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

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

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) Dry **Wetted Depth (mm)** No Water **Hydraulic head (mm)** Dry **Volume (L)** _____ **Distance (m)** _____ **Time (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)

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

Date: Project #: 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:

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240704 Project #: 46666-100 Recorder/Crew: VS + FB
 Stream Name: _____ Stream Code: HDF1 Site Code: Reach 6
 Site Limits: ~~Upstream~~ Downstream 17 WP# 475205 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network
 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) Wetland (6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> 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 (°):

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

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
<u>-99</u>	<u>45 51 80</u>	<u>0 0 0</u>	_____	_____	_____

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

yyyy/mm/dd

Date: 20240704

Project #: 40606-100

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:

- Lots of Duckweed in wetland
 - Lots of water in feature

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments Wetland

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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240704 Project #: 46666-14 Recorder/Crew: VS + ER
 Stream Name: _____ Stream Code: HDF1 Site Code: Reach 7
 Site Limits: 17 Upstream WP# 475363 Field Assessment: Sample 1 Sample 2 Sample 3
 Downstream WP# 4753490 Unconnected HDF: Not connected to downstream network
 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) Wetland (6) Forest (7)

Riparian Vegetation

0 - 1.5 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input checked="" type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 1 Elevation (cm): +5 Gradient (°): _____

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

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

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
<u>Dry</u>	<u>No Water</u>	<u>No Water</u>			

Sediment Transport

Adjacent	<input checked="" type="checkbox"/> None (1)	<input type="checkbox"/> Rill (2)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Gully (4)	<input type="checkbox"/> Outlet Scour (5)
Feature	<input type="checkbox"/> Sheet Erosion (6)	<input type="checkbox"/> Rill (2)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Gully (4)	<input type="checkbox"/> Outlet Scour (5)
	<input type="checkbox"/> Sheet Erosion (6)	<input type="checkbox"/> Rill and Gully (3)	<input type="checkbox"/> Instream Bank Erosion (7)	<input type="checkbox"/> Other (8)	<input type="checkbox"/> 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

Date: Project #: 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 Watercross Seepage Bubbling Stained Other:
 Fish Collection Absent Present Comment:

WP#	Photo #	Code	Category	Description

Additional Notes:

- Lots of gravel
 - very dry

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

Point Data Ongoing and Active (1) Historic Evidence (2) Reported but No Evidence (3)
 Category 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 Watercross - 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

Unconstrained Headwater Drainage Feature Assessment

Date (yyyy/mm/dd): 20240704 Project #: 46666-191 Recorder/Crew: VR + EP

Stream Name: _____ Stream Code: HDF1 Site Code: Reach 8

Site Limits: Upstream _____ Downstream 17 WP# 475338 Field Assessment: Sample 1 Sample 2 Sample 3 Unconnected HDF: Not connected to downstream network

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) 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	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
1.5 - 10 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
10 - 30 m	Left Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input checked="" type="checkbox"/> Forest (7)
	Right Bank	<input type="checkbox"/> None (1)	<input type="checkbox"/> Lawn (2)	<input checked="" type="checkbox"/> Cropped (3)	<input type="checkbox"/> Meadow (4)	<input type="checkbox"/> Scrubland (5)	<input type="checkbox"/> Wetland (6)	<input type="checkbox"/> Forest (7)

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

Distance (m): 1 — — Elevation (cm): +15 — — Gradient (°): —

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

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
No water	Dry	No water	—	—	—

Sediment Transport Adjacent: None (1) Rill (2) Rill and Gully (3) Gully (4) Outlet Scour (5)

Feature: Sheet Erosion (6) 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

Date: yyyy/mm/dd

Project #:

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:

Site Break Feature Type Feature Modifier Flow Conditions Feature Vegetation Riparian Vegetation
 Trigger Other: Comments

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

Environmental Management Plan (EMP)



August 19, 2024

MTE File No.: 46666-100

Michael Frijia
75 Blackfriars Street
London, Ontario N6H 1K8
michael@southsidegroup.ca

Dear Michael,

RE: Environmental Management Plan (EMP) for Talbot Village Subdivision Phase 8

Southside Construction Management Limited (the 'Proponent') has initiated the Draft Plan of Subdivision and Zoning By-law Amendment process for the residential development (the 'Project') at 3095 Bostwick Road in the City of London (the 'Subject Lands'). MTE Consultants has been retained to prepare an Environmental Impact Study (EIS) and Environmental Management Plan (EMP) for the proposed development. The EIS provides recommendations for avoidance and mitigation measures to protect adjacent significant natural heritage features. This EMP has been prepared to complement the EIS Addendum and provide the mitigation and monitoring recommendations in the order to be completed.

Based on the analysis of the Subject Lands in the EIS, the significant features identified on or adjacent to the Subject Lands are:

- Wetlands (Polygon 2 (MAM), Polygon 4 (MAS2), Polygon 5 (SWD3));
- Retained Woodland (FOD7); and
- Significant Wildlife Habitat
 - Terrestrial Crayfish (FOD7, MAS2, MAM)
 - Habitat for Eastern Wood-Pewee (FOD7)
 - Candidate Habitat for Snapping Turtle (MAM, MAS2, SWD3)

The EMP has been prepared to provide mitigation and monitoring recommendations by tasks related to contract implementation:

- Building
- Landscape and Trees – Development Area
- Erosion and Sediment Control
- Water Management
- Naturalization & Restoration

These general tasks have been further subdivided into the order to be completed as follows;

Pre-Construction

Pre-construction planning includes defining the project, identifying potential risks, and mitigation risks before development begins. The recommendations are to be completed prior to the initiation of construction activities.

During Construction

These recommendations are to be conducted from initiation of construction activities until a specified build-out stage as determined in consultation with the City of London. Should the proposed development become non-compliant with the EMP, immediate action shall be taken to ensure the correct implementation of mitigation measures in accordance with the EMP.

Activities that may result in negative impacts to natural heritage systems shall be halted as soon as the issue is identified.

Post-Construction

These recommendations, as provided in various drawings of the Site Plan submission, are to be carried out following construction until the end of the Assumption of Development Stage.

Site Plan Sources

Plans to be referenced are noted under each section and may be subject to change during the site plan application phase. The referenced documents are summarized below:

- Talbot Village – Phase 8 Grading Plan (Arcadis, July 2024)
- Hydrogeological Assessment – Talbot Village Phase 8 (EXP, 2024);
- Erosion and Sediment Control Plan (Arcadis, July 2024)
- Erosion and Sediment Control Guide for Urban Construction (Toronto and Region Conservation Authority, 2019);
- Design Specifications & Requirements Manual (City of London, 2019); and
- Environmental Management Guidelines (City of London, 2021).

Additional recommendations are also included and shaped by provincial and municipal policies to provide natural heritage support and protection.

1.0 CONSTRUCTION SITE MANAGEMENT

The following are recommendations related to the construction site management of the Subject lands and included in the updated 2024 EIS prepared by MTE.

1.1 Pre-Construction

MTE Recommendations

Recommendation 1.1.1:

Prior to conducting any work on site, project personnel and contractors should be made aware of the possible presence of Eastern Hog-nosed Snake and their protection under the *ESA, 2007*.

Recommendation 1.1.2:

Equipment should be cleaned prior to arrival on site including tires, undercarriage, and any part of the equipment that may transport invasive seeds to the site. Clean equipment protocols are provided by the Ontario Invasive Plant Council's Clean Equipment Protocol for Industry (Halloran, Anderson & Tassie, 2016) and London's Invasive Plant Management Strategy (2017) and should be followed where appropriate.

1.2 During Construction

MTE Recommendations

Recommendation 1.2.1:

Regular cleanup of the site must be completed during construction and post-construction to ensure the adjacent natural heritage features are not degraded.

Recommendation 1.2.2:

Dust abatement measures (e.g., watering) are recommended if site grading will occur during extended dry weather periods.

Recommendation 1.2.3:

Advise workers of potential encounters with wildlife during construction. If an animal enters the work site, work at that location will stop and the animal should be permitted to leave unharassed.

Recommendation 1.2.4:

Noise disturbance should be limited to allowable hours per the City of London Noise By-law (No.PW-12).

1.3 Post-Construction

MTE Recommendations

Recommendation 1.3.1:

The installation of educational signage on permanent fencing post-development is recommended to inform future landowner(s) of the significance of the adjacent features. Signage discussing the ecological value of the wetland areas and wildlife species present may be particularly effective. Some studies show the public are more likely to avoid damaging activities (ex: littering, trampling plants, dumping landscape waste) if they are aware of the link between their actions and the subsequent negative impacts, and if they feel they are responsible for the stewardship of a natural area (Gamman et al., 1995; Johnson and Van de Kamp, 1996). People are also more likely to respect a barrier if they understand the reason for it (Johnson, 1989).

Recommendation 1.3.2:

For the future development, provide homeowners with the “Living with Natural Areas” brochure published by UTRCA in 2005. This will help educate residents on appropriate ways to interact with natural areas and discourage damaging encroachment activities such as dumping landscape waste, using chemicals on lawns, mowing past residential boundaries, and creating trails.

Recommendation 1.3.3:

Exterior lighting should be fully shielded and pointed downward to minimize skyglow, glare and light trespass into the adjacent natural features.

2.0 TREES AND LANDSCAPE – DEVELOPMENT AREA

Recommendations in Section 2 relate to tree and vegetation removal as per the updated EIS prepared by MTE (2024).

2.1 Pre-Construction

MTE Recommendations

Recommendation 2.1.1:

Complete a Tree Preservation Report to inform tree protections and site design prior to earth or construction works. Include the surveyed locations of the large diameter natural heritage trees within the Tree Preservation Report.

2.2 During Construction

MTE Recommendations

Recommendation 2.2.2:

Tree removals should occur outside of the breeding bird nesting period (April 1 to August 31) unless a nest sweep confirms no active nests are present.

Recommendation 2.2.3:

Vegetation clearing, including grubbing, should occur when weather conditions are suitable to allow snakes to flee (sunny and at least 18°C). Vegetation clearing and grubbing should occur in an orderly and systematic manner to direct wildlife movement in one direction, and to reduce the possibility of wildlife encounters with equipment. Vegetation clearing will occur under the supervision of a qualified biologist to ensure no reptiles or other species at risk are harmed. Clearing of vegetation can occur without the supervision of a qualified biologist if it occurs during the inactive season (between December 1 and March 31) and no grubbing or below-ground works are undertaken. Vegetation clearing during the inactive season should be performed in a manner that avoids soil compaction; vegetation can be cleared by hand, or cleared while the soil is frozen with light machinery that is equipped to reduce compaction.

Recommendation 2.2.4:

Once vegetation has been cleared, geotextile fencing should be installed as snake exclusion barrier along the construction boundary. ESC fencing may function as exclusion fencing. The geotextile fence should be at least 1.0 meters high from grade at all locations and buried at least 0.2 meters below grade. Exclusion fencing should extend out from its terminal edges by a distance of at least 5 meters and angle out or back at a 45° angle (whichever is most beneficial) to direct wildlife away from the construction site. Installation of fencing during the active season (April 1 to November 30) will be supervised by a qualified biologist. Outside the active season, fencing may be installed without the supervision of a qualified biologist.

Recommendation 2.2.5:

To prevent entanglement of wildlife, including snakes, mesh or netting-type material must not be used for erosion control. Net-free materials, such as Curlex Net-Free blanket, riprap over geotextile fabric, or similar alternative is recommended.

Recommendation 2.2.6:

Between April 1 and November 30, all equipment and machinery that is left idle for over 1 hour, or overnight, on the property must be visually examined prior to (re)ignition, to ensure snakes are not present within the machinery. This visual examination should include all lower components of the machinery, including operational extensions and running gear.

Recommendation 2.2.7:

Any protected species that is encountered on site (not anticipated) must be protected from harm and harassment. Should a snake protected by the *ESA* be observed in the work area and

presumed to be unharmed, all project personnel and operating machinery should maintain a minimum 30-meter distance from it at all times until it has left the area. Contact MECP immediately if this cannot be done. A large Rubbermaid type container with ventilated lid should be kept on site at all times in the event a snake is injured or killed during the project. If an ESA-protected snake is injured, it should be immediately transported in the container to a licensed Wildlife Custodian. During transport, the snake inside the container should be maintained at a temperature between 10 and 30°C. MECP immediately if any protected snakes are harmed or killed during construction.

Recommendation 2.2.8:

The property should be clean and free of debris for any activities that occur during the active season for snakes (April 1 to November 30). Snakes may find and occupy materials and equipment stored on site and could be harmed when materials and debris are handled or used. The creation and duration of debris stockpiles within the development footprint should be limited. Materials such as excavated soils, lumber, and other construction materials should only be stored in areas that previously had understorey vegetation (1 m or shorter), mowed to a height of 5 cm or shorter. Excavated soil should not be stored on the sites long term. Flat materials such as plywood or rubber mats should not be left lying on the ground. Any material stockpiles created on the property during the project must be visually examined for snakes prior to disturbance or removal.

Recommendation 2.2.9:

Cleared areas should be maintained at a height of 7-10 cm. Allowing grass to grow greater than 15 cm in height could attract snakes to the construction sites.

Recommendation 2.2.10:

As per the *MBCA* (1994), it is recommended that any tree removals occur outside of the migratory breeding bird season (i.e., April 1 to August 31). If this window cannot be avoided, nest searches to determine the presence or absence of nesting birds or breeding habitat should be conducted until clearing is complete, or until August 31, whichever comes first.

Recommendation 2.2.11:

Where tree removal is proposed, removal of trees of any size should occur outside the bat maternity roost period, which is approximately May 1 to September 31. All trees proposed for removal must be assessed for bat habitat. This avoidance measure includes dead standing trees.

2.3 Post-Construction

MTE Recommendations

Recommendation 2.3.1:

Install fencing without gates along the rear of lots where lots are directly abutting the remaining woodland in the south and along the north. Material, height and style details should be determined in consultation with City of London staff.

3.0 SEDIMENT AND EROSION CONTROL

Recommendations in section 3 are from the updated EIS prepared by MTE (2024) and standard recommendations influenced by the TRCA Erosion and Sediment Control Guide for Urban Construction. The following standard erosion control recommendations should be included with the final site alteration plans. The ESC Plan (Arcadis, 2024) should also be followed in addition to these recommendations.

3.1 Pre-Construction

MTE Recommendations

Recommendation 3.1.1:

A multi-barrier approach for sediment and erosion control should be used for this development and contained within a project-specific ESC Plan. Prior to works on site, robust sediment and erosion control fencing should be installed in areas immediately adjacent to retained natural features and across low-lying areas prone to receiving overland runoff. The fencing will act as a barrier to keep construction equipment and spills away from vulnerable natural areas and features where sediment loading has the potential to negatively impact wildlife habitat.

Recommendation 3.1.2:

Sediment and erosion control fencing must be installed according to the City of London Design Specifications and Requirements Manual specifications (2019b), the Guidelines for Erosion and Sediment Control for Urban Construction Sites (TRCA 2019), and the applicable standards established in the Ontario Provincial Standard Specification/Ontario Provincial Standard Drawings (OPSS/OPSD) documents.

Recommendation 3.1.3:

Sediment and erosion control fencing should be inspected prior to construction to ensure it has been installed correctly and during construction to ensure that the fencing is being maintained and is functioning properly. Any issues that are identified are to be resolved in the same day.

3.2 During Construction

MTE Recommendations

Recommendation 3.2.1:

During construction, the lands between the sediment and erosion control fencing must be maintained. The fencing should remain in place until construction is complete and the remainder of the natural areas to remain are stabilized and/or naturalized.

Recommendation 3.2.2:

Site runoff over bare ground can generate considerable sediment movement beyond the construction limits. Until the lots have been vegetated and are stable for development adjacent to vegetation, site/lot runoff should be directed to nearby stabilized vegetated areas or ditches.

Monitoring Phase 1 – During Construction

The construction monitoring plan will monitor for construction-related impacts, document successes or deficiencies of the implemented mitigation measures and provide guidance on remedial actions for circumstances when mitigation is not successful. This plan should continue from clearing and grubbing through to the home building construction until rear yards and grounds adjacent to natural features are vegetated and stabilized. This plan will be developed during the detailed design stage. Reports should be made available to the appropriate staff at the City of London.

3.3 Post-Construction

MTE Recommendations

Recommendation 3.3.1:

Sediment and erosion control fencing should not be removed until adequate re-vegetation and site stabilization has occurred. Additional re-vegetation plantings and/or time for vegetation to establish may be required; however, two growing seasons are typically sufficient to stabilize most sites.

4.0 NATURALIZATION AND RESTORATION

This section provides MTE recommendations for the removal of wetland and subsequent proposed naturalized wetland compensation area and buffer.

4.1 Pre-Construction

MTE Recommendations

Recommendation 4.1.1:

An amphibian and reptile salvage plan should be developed for Polygons 4, 5, and the northeast SAS1 pond prior to removal. Species should be relocated to the existing wetland (Polygon 2) and created wetland habitat. A wildlife collection permit will be required for this work.

Recommendation 4.1.2:

The implementation of select non-infiltration based low impact development (LID) techniques to maintain surface water inputs into the natural features (i.e., provision of clean rooftop water) on the Subject Lands should be considered as part of the stormwater management plan.

4.2 During Construction

MTE Recommendations

Recommendation 4.2.1:

Wetland removal should occur outside of the breeding bird period (April 1 to August 31) to ensure maximum protection of species. Alternatively, a nest sweep can be completed prior to vegetation removal to ensure no active bird nests are present. If nesting birds are present, works in the area should not proceed until after August 31 or until the nest has been confirmed inactive (e.g., young have fledged).

Recommendation 4.2.2:

The wetland compensation area should begin to be established prior to wetland removal. This is recommended to allow for wildlife relocation and pumping of water to the compensation lands to help initiate wetland creation.

Recommendation 4.2.3:

Re-seed all disturbed areas as soon as possible to maximize erosion protection and to minimize the establishment of invasive species, which may spread to the adjacent natural features.

Monitoring Phase 1 – During Construction

As outlined in the Hydrogeological Assessment (EXP, 2024a) a development phase monitoring plan is proposed to start once development begins (i.e., grading) and continue until 80% build out is reach, as long as all wetland impact mitigation measures are in place. This plan will include:

- Water level measurements to be collected from SW Stations 2-4 four (4) times annually. Dataloggers installed during the pre-development monitoring are to remain in place and be downloaded four (4) times annually, during manual water level monitoring events.
- Collect two (2) surface water quality samples from SW Station 2 two (2) times annually (spring and fall) to cover variations across seasons and compare to pre-development conditions. Water quality analytical parameters should include, at a minimum, analysis of nitrates, sodium, chloride, phosphorus, turbidity, and total dissolved and suspended solids.
- Photo documentation of each of the existing monitoring stations (SW Stations 2-4) to be taken four (4) times annually, coinciding with the water level monitoring events.

Once the wetland compensation area has been established, an additional monitoring station (SW Station 5) should be installed, as follows:

- One (1) staff gauge (SG5) and one piezometer P5 will be installed and equipped with dataloggers in each for continuous water level monitoring. The installation timing of this monitoring station will depend on the construction timing.
- Once installed, water level measurements to be collected and dataloggers downloaded four (4) times annually. Monitoring is to coincide with the existing monitoring program for SW Stations 2-4.
- Once installed, photo documentation four (4) times annually, coinciding with the water level monitoring events.

After each water level and quality sampling round, the results will be charted to compare to historical results. Monitoring Summary Reports will be prepared and provided by EXP to the Proponent on an annual basis.

4.3 Post-Construction

Refer to the EIS (MTE, 2024) for wetland compensation area creation details. A detailed wetland design will be development as part of detailed design.

Recommendation 5.3.1:

The wetland buffer and compensation area should be actively naturalized with pollinator-friendly native seed mixes and native shrub species to support the ecological function of the area. Plant species should be native to Ecoregion 7E and appropriate for the soil conditions and water depths present.

Monitoring Phase 2 – Post Construction

Long-term post-construction monitoring shall evaluate the success of the proposed encroachment prevention strategies, wetland compensation creation and invasive species management. This plan should include remedial actions that are triggered if effects exceed pre-determined thresholds. Monitoring requirements should be finalized at the detailed design stage in consultation with City of London staff. The post-construction monitoring plan is proposed to include the following.

Buffer and Wetland Naturalization – Vegetation Monitoring Plan

- Complete vegetation monitoring in the created wetland and associated buffer over three years (monitor in Year 2 and 3 coordinated with hydrogeological monitoring) after

enhancement efforts to document compliance with a prepared landscape plan. Monitoring in Year 1 by the landscape contractor should document success of seed germination/cover and tree/shrub installation and confirm the correct seed mixes and trees/shrubs species were used. Monitoring in Years 2 and 3 should document plant establishment and growth through completion of a floral inventory through one visit conducted by a qualified professional during the growing season.

- Implement adaptive management strategies such as supplemental plantings and or control of non-native invasive species if required. Adaptive management may be triggered by poor survival of planted material (triggered at <80% survival of seeded species or woody materials), insufficient vegetation cover (triggered at <80% if planted at 100%) and the presence of unacceptable invasive species (triggered at >20% invasive groundcover; 80% non-native/native is target)
- Adaptive management strategies within the wetland buffer and created wetland habitat will depend on the issue encountered but may include:
 - Removal of invasive species with a species-specific method outlined in the Best Management Practices (BMPs) from the Ontario Invasive Plant Council. These may include biological, physical/mechanical, chemical management strategies or a combination of strategies;
 - Re-seeding with a target seed mix;
 - Re-planting of dead trees/shrubs or other plant materials; and
 - Increased monitoring frequency or length (e.g., adding monitoring in Year 4).
- Inventory invasive plants throughout the ecological monitoring period. This should include identification of invasive species type, location and abundance within the wetland buffer and created wetland feature as well as a record of completed management strategies.

Wetland Habitat Monitoring Plan

- Complete targeted searches for Terrestrial Crayfish (i.e., visual survey for chimneys) in Years 2 and 3 to confirm presence/absence. Habitat suitability is to be reviewed in collaboration with groundwater level monitoring.

Encroachment Monitoring Plan

- Encroachment monitoring should be completed for two years (Years 2 and 3) in coordination with the wetland monitoring. Monitoring should focus on the wetland compensation area and remaining woodland. Observations should include looking for litter in natural features, dumping of yard waste, informal trail creation, fence damage and other impacts.
- If encroachment is an issue post-construction, additional strategies should be implemented. The strategy should be tailored to the issue but may include additional signage, fences, monitored garbage cans along the multi-use pathway, additional landowner awareness, or other identified strategies.

Wetland Hydrogeology Monitoring Plan

Implement the post-construction wetland monitoring plan from the Hydrogeological Assessment (EXP, 2024). This plan should be referenced directly, but includes the following:

- Water level measurements to be collected from SW Stations 2-4 and from the newly installed SW Station 5 in the compensated wetland area four (4) times annually for three (3) years, in coordination with the ecological monitoring plan. Dataloggers installed during the pre-development and development monitoring are to remain in place and be downloaded four (4) times annually, during manual water level monitoring events.
- Collect surface water samples from SW Station 2 and the new wetland compensation area two (2) times annually (spring and fall) for three (3) years. Water quality analytical parameters should include, at a minimum, analysis of nitrates, sodium, chloride, phosphorus, turbidity, and total dissolved and suspended solids.
- Photo documentation of each of SW Station 2-5, to be completed four (4) times annually for three (3) years.

After each water level and quality sampling round the analytical results will be charted to compare to historical results. Monitoring Summary Reports will be prepared and provided to the Client on an annual basis.

During and post-construction monitoring will evaluate changes to water levels and potential impacts to the wetland features and functions as a result of substantial changes to water levels (i.e., deviations from 'typical' conditions in consideration of climatic data). If deviations from the norm are not the result of climatic conditions, the Client and UTRCA will be notified, and appropriate mitigation measures will be implemented. The level of significance of the detrimental impacts to the wetlands will be determined by assessing the magnitude and duration of change within surface water measurements. Potential adverse impacts to wetland vegetation, flora and wildlife habitat related to hydrogeology will be assessed via the ecological monitoring plan with appropriate mitigation measures identified in the annual reports.

CONCLUSION

This Environmental Management Plan has provided recommendations to protect the adjacent significant natural heritage features from both direct and indirect impact, through avoidance, mitigation, management, and monitoring. Timelines (pre-, during, and post-construction) have been outlined. Provided these recommendations are followed, it is our option that the proposed development will have no significant impacts on the adjacent natural heritage features.

Yours Truly,

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