Strada Pit/Quarry

Natural Environment Assessment

Prepared for:

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NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Strada Pit/Quarry

Natural Environment Assessment

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1.0 Introduction

Natural Resource Solutions Inc. (NRSI) was retained by Strada Aggregates Inc. to complete a Natural Environment Assessment (NEA) associated with a planned application for below-water table bedrock extraction on their lands in Melancthon Township, Dufferin County. The proposed area of extraction, referred to as the Strada Pit/Quarry, will be located within the footprint of the existing Melancthon Pit, which operates as a Category A pit that is licensed under the *Aggregate Resources Act* (ARA) to extract sand and gravel aggregate from above the water table.

The Melancthon Pit has been operational for 23 years, and over that time has expanded into new extraction phases that span four adjacent properties that are owned by Strada Aggregates. The first of these properties that was extracted (in 2001) is referred to as Melancthon Pit #1. The southernmost property, where extraction was initiated in 2014, is referred to as Melancthon Pit #2. The other two Strada-owned properties are referred to as the former Prince and Bonnefield properties; for the purposes of this report these properties are named after their former owners. Extraction activities expanded on to the former Bonnefield property in 2020, while the northernmost former Prince property is currently in agricultural land use and is planned for future extraction. All four properties are licensed for above-water table extraction under the ARA. For the purposes of this report, the Strada properties are collectively referred to as the "subject lands".

The subject lands are located within a largely agricultural landscape that is interspersed with natural features including wetlands, woodlands and watercourses. This area provides headwater contributions to the Nottawasaga River, and is located nearby to the upper Grand River watershed, approximately 2km to the west. The subject lands themselves straddle the topographical divide between the Boyne River and Pine River subwatersheds, which each flow into the Nottawasaga River downstream. Large wetland complexes associated with these headwaters occur on the landscape, and include the Melancthon Provincially Significant Wetland (PSW) Complex #1 to the west, the Terra Nova PSW complex to the east, and several unevaluated wetlands in between. The area surrounding the subject lands is well known for its coldwater watercourses, which supports coldwater species, including Brook Trout (*Salvelinus fontinalis*). Several of these natural features are identified as part of the provincial Natural Heritage System (OMMAH 2020), as significant features in municipal Official Plans (OP) (County of Dufferin 2017, Township of Melancthon 2017), and are regulated by the

Nottawasaga Valley Conservation Authority (NVCA) as described further below. See Map 1 for the location of the subject lands in the context of these adjacent natural features.

NEA reporting is required as part of a license application to the Ontario Ministry of Natural Resources (OMNR) under the provincial ARA. In order to address the requirements of the *Planning Act*, this reporting will also be completed to satisfy the County of Dufferin and Township of Melancthon requirements for an EIS. The *Planning Act* requirements must be fulfilled in regards to a necessary Official Plan Amendment and Zoning Bylaw Amendment application to the Township of Melancthon. An NEA is required to ensure that the proposed pit/quarry operation will not negatively impact the natural features or ecological functions on and adjacent to the subject lands.

Technical studies, addressing other aspects of the NEA such as quarry design and operations planning, and hydrological/hydrogeological assessment and modelling, have been prepared by the study team and have been used to supplement the natural feature characterization and inform the impact assessment. Other members of the study team comprise the following:

- Strada Aggregates (proponent)
- MHBC Planning
- Earthfx Inc.
- Tatham Engineering

This report summarizes background information on natural heritage features, as well as results of field surveys completed within the project study area. This information was used to

1) define natural features on the subject lands as potential development constraints for the proposed operation based on significance and sensitivity of the features, to inform facility design and operational planning, and;
2) characterize the external lands' natural features, with a focus on features and functions that could be influenced by hydrological and hydrogeological regimes (e.g., dependent on groundwater inputs), to determine their relationship to surface and groundwater resources, assess their ecological sensitivity, and assess impacts to these features that could result from changes in the hydrological or hydrogeological regimes.

The impact assessment has been completed at two scales. One scale addresses site-level impacts (direct, indirect and operational-stage human-induced impacts) within the subject lands that were determined by comparing details of the proposed pit/quarry design and operation

against the existing on-site natural features. The other scale addresses broader-scale indirect impacts that could occur to the adjacent natural features surrounding the subject lands as a result of potential changes to the surface water or groundwater regimes. The latter level was informed by the results of hydrological/hydrogeological modelling completed by Earthfx. Recommendations have been provided to avoid, or otherwise minimize or mitigate impacts to on-site and adjacent natural features.

1.1 Identification of the Study Area and Priority Natural Features

In 2021, an Original Study Area (Appendix I) was identified for the NEA study. Modelling data from Earthfx was not initially available to define the boundaries of the Original Study Area (in terms of extent and distance of potential hydrological/hydrogeological effects on landscape features). As a conservative approach, NRSI biologists therefore identified an Original Study Area that was relatively large, with Priority Natural Features (hereafter referred to as NAT complexes, and labelled as NAT-XX on all maps) on the surrounding landscape. These include features within both the Pine and Boyne River subwatersheds, as well as features that are directly upstream and downstream of prevailing groundwater flows under the Strada lands. NAT complexes include ecologically important headwater areas, often comprising large wetland complexes as well as watercourses and other drainage features. The groundwater-surface water interaction in these areas was thought to be important to maintaining the existing hydrological balance and aquatic thermal regimes that support these ecological communities and species habitats. In total, 21 NAT complexes were initially identified within the Original Study Area during field surveys that were completed in 2021. Prior to the start of 2022 field surveys, certain NAT complexes (NAT-05, NAT-06, NAT-07, NAT-08, NAT-09, NAT-10, NAT-11, NAT-12, NAT-13, NAT-17, NAT-22) that were located furthest downstream were excluded from the 2022 Study Area moving forward since it was determined by the Project Team, based on preliminary modelling, that those natural features would not experience any discernable effects from quarry operation even under a no-mitigation scenario. In addition, three additional NAT complexes (NAT-19, -20, and -21) were added to the Study Area for 2022 field survey season, which had not been investigated in 2021.

The limits and composition of the NAT complexes were not based on any specific criteria, but were rather determined based on NRSI biologist experience and professional judgement as a means of grouping natural feature units (particularly wetland units with associated watercourse segments) for the purposes of distinguishing and differentiating natural features that are

distributed throughout various portions of the Study Area. The boundaries of these NAT complexes were delineated using original OMNR wetland mapping and other natural feature shapefile data. For consistency those boundaries have been retained for use in this report, but through the completion of NRSI field surveys and natural feature mapping, adjacent natural features have been identified that fall just outside of NAT complex boundaries, but are still in considered in the context of discussing the NAT complex natural features generally.

See Map 1 for the locations of the NAT complexes that were investigated in 2022 and will be the focus of assessment in this report. Herein, the term “Study Area” refers to the NAT complexes that were surveyed in 2022, as presented in Map 1. The Study Area encompasses an area that extends up to approximately 3.5km west, 1.5km north, 3.0km east, and 2.0km south of the subject lands. For the purposes of this study, “external lands” refers to lands surrounding the subject lands that were investigated as part of this study, to determine the potential for off-site impacts to surface water and groundwater resources.

1.2 Study Objectives

NRSI completed a NEA to identify natural environment features and potential significant species habitats that require consideration in the completion of impact studies associated with the proposed quarry operations. This NEA was completed in two phases.

In Phase 1, NRSI biologists identified and mapped several wetlands, woodlands, and aquatic features on the landscape within the Original Study Area (Appendix I). These included significant features, such as PSWs, unevaluated wetlands and watercourses. NRSI also completed a review of existing natural heritage information to identify key natural heritage features and species that are known or have potential to occur within the Study Area.

In Phase 2, NRSI completed a more detailed characterization of the NAT complex natural features within the Study Area. A more detailed understanding of these features and their ecological functions was required to better understand their level of sensitivity to hydrological and/or hydrogeological change potentially caused by the proposed quarry operations. Data collected through this work will also contribute to baseline monitoring data that will be used in comparing against future operational-stage monitoring phases such that potential negative impacts to natural features can be identified and appropriately mitigated.

Detailed site characterization was also completed for the subject lands for the purposes of identifying development constraints and sensitive ecological features. This information would

be used to inform the layout and operational design of the pit/quarry, such as the extraction limits and planned infiltration facilities. The results of previous field studies completed by NRSI within the subject lands (NRSI 2017, 2022, 2023) have been incorporated into this assessment and supplemented with field survey data collected for this study. Previous NRSI vegetation community mapping for the subject lands (NRSI 2010, 2017) was updated based on 2022 site characterization studies.

2.0 Relevant Policies, Legislation and Planning Studies

2.1 Dufferin County Official Plan

The Dufferin County OP (2017) identifies known natural heritage features, including features protected under provincial plans within the county that form the basis of a county Natural Heritage System.

PSWs (also designated on Schedule B), Areas of Natural and Scientific Interest (ANSIs), woodlands, and unevaluated wetland natural heritage features are designated under Schedule E. Development and site alteration is not permitted in Significant Woodlands, Significant Wildlife Habitat (SWH), significant ANSIs, or on lands adjacent to a PSW unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions (through an EIS). Development and site alteration is not permitted in fish habitat or in habitat or Endangered and Threatened species, except in accordance with provincial and federal requirements.

Significant mineral aggregate resources (sand and gravel resource area) are designated under Schedule D. Under section 4.2.2.1.c) of the County OP, mineral aggregate resource operations shall be protected from development and activities that would preclude or hinder their expansion or continued use or which would be incompatible for reasons of public health, public safety, or environmental impact.

Schedule E1 of the County OP includes the Provincial Plan natural heritage systems, as well as the natural heritage features and areas that are identified on Schedule E. This schedule includes the Escarpment Natural Area and Escarpment Protection Area.

2.2 Melancthon Township Official Plan

The Natural Heritage System within the Township is primarily comprised of features designated Environmental Protection or with an Environmental Conservation overlay designation as illustrated in the Official Plan (2017) Schedules A-1 and B.

The Environmental Conservation overlay designation on Schedules A, B, and C includes or is intended to include the following the natural heritage features and areas:

- locally significant and unevaluated wetlands
- significant woodlands
- significant wildlife habitat

- significant areas of natural and scientific interest
- habitat of endangered species and threatened species
- fish habitat

Section 3.4.2 states that an Environmental Impact Study is required for developments or site alterations involving sites in and most sites adjacent to the Environmental Protection or Environmental Conservation overlay designation, and for most developments in wellhead protection areas, in the vicinity of watercourses, or in or near areas of high aquifer vulnerability as shown on Schedule E.

Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

Development may be permitted on lands adjacent to a PSW if it does not result in a loss of wetland function or area, subsequent demand for future development which will have negative impacts on existing wetland functions, or conflict with existing site-specific wetland management practices.

2.3 Conservation Authority Regulation

The Study Area contains the jurisdictional authorities of the NVCA and the Grand River Conservation Authority (GRCA). A small western section of the Study Area (corresponding to NAT-21) falls within the GRCA jurisdiction while the remaining majority of the Study Area falls within NVCA's jurisdiction.

Portions of the Study Area are regulated by the GRCA and NVCA under Ontario Regulation 41/24 of the *Conservation Authorities Act*. Development and site alteration within the regulated lands is prohibited unless permitted by the applicable conservation authority under the policies of the regulation. However, if an activity is authorized under the ARA, a permit is not required. Regulated features within the Study Area include floodplain, valley and slope erosion hazards, wetland and meander belt hazards, and their regulatory safety allowances (GRCA 2015, NVCA 2009).

2.4 Aggregate Resource Act

The *Aggregate Resource Act* (Ontario Regulation 244/97) provides for the management of Ontario's aggregate resources and controls and regulates aggregate operations on Crown and

private lands. It supports the rehabilitation of previously aggregate-excavated lands and minimizing adverse impacts on the environment.

As per *the Aggregate Resources of Ontario: Technical Reports and Information Standards* (OMNR 2020), applications for a Class A, Class B license, or an aggregate permit must include several technical reports, including a Natural Environment Report. The Natural Environment Report must identify several natural heritage features and areas that exist on and within 120m of the site, including significant wetlands, fish habitat, significant woodlands, habitat of endangered species and threatened species, significant wildlife habitat, and significant ANSIs.

2.5 Provincial Planning Statement

The 2024 Provincial Planning Statement (OMMAH 2024) provides direction on matters of provincial interest with respect to land use planning and developments that are subject to the provincial *Planning Act*. It supports improved land use planning and management, contributing towards a more effective and efficient land use planning system while protecting resources of provincial interest, including, but not limited to, the natural environment. Of relevance to this project and its Study Area natural features are the following policies:

- Section 4.1.2:
    - The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features
- Section 4.1.4:
    - Development and site alteration shall not be permitted in significant wetlands in Ecoregion 6E
- Section 4.1.5:
    - Development and site alteration shall not be permitted in Significant Wildlife Habitat or Significant Woodlands unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.
- Section 4.1.6:

    - Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements.

- Section 4.1.7:
    - Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

- Section 4.1.8:
    - Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 4.1.4, 4.1.5 and 4.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

- Section 4.5.2.2:
    - Mineral aggregate extraction shall be undertaken in a manner which minimizes social, economic, and environmental impacts.

- Section 4.5.3.1, in regards to mineral aggregate resources:
    - Progressive and final rehabilitation shall be required to accommodate subsequent land uses, to promote land use compatibility, to recognize the interim nature of extraction, and to mitigate negative effects to the extent possible. Final rehabilitation shall take surrounding land use and approved land use designations into consideration.

2.6 Fisheries Act

The *Fisheries Act* provides for the conservation and protection of fish and fish habitat and pollution prevention by prohibiting the “harmful alteration, disruption or destruction of fish habitat” and protects against the “death of fish, other than by fishing”. To ensure compliance with relevant provisions included in the *Fisheries Act*, Fisheries and Oceans Canada (DFO) facilitates review of proposed works, undertaking, and activities that may affect fish and fish habitat through the Fish and Fish Habitat Protection Program. Proponents are responsible for assessing their projects for their potential to negatively impact fish and fish habitat through a self-screening process. DFO provides measures to protect fish and fish habitat and several codes of practice that may be incorporated into project design. If there is the potential to

contravene the provisions within the *Fisheries Act*, then the project needs to be submitted to DFO for review and approval, which may include a Letter of Advice or a *Fisheries Act* Authorization.

The Study Area contains several watercourses that provide, or have the potential to provide, direct fish habitat. Project design will need to consider these features and should attempt, to the extent possible, to mitigate the harmful alteration, disruption, or destruction of fish habitat and fish mortality.

2.7 Endangered Species Act

The *Endangered Species Act* (ESA) prohibits the killing, harming, harassing, or capturing of species that are listed as Endangered or Threatened in the Species at Risk in Ontario list (MECP 2024). It also protects the regulated or general habitats of these species from damage or destruction. Activities that would otherwise be in violation of the ESA may be permitted by the Ontario Ministry of Environment, Conservation and Parks (MECP), such as in accordance with Section 17(2)(c) of the ESA. Activities may also be authorized in accordance with Ontario Regulation 242/08, as applicable to certain SAR, certain activity types, and provided various conditions are met.

As described in Section 5.1, various SAR have potential to occur within the Study Area based on the results of the SAR/SCC screening described in Section 3.3.

2.8 Migratory Birds Convention Act

The federal *Migratory Birds Convention Act* (MBCA) protects populations of, and individual, migratory bird species as listed under the Act, as well as their eggs and nests. The MBCA enacts various prohibitions, including but not limited to the disturbance, destruction, or taking of a nest or eggs of migratory birds. In the context of this NEA, this primarily applies to the removal of trees, other vegetation, or structures that may contain migratory birds or their active nests.

3.0 Summary of Background Information

A review of existing natural heritage information was completed to identify natural heritage features and species that are known or have potential to occur within the Study Area. Requests for background information were sent to the OMNR Midhurst District and the NVCA. The OMNR provided a response on November 1, 2021.

Background information relevant to the study was also collected and reviewed from sources including the following:

- Land Information Ontario (LIO) Natural Heritage Make-a-Map base mapping and Natural Heritage Information Centre (NHIC) online database (OMNR 2023);
- GRCA *Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* (2015);
- NVCA *Planning and Regulation Guidelines* (2009);
- Dufferin County OP (County of Dufferin 2017);
- Melancthon Township OP (Township of Melancthon 2017);
- *Species at Risk Act* Registry (Government of Canada 2024);
- Ontario Breeding Bird Atlas (OBBA) (BSC et al. 2008);
- Ontario Reptile and Amphibian Atlas (ORAA) (Ontario Nature 2019);
- Ontario Odonata Atlas Database (OOAD) (OOAD 2023);
- Atlas of the Mammals of Ontario (Dobbyn 1994);
- DFO Aquatic Species at Risk Mapping (DFO 2022);
- NVCA online mapping (2021a);
- GRCA online mapping (2021);
- Ontario Butterfly Atlas (Macnaughton et al. 2023); and,
- Highland Quarry Aggregate Resource Area application (Stantec 2011).

3.1 Mapped Significant Natural Features

3.1.1 Wetlands

3.1.1.1 Provincially Significant Wetlands

Melancthon Wetland Complex #1

The Melancthon Wetland Complex #1 is within Dufferin County in the Township of Melancthon. It is a single contiguous wetland of 55.7ha in size (OMNR 1983) (Map 1). Its soil is made up of 100% clays, loams or silts (mineral). It is predominantly a swamp wetland type (65%), with some carr features (35%).

The Melancthon Wetland Complex #1 occasionally contains commercial fish (i.e., baitfish and/or coarse fish). It is also known to contain Muskrat (*Ondatra zibethicus*) and Northern Raccoon (*Procyon lotor*). The wetland feature provides good winter cover for Northern Raccoon and upland game and has unknown significance for fish spawning and rearing habitat (OMNR 1983).

Terra Nova Wetland Complex

The Terra Nova Wetland Complex is within Dufferin County in the Township of Mulmur. Based on OMNR background information, it is a wetland complex comprised of nine individual wetlands, with a total size of 435ha. Its soil is made up of 70% clays, loams or silts (mineral), and 30% organic material. It is predominantly a swamp wetland type (94%), with some marsh features (6%). Fifty-one (51) to 100% of the wetland area has mature trees (i.e., >10cm diameter at breast height and >25% cover) (OMNR undated a).

The Terra Nova Wetland Complex is not abundant with, or only occasionally contains, commercial fish (i.e., baitfish and/or coarse fish). However, it is known to contain American Bullfrog, Snapping Turtle (*Chelydra serpentina*), Mink Frog (*Lithobates septentrionalis*), Magnolia Warbler (*Setophaga magnolia*), Muskrat, Northern Raccoon, Beaver (*Castor canadensis*), American Mink (*Neovison vison*), Red Fox (*Vulpes vulpes*), Coyote (*Canis latrans*), and Brook Trout (*Salvelinus fontinalis*). The feature contains Northern Harrier (*Circus hudsonius*) breeding or feeding habitat and is an active feeding area for nesting colonial waterbirds. It is also of local significance for waterfowl production and holds regional significance for spawning and rearing habitat for Rainbow Trout (*Oncorhynchus mykiss*) and Brook Trout (OMNR undated a).

3.1.1.2 Unevaluated Wetlands

The majority of the wetlands found within the Study Area are unevaluated wetlands according to OMNR mapping (OMNR 2023). These wetlands are widespread throughout the Study Area, which is indicative of the Study Area's location within the headwaters of the Pine River and Boyne River subwatersheds. These mapped wetlands range in size from relatively small features (e.g., approximately 0.5ha) to large contiguous wetland units (e.g., approximately 90ha).

Wetlands within the Study Area are regulated by the NVCA where they meet the definition of "wetland" as stated in Section 4.7 of the NVCA's *Planning and Regulations Guidelines* (2009). Wetlands within the Study Area are also regulated by the GRCA where they meet the definition of "wetland" as stated in Section 8.4 of the GRCA's *Policies for the Administration of the Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation* (2015). Unevaluated wetlands are mapped in Schedule E of the Dufferin County OP. "Locally Significant and Unevaluated Wetlands" are also illustrated on Schedule D of the Melancthon Township OP (2017).

3.1.2 Woodlands

Woodland cover is abundant within the Study Area, but occurs within a matrix of agricultural lands that dominate the landscape. As a reflection of the several headwater wetlands that occur within the Study Area, many of the woodland features correspond to treed swamp communities as mapped by the OMNR (OMNR 2023) and verified through NRSI site investigations.

Schedule E of the County OP maps the presence of woodlands throughout the Study Area. The County OP does not map Significant Woodlands or provide specific criteria to determine the significance of woodlands, but instead refers to the definitions provided in the Natural Heritage Reference Manual (OMNR 2010) and local municipal official plans (County of Dufferin 2017).

Significant Woodlands are mapped on Schedule E of the Melancthon Township OP. These primarily comprise woodlands 20ha or greater in size. Some woodland areas designated as Significant Woodland within Schedule E of the OP are less than 20ha, but have other important features such as a location either near other woodlands, in a headwater area, or in a linkage feature between other natural heritage features and areas. Significant Woodlands are considered a form of "Environmental Conservation" as defined and mapped in the Township OP (Township of Melancthon 2017).

Background information resources were reviewed to inform the mapping of woodlands within the project Study Area. Woodland cover was also mapped within the subject lands as part of previous studies in support of Strada Aggregates pit license applications (NRSI 2010, 2017) and updated as part of this study. With the exception of the subject lands, terrestrial (i.e., non-wetland) woodlands are mapped and have been generally characterized to inform the overall context of natural feature cover within the Study Area. However, these terrestrial woodlands on external lands within the Study Area are generally not expected to be indirectly impacted by quarry operations through changes in hydrology or hydrogeology, except where specified in the impact assessment. For this reason, they are not a primary focus of the field surveys and feature characterizations.

3.1.3 Watercourses

The watercourses that occur across the Study Area include a variety of ephemeral, intermittent, and permanent features. In general, the features that exist east of 4th Line and north of County Road 17, which include the lands to the north and east of the subject lands, are within the Pine River subwatershed. These include headwater tributaries to, and the mainstem of, the Pine River. Features that exist south of County Road 17 and to the immediate west of the subject lands are within the Boyne River subwatershed and flow southeast and east as headwater tributaries to, and the mainstem of, the Boyne River. Many of the tributaries exhibit some level of impairment as they flow across a landscape dominated by agricultural fields, which include online ponds. However, watercourse conditions improve to a more unimpaired condition as they enter the Niagara Escarpment area (NVCA 2018a, b).

Although the condition of many watercourses within the Pine and Boyne River subwatersheds are suboptimal, many of the tributaries, including the mainstems of both rivers, provide productive trout habitat that support healthy trout populations in addition to supporting a variety of other cool- and warmwater fish species, as noted in Section 5.0. The main branches of the Pine River and Boyne River support resident and migratory trout populations, including both Brook Trout and Rainbow Trout, while the headwaters and some escarpment tributaries support Brook Trout populations (NVCA 2018a, b). Where they exist, these trout populations are supported in part by groundwater inputs to the watercourses, which help to maintain relatively consistent water temperatures throughout the year. This is particularly important for Brook Trout, which rely on cold, clean water throughout the summer months and areas of groundwater upwelling for spawning and incubation through the fall and winter months (Scott and Crossman 1998).

3.2 Significant Wildlife Habitat Screening

NRSI conducted a screening for the presence of SWH in the Study Area. The Significant Wildlife Habitat Technical Guide (SWHTG) is a guideline document that outlines the types of habitats that the OMNR considers significant in Ontario as well as criteria to identify these habitats (OMNR 2000, OMNR 2015a). The SWHTG groups SWH into four broad categories: seasonal concentration areas, rare vegetation communities and specialized wildlife habitat, habitats of SCC, and animal movement corridors. This screening involved the comparison of OMNR criteria outlined for Ecoregion 6E, in which the Study Area is located, against habitats known to occur in the Study Area. With the exception of the subject lands, where direct impacts to natural features may occur through creation of the quarry, this study is primarily focused on SWH that could be indirectly impacted by changes in hydrological or hydrogeological regimes (e.g., amphibian breeding habitat, marsh bird breeding habitat, turtle overwintering habitat, seeps and springs).

Table 1. Candidate Significant Wildlife Habitat Preliminary Screening Results provides a summary of SWH types that were considered Candidate SWH for the Study Area external lands (i.e., *outside of the subject lands),* as well as within the subject lands to inform the need for further assessment.

Table 1. Candidate Significant Wildlife Habitat Preliminary Screening Results

Significant Wildlife Habitat Type	Study Area External Lands	Subject Lands
Waterfowl Stopover and Staging Areas (Terrestrial)	X	
Waterfowl Stopover and Staging Areas (Aquatic)	X	
Shorebird Migratory Stopover Area	X	
Raptor Wintering Area	X	
Bat Maternity Colonies	X	X
Turtle Wintering Area	X	
Snake Hibernaculum	X	X
Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)	X	X
Deer Yarding Areas	Confirmed	
Deer Winter Congregation Areas	Confirmed	
Waterfowl Nesting Area	X	
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	X	
Woodland Raptor Nesting Habitat	X	
Turtle Nesting Area	X	X
Seeps and Springs	X	
Amphibian Breeding Habitat (Woodland)	X	X
Amphibian Breeding Habitat (Wetland)	X	X

Significant Wildlife Habitat Type	Study Area External Lands	Subject Lands
Woodland Area-Sensitive Bird Breeding Habitat	X	
Marsh Bird Breeding Habitat	X	X
Open Country Bird Breeding Habitat	X	
Shrub/Early Successional Bird Breeding Habitat	X	
Terrestrial Crayfish	X	X
Special Concern and Rare Wildlife Species		
Wood Thrush (*Hylocichla mustelina*)	X	X
Grasshopper Sparrow (*Ammodramus savannarum*)	X	
Upland Sandpiper (*Bartramia longicauda*)	X	
Canada Warbler (*Cardellina canadensis*)	X	X
Eastern Wood-pewee (*Contopus virens*)	X	X
Barn Swallow (*Hirundo rustica*)	X	X
Blue-winged Teal (*Spatula discors*)	X	
Snapping Turtle (*Chelydra serpentina*)	X	X
Monarch (*Danaus plexippus*)	X	X
Riffle Snaketail (*Ophiogomphus carolus*)	X	
Floating Crystalwort (*Riccia fluitans*)	X	X
Amphibian Movement Corridors	X	X
Deer Movement Corridors	X	

Deer Yarding Areas and Deer Wintering Congregation Areas (Stratum 1 and Stratum 2, respectively) have been mapped by the OMNR within the vicinity of the Study Area, mainly occurring to the east but incorporating a portion of NAT-16. Deer Yarding Areas SWH and Deer Winter Congregation Areas SWH have therefore been confirmed as present within the Study Area (Map 1).

See Appendix II for the initial desktop-level SWH screening tables that were prepared to inform this study, including rationale as to whether the SWH types are considered “candidate”, “confirmed”, or not present within the focused Study Area. Updated assessments of SWH presence, based on the results of field investigations and specific to individual NAT complexes, are presented in Section 5.0.

3.3 Species at Risk Habitat Screening

Species at Risk (SAR) are those listed on the Species at Risk in Ontario List (MECP 2024). These include species identified by the Committee on the Status of Species at Risk in Ontario (COSSARO) as provincially Endangered, Threatened, or Special Concern. Species listed as Endangered or Threatened are protected under the ESA, which includes protection to their regulated or general habitat.

Species considered Special Concern are included in the definition of Species of Conservation Concern (SCC), which includes the following:

- Species designated provincially as Special Concern,
- Species that have been assigned a conservation status (S-Rank) of S1 to S3 or SH by the Natural Heritage Information Centre (OMNR 2021); and,
- Species that are designated federally as Threatened or Endangered by the Committee for the Status of Endangered Wildlife in Canada (COSEWIC) but not provincially by the COSSARO. These species may be protected by the federal SARA if they are listed as Threatened or Endangered on Schedule 1 of the SARA.

Habitat for SCC is considered Significant Wildlife Habitat (SWH) (OMNR 2010), which is afforded protection under the Provincial Planning Statement (OMMAH 2024) and municipal natural heritage protection policies. For the purposes of this report, the term “SAR” will refer to provincially Threatened and Endangered species regulated under the ESA while provincial species of Special Concern will be considered SCC.

Although all SAR are considered in this study where impacts to the individuals or their habitats may occur, with the exception of the subject lands where direct impacts associated with pit/quarry operations may occur, this study is primarily focused on SAR whose habitats could be indirectly impacted by changes in hydrological or hydrogeological regimes (e.g., Louisiana Waterthrush (*Parkesia motacilla*)).

Based on NRSI’s examination of background sources and federally or provincially significant species with occurrence records in the Study Area vicinity (within 10km), an assessment of SAR and SCC suitable habitat presence within the Study Area was completed. Desktop-level assessments of habitat suitability in the Study Area were initially made by cross-referencing each species’ known habitat preferences or requirements (e.g., OMNR 2000) with existing natural features based on review of recent satellite imagery of the Study Area lands and based on previous NRSI site characterization (NRSI 2010, 2017).

On December 2021, NRSI submitted a SAR memo to the MECP requesting any additional information on SAR records from the Study Area. On January 17, 2022, MECP provided known occurrence records for several SAR and SCC. See Appendix III for the response information provided by MECP.

Table 2. Species at Risk/Species of Conservation Concern Preliminary Screening Results provides a summary of SAR that were identified as having potentially suitable habitat

within the Study Area (i.e., outside of the subject lands) as well as within the subject lands.

Table 2. Species at Risk/Species of Conservation Concern Preliminary Screening Results

Species	Study Area External Lands	Subject Lands
Bobolink (*Dolichonyx oryzivorus*)	X	
Butternut (*Juglans cinerea*)	X	X
Chimney Swift (*Chaetura pelagica*)	X	
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	X	X
Louisiana Waterthrush (*Parkesia motacilla*)	X	X
Bank Swallow (*Riparia riparia*)	X	X
Eastern Meadowlark (*Sturnella magn*)	X	X
Eastern Small-footed Myotis (*Myotis leibii*)	X	X
Little Brown Myotis (*Myotis lucifugus*)	X	X
Northern Myotis (*Myotis septentrionalis*)	X	X
Tri-colored Bat (*Perimyotis subflavus*)	X	X

4.0 Field Methodology

Terrestrial and aquatic field surveys were completed between the period of October 8, 2020 to October 3, 2022 to characterize and map the existing natural features present within the Study Area. Field surveys were completed on the subject lands, within properties containing the NAT complex natural features where property access was permitted, and from roadside at NAT complex natural features at locations where property access was not available.

Field surveys were initially exploratory in nature and comprised only roadside-based observations. These were completed during the period October 2020-February 2021 and comprised preliminary fall- and winter-based characterization of the existing terrestrial features (woodlands and wetlands) and aquatic features throughout the Study Area. Terrestrial characterization was completed as high-level Ecological Land Classification (ELC) (Lee et al. 1998). The aquatic investigation provided initial ground-truthing of mapped watercourses and drainage features in the fall, followed by an investigation of watercourses containing open flowing water during sub-zero temperatures during the winter. The winter-based aquatic observations were used to inform an understanding of which watercourses/watercourse reaches may be receivers of groundwater inputs.

Additional seasonally-timed targeted surveys of terrestrial wildlife, vegetation species/communities, and aquatic habitats were completed during the period April-August 2021. With the exception of the subject lands, these surveys were done entirely from roadside and comprised the following:

- Turtle basking surveys
- Amphibian egg mass surveys
- Anuran call surveys
- Breeding bird surveys (marsh bird surveys completed where suitable habitat was present)
- Vegetation community mapping and species inventories
- Aquatic habitat assessment

See below for details of the field survey methodologies.

NRSI field surveys completed in 2020 and 2021 included NAT complexes located further downstream (eastwards) of the subject lands that were subsequently determined by the Project Team to be outside of the area of potential hydrogeological influence, based on preliminary modelling. Field surveys completed in 2021 corresponded to the NAT complex features that were part of the Original Study Area (Appendix I), with the exception of NAT-19, -20, and -21. These included the following NAT complexes that were not further surveyed in 2022, but are mapped as part of the Original Study Area as shown in Appendix I:

- NAT-05
- NAT-06
- NAT-07
- NAT-08
- NAT-09
- NAT-10
- NAT-11
- NAT-12
- NAT-13
- NAT-17
- NAT-22

Beginning in 2022, NRSI biologists were granted access to various private properties within the Study Area in which additional field surveys were undertaken. These were completed over the period March-August 2022 and included the following survey types:

- Salamander habitat assessments and trapping
- Turtle basking surveys
- Anuran call surveys
- Breeding bird surveys (marsh bird surveys completed where suitable habitat was present)
- Vegetation community mapping, and spring- and summer-based vegetation inventories

- Aquatic habitat assessment and electrofishing

See Map 2 for the locations of survey stations within the Study Area that are associated with certain survey methodologies as described below. Individual properties that were accessed by NRSI biologists for field surveys are identified as “Participating Properties” on Map 2. For reference in this report, each participating property is identified with a unique code as shown on Map 2.

Field investigations that were completed to inform the NEA are summarized in Table 3.

Table 3. Field Survey Summary

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	Staff
Terrestrial Surveys (2021-2022)									
April 27, 2021	Anuran Call Surveys	BSC 2009a	20:49-22:07	4.5	9-15	None-Light rain	80-100	1	R. Archer D. Griffiths
April 28, 2021			20:52-22:28	3	10.4-10.7	Rained earlier	100	0-1	J. Dertinger D. Griffiths
April 29, 2021			20:47-21:59	2.5	7	Light rain	100	1	M. Beck D. Griffiths
May 18, 2021			20:36-23:45	6	10-12	None	0	0	D. Frey K. Higgens
May 19, 2021			21:21-23:35	1.5	16-19	None	20-100	0-2	P. Anderson S. Burgin
May 26, 2021			21:25-22:25	1	11-13	None	0-10	1-3	R. Archer
June 17, 2021			22:09-23:28	1.25	14-16	None	0	1-2	J. Lance
June 18, 2021			20:09-22:51	5.5	20-21	None	45	1	D. Griffiths S. Hederson
June 30, 2021			21:32-22:32	1	17-19.1	None	5-15	1	D. Griffiths
April 25, 2022			20:51-23:58	12	8-10	Light rain	90-100	0-3	J. Mennen W. Konze H. Manoharan S. Gilmour
May 2, 2022			20:57-00:16	6.5	9	None	100	1-2	J. Mennen S. Gilmour
May 19, 2022			21:16-23:50	5	13-15	None	70	0-1	S. Gilmour L. Hockley
May 25, 2022			21:28-23:47	4.5	14	Light rain	100	3	J. Mennen S. Gilmour
May 30, 2022			21:20-23:28	4	23-24	None	0-10	1-3	J. Mennen S. Morouney
June 24, 2022			21:46-23:07	1.5	18-19	None	0	0	R. Archer

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	Staff
Terrestrial Surveys (2021-2022)									
June 28, 2022			21:43-00:05	4.5	17-19	None	0	0-2	J. Mennen D. Frey
June 30, 2022			21:32-23:38	4	23-24	None	0	3-4	J. Mennen S. Gilmour
July 1, 2022			21:39-23:00	1.25	19-20	None	0-30	1	S. Gilmour
March 24, 2022	Suitable Salamander Habitat Assessment	n/a	09:00-16:00	14	6	None	100	2	P. Deacon J. Mennen
March 25, 2022			09:00-16:00	14	-1	Light snow	100	3	
April 4, 2022	Salamander Minnow Trapping Surveys	JESA Recovery Team (2013) Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders (OMNR undated b) Chytrid Disease Decontamination Protocol (CWHC 2017) Decontamination Protocol for Field Work with Amphibians and Reptiles in Canada (CHHWG 2017)	17:00-21:30	16.5	6	None	80	1	H. Manoharan M. Beck J. Pedersen J. Mennen
April 5, 2022			06:50-09:17	4.75	1-2	None - light rain	100	2	H. Manoharan S. Gilmour P. Deacon N. Grant
			15:20-18:43	10	11-12	None	50-90	2-4	J. Pedersen M. Beck J. Mennen J. Weber
April 6, 2022			06:45-09:30	4.5	-1.5 - 2	None	20-25	0-1	P. Deacon J. Mennen D. Frey A. Timmerman
April 13, 2022			16:00-19:00	6	19	None	100	4	S. Gilmour J. Pedersen
April 14, 2022			07:00-10:20	6	13	Rained earlier	100	4-5	N. Grant S. Gilmour M. Beck J. Mennen
			16:15-18:50	4.5	9	None	50	5	J. Weber J. Pedersen
April 15, 2022			07:25-09:21	8	0-5	None	10-30	4-6	J. Mennen R. Archer

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	Staff
Terrestrial Surveys (2021-2022)									
									K. Richter A. Timmerman
			16:00-19:00	6	8	None	50	7	S. Gilmour J. Weber
April 16, 2022			07:30-09:30	8	1	None	0	2-3	L. Hockley S. Gilmour J. Mennen M. Bosco
April 13, 2021	Egg Mass Surveys		08:35-14:13	11.5	7	None	100	1	K. Mimms D. Griffiths
April 14, 2021			08:30-12:00	7	4	None	0	1	E. Bannon D. Griffiths
April 27, 2021			08:31-11:55	7	7.9	None	95	2	K. Mimms D. Griffiths
April 29, 2021			17:00-19:30	5		Light rain	100	1	D. Griffiths
April 6, 2021	Turtle Basking Surveys	Modified Visual Encounter Surveys based on the Survey Protocol for Blanding's Turtle (*Emydoidea blandingii*) in Ontario (OMNR 2015b)	09:30-14:15	9.5	9-15	None	60	2-3	G. MacVeigh S. Catry
April 8, 2021			12:50-15:00	9	22-23	None	0	2-3	G. MacVeigh A. Marubashi
April 23, 2021			09:07-13:02	8	10-16	None	0	1-2	S. Marouney D. Griffiths
May 5, 2021			09:59-13:00	6	14.1-18.8	None	0	2-3	E. Bannon D. Griffiths
May 20, 2021			08:50-10:45	4	20.8-22.6	Storm approaching - light rain	100	2	K. Hoo D. Griffiths
May 31, 2021			10:12-12:45	5	18-26	None	5-15	1-2	D. Griffiths S. Turner
June 1, 2021			09:21-12:15	6	19-23	None	10-25	2	D. Griffiths J. Lance
June 2, 2021			10:08-13:10	6	21-23	None	40-75	1-2	C. Stadke D. Griffiths
April 12, 2022			10:33-17:00	10.5	17-19	None	10-40	2-3	J. Mennen S. Gilmour H. Manoharan

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	Staff
Terrestrial Surveys (2021-2022)									
									W. Konze
April 14, 2022			12:15-15:55	7	12-16	None	0-10	5	K. Hoo M. Bosco
April 22, 2022			12:03-15:33	10.5	6-12	None	5-30	2	J. Pedersen J. Nene
April 29, 2022			10:54-14:33	5.25	8	None	0	0-2	R. Archer S. Gilmour
May 5, 2023			12:07-16:10	12	13	None	0	0-2	S. Gilmour J. Mennen
May 6, 2023			13:15-15:35	4.5	13-15	None	50-90	4	
May 9, 2023			12:13-16:22	8	17-19	None	3-10	3-4	
May 11, 2023			10:00-15:38	15.5	27	None	0-40	2	
May 12, 2023			12:18-16:00	5.75	29	None	30	4	H. Manoharan
June 6, 2022			11:00-13:56	5	18	None	100	3	J. Mennen
June 8, 2022			08:00-12:45	9.5	15-26	None	0-30	3	J. Mennen W. Konze
June 10, 2022			09:22-11:07	1.75	13-14	None	0-25	3	S. Gilmour
June 17, 2022			11:44-16:43	14	16	None	30	2	S. Gilmour A. Walmsley
June 7, 2021	Breeding Bird Surveys Marsh Bird Surveys	Birds Canada et al. 2021 BSC 2009b	06:43-09:49	6	21-24	None	40-90	1-2	R. Archer K. Higgins
June 10, 2021			05:21-09:20	8	18-24	None	10-30	1-4	K. Hoo S. Catry
June 11, 2021			05:34-09:43	3.75	14-18	None	5-98	1-2	K. Hoo
June 16, 2021			06:54-08:43	1.75	9-17	None	0	1	R. Archer
June 23, 2021			05:46-09:49	4	7-14	None	0-70	1-4	W. Konze

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				Staff
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	
Terrestrial Surveys (2021-2022)									
June 24, 2021			06:05-09:41	3.5	18-22	None	10-50	3-4	E. Gosnell
June 6, 2022			05:58-10:42	10	11-13	None - light rain	100	1-3	W. Konze J. Mennen
June 8, 2022			06:00-10:08	8	9-16	None	0-100	1-4	
June 9, 2022			06:53-09:20	4.5	11-12	None - light rain	100	3	M. Alexandrou S. Gilmour
June 10, 2022			05:43-09:54	8	9-13	None	0	3-4	
June 13, 2022			06:53-09:56	3	10-14	None	5-10	1	R. Archer
June 22, 2022			05:49-09:59	4	20-26	None	0-5	1-3	J. Nafziger
June 23, 2022			05:48-09:48	4	11-18	None	0-5	3	
June 27, 2022			06:15-08:45	2.5	11-14	None	10-80	3-5	E. Campanelli
June 28, 2022			05:30-08:15	2.75	7-14	None	5-20	1-3	
July 6, 2022			05:15-07:00	1.75	16-18	None	50-100	1-2	D. Pomezanski
July 7, 2022			06:50-07:20	0.5	12	None	60	1	T. Brenton
July 29, 2021	Ecological Land Classification Vegetation Inventory	Lee et al. 1998	09:00-16:30	7.5	16-23	None - light rain	-	2-3	A. Dean
August 2, 2021			09:00-17:00	8	17-22	None	-	2-3	
August 12, 2021			09:00-16:00	7	24-27	None	-	3-4	
May 12, 2022			09:15-16:00	13	23-27	None	-	2-3	P. Deacon J. Weber
May 16, 2022			09:00-16:00	13.5	10-14	Light rain	-	2-3	
May 24, 2022			10:00-19:30	10	14-16	None	-	2	P. Deacon E. Krauss

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				Staff
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	
Terrestrial Surveys (2021-2022)									
May 25, 2022			09:00-17:30	24	16	None	-	2	A. Dean P. Deacon E. Krauss
May 26, 2022			09:00-14:30	11	18-22	None	-	3-4	A. Dean C. Kolar
June 8, 2022			09:00-15:30	13	17-20	None	-	1-3	A. Dean J. Weber
June 16, 2022			09:00-14:00	5	27	Light rain	-	2-3	A. Dean
July 21, 2022			09:00-14:30	5.5	17	None	-	4	
July 26, 2022			08:00-16:00	8	17-23	None	-	2-3	P. Deacon
July 27, 2022			08:00-14:00	6	20-23	None	-	2-3	
July 28, 2022			09:00-15:30	7.5	21-23	None	-	3-4	A. Dean
August 4, 2022			09:00-15:30	7.5	23-26	None	-	2-3	
August 11, 2022			09:00-12:00	3	19-21	None	-	3	
August 22, 2022			09:00-14:00	5	19-24	None	-	2	
October 3, 2022	Feature Boundary Delineation	OMNR 2022	09:00-14:00	5	7-13	None	-	1-2	
Aquatic Surveys (2020-2022)									
November 3, 2020	Aquatic Habitat Assessment	Modified Ontario Stream Assessment Protocol (OSAP) Version 10 (Stanfield 2017)	08:00-16:10	10.25	3	None	100	2	S. Burgin
February 12, 2021			08:30-17:00	8.5	-17 - -13	Light snow	100	1	
February 17, 2021			09:00-16:00	7	-8	None	80	2	
July 19, 2021			09:00-16:10	9.25	30	None	0	1	

Date	Field Survey	Protocol	Time	Approx. Person Hours	Weather Conditions				Staff
					Air Temp. (°C)	Precip.	Cloud Cover (%)	Wind (Beaufort Scale)	
Terrestrial Surveys (2021-2022)									
July 19, 2022			10:00-11:00	1	26.6	None	25	3	S. Burgin E. Voogjarv
			15:10-15:30	0.25	30	None	25	3	
July 20, 2022			09:20-09:30	0.25	25	None	95	3	S. Burgin J. Hunter
			12:00-12:30	0.5	30	None	100	3	
			14:10-14:30	0.25	31	None	75	3	
July 21, 2022			10:40-11:00	0.25	20	None	100	4	
			12:00-12:25	0.5	23	None	100	3-4	
July 22, 2022			09:15-17:00	7.75	26	None	0	1	
			13:30-14:30	1	27	None	0	1	S. Burgin
July 19, 2022	Fish Community Assessment	Modified version of the Ontario Stream Assessment Protocol (OSAP) Section 3. Module 1. Version 10 (Stanfield 2017)	10:10-10:50	0.75	26.6	None	25	3	S. Burgin E. Voogjarv
			14:00-14:40	0.75	30	None	50	3-4	
July 20, 2022			09:10-09:40	0.5	25	None	95	3	S. Burgin J. Hunter

4.1 Vegetation Community Mapping and Vascular Flora Inventory

Vegetation communities were described and mapped according to the ELC system for southern Ontario (Lee et al. 1998). Detailed mapping of natural features was completed where site access was granted. For properties where access was not granted, assessments were completed from roadsides or property lines, informed by available aerial imagery and background mapping (topography and mapped wetlands). The surveys included the collection of soil profile data, where necessary, and the compilation of a stand description to note the dominant species and cover within each community.

NRSI biologists completed a comprehensive three-season (fall, spring, summer) inventory of vascular flora. NRSI biologists walked throughout each ELC polygon inventorying all tree, shrub, and herbaceous species that were observed. Where property access was not available, vegetation species were inventoried from roadside as could be viewed. The vascular plant list was compiled by ELC polygon with an abundance code assigned (dominant, abundant, occasional, rare) in one or more strata (canopy, sub-canopy, shrub layer, groundcover). This inventory also recorded any federally, provincially, or regionally significant vegetation species, and species that are dependent on the existing hydrological/hydrogeological regimes and may be sensitive to changes in these conditions.

NRSI biologists also flagged and surveyed the woodland dripline and wetland boundaries where they occur on the Strada lands (i.e., former Bonnefield Property, former Prince Property, Melancthon Pit #2, and Melancthon Pit #1). These tasks updated previous NRSI woodland and wetland boundary delineations completed for previous above-water table aggregate pit ARA application NEA studies that were completed for Strada Aggregates (NRSI 2010, 2017). The wetland boundary delineation was completed according to Ontario Wetland Evaluation System (OWES) methodology (OMNR 2022). Although the 2014 version of the OWES manual was used, and was the latest available version at the time of the field studies, the methodology used is consistent with what is included in the current 2022 version of the OWES manual (OMNR 2022).

4.2 Breeding Bird Surveys

Two rounds of early morning breeding bird surveys were conducted between May 24-July 10 in each of 2021 and 2022 in accordance with the Ontario Breeding Bird Atlas (OBBA) protocol (Birds Canada et al. 2021). Surveys were completed between a half-hour before sunrise and

10:00am and were timed to occur at least 10 days apart. Surveys were completed through 10-minute point counts at 18 stations in 2021 and 24 stations in 2022. Standard breeding evidence codes were recorded based on OBBA protocol.

Where suitable marsh habitat exists, the surveys also included a marsh bird survey, using the Marsh Monitoring Program marsh bird survey protocol (BSC 2009b). Surveys were completed through 15-minute point counts at six stations in 2021 and 13 stations in 2022. The 15-minute point count includes a five-minute period during which the calls of six secretive marsh bird species are broadcast from an audio device in order to elicit a response from any individuals of those species that may occur in the marsh feature. In addition to marsh bird species, all other bird species seen or heard during the 15-minute point were recorded on standardized forms.

See Map 2 for the bird survey station locations. Where standard OBBA survey protocol was used, stations are labelled “BMB-XX”; where marsh bird surveys were conducted, stations are labelled “MBB-XX”.

4.3 Anuran Call Surveys

Three rounds of nighttime anuran call surveys were completed in each of April, May, and June 2021 and 2022 in accordance with the Marsh Monitoring Program amphibian survey protocol (BSC 2009a). Surveys comprised three-minute passive-listening point counts at 19 stations in 2021 and 48 stations in 2022. Surveys were completed in wetland habitats where property access was permitted or where wetlands could be surveyed from roadside. See Map 2 for the survey station locations. Surveys were conducted when the air temperatures were at least 5°C, 10°C, and 17°C during each survey, respectively, and between one-half hour after sunset and midnight. The exceptions were stations ANR-05A, ANR-05B, and ANR-11A, where survey times began slightly before the one-half hour after sunset start-time for surveys (i.e., surveys began at 20:36 for ANR-05A and 20:40 for ANR-05B on May 18, 2021 (sunrise at 20:36) and 20:09 for ANR-11A on June 18, 2021 (sunrise at 20:09)). Species were recorded according to their three-level calling code categories of calling intensity. Code 1 was recorded when calls from a species were not overlapping and the number of individuals could be estimated), Code 2 was recorded when calls were overlapping but the number of individuals could still be estimated, and Code 3 was recorded when a species was calling at full chorus and the number of individuals could not be estimated. The estimated number of calling individuals was also recorded for Calling Codes 1 and 2.

4.4 Turtle Basking Surveys

Turtle basking surveys were completed in 2021 and 2022 in accordance with a modification of the visual encounter survey protocol for Blanding's Turtle in Ontario (OMNR 2015b). Biologists surveyed heavily vegetated, shallow wetlands using evenly spaced transects across the wetland once for each survey. This differs from the visual encounter survey (OMNR 2015b), which recommends that transects are repeated twice for each survey (within the same day). Where property access was not available, habitat areas were visually inspected from the edge of the road.

Four surveys were completed in 2021 at 21 stations and five surveys were completed in 2022 at 30 stations. See Map 2 for the survey stations locations. Surveys were completed where suitable open water habitat exists. Data was recorded on standardized forms including species, number of individuals, basking substrate, and associated weather and temperature conditions.

4.5 Salamander Habitat Assessment and Trapping Surveys

NRSI biologists first conducted site visits on March 23 and 24, 2022 at all accessible properties to identify and map the presence of suitable salamander habitat. In ponds where suitable habitat was deemed present, minnow traps were deployed to trap salamanders. Salamander trapping surveys were completed in April 2022. The survey methods have been informed by the Jefferson Salamander (JESA) Recovery Team (2013), the Ontario Risk Handling Manual: For Endangered Species Act Authorization Holders (OMNR no date b), the Chytrid Disease decontamination protocol (CWHC 2017), the Decontamination Protocol for Field Work with Amphibians and Reptiles in Canada (CHHWG 2017), as well as in accordance with the required permits and authorizations (Appendix IV). Minnow traps were set in the water and checked for salamanders within 12 hours. NRSI biologists collected information from all trapped salamanders, including species, size, and sex, and then immediately returned them to water. Each minnow trap was checked a total of five times, with traps re-set back into the water following each visit except for the last visit. See Map 2 for the salamander minnow trap locations, referred to in this report as "trap stations".

4.6 Amphibian Egg Mass Surveys

In 2021, two amphibian egg mass surveys were conducted at 15 stations during the spring, after the first warm rain. Surveys were timed to occur following the start of observed salamander movements as determined by NRSI biologists at various project sites around southern Ontario. The survey start time also accounted for the later start to the season that generally occurs in the

Melancthon Township area relative to other portions of southern Ontario, and was initiated once ice cover on ponds started to melt. The edges of wetlands and open water ponds were thoroughly examined for the presence of egg masses, with a focus on substrates that might provide attachment sites for the egg masses. Egg masses were identified to species where possible. Wetland and aquatic features were examined to the extent possible based on visibility from roadside. See Map 2 for the amphibian egg mass survey station locations.

4.7 Aquatic Habitat Assessment and Fish Community Characterization

NRSI aquatic biologists visited the Study Area on multiple occasions through 2020, 2021, and 2022 to assess the aquatic conditions across the Study Area. This included collecting information under fall, winter, and summer conditions, which was important for identifying areas of groundwater influence and characterizing thermal regime. Roadside surveys were completed on three separate occasions, as shown in Table 3, which included high-level screening surveys of all potential watercourse crossings within the Study Area in November 2020 and February 2021, and a more targeted screening survey of watercourse crossings within or near identified NAT complexes in July 2021. Roadside screening surveys focused on identifying watercourse permanence, fish habitat potential, groundwater influence, and thermal regime.

More detailed aquatic habitat assessments and fish community surveys were completed for participating properties and at several roadside locations between July 19 and 22, 2022. For participating properties, where space allowed, a 40m section of each watercourse was assessed, which included more detailed notes on channel morphology, substrate composition, in-stream habitat and cover, aquatic vegetation, and *in situ* water quality measurements (e.g., water temperature, conductivity, pH, and total dissolved solids). Additional notes on fish habitat significance and sensitivity were also collected, where appropriate.

Fish community surveys were completed in conjunction with many of the detailed aquatic habitat assessments, and at several additional roadside locations. Surveys were conducted to characterize the fish communities occurring within the NAT complexes, either to confirm historical records or to provide records for watercourses where information was lacking. These surveys were completed using a Smith Root LR20B backpack electrofishing unit to conduct a standard, single–pass screening electrofishing survey following Section 3, Module 1 of the Ontario Stream Assessment Protocol (OSAP) (Stanfield 2017). All fish captured were identified to species, enumerated, and released. For most sites, the smallest and largest individuals were

measured (fork and total lengths) for each species, except for Brook Trout. All captured Brook Trout were measured individually.

Water temperatures and associated ambient air temperatures were collected during surveys completed during July 2021 and 2022 to assess watercourse thermal regimes. The method described in Stoneman and Jones (1996), and later revised by Chu et al. (2009) was utilized to classify each assessment location as coldwater, coolwater, or warmwater. Due to timing restrictions, these measurements were not all able to be collected during the preferred measurement window (16:00-18:00), as identified by Stoneman and Jones (1996), but air temperature measurements were nearly all in excess of 24.5°C. As such, the classifications that were determined using this method are still expected to be accurate.

See Map 2 for the aquatic habitat assessment and fish community characterization (electrofishing) locations within the Study Area.

4.8 Incidental Wildlife Observations

All incidental observations of wildlife (e.g., mammals, butterflies, odonates) and vegetation species were document on all 2021 and 2022 field visits. This included both direct and indirect (e.g., tracks, scat, dens, nests, etc.) observations of wildlife presence.

5.0 Existing Conditions

The following is a summary of terrestrial and aquatic field survey results collected within the Study Area during the 2021 and 2022 survey periods. A summary of the existing hydrogeological regime within the Study Area is provided in Section 5.1.

Field survey results have been summarized by NAT complex to aid in differentiating results according to particular natural features or locations within the Study Area, as well as within the Strada lands themselves. A high-level summary of field survey findings for the Study Area as a whole is presented below. The results presented herein do not include NAT complexes and associated survey stations that were only surveyed in 2021 since those were removed from the Study Area as described above.

A focus of the natural feature characterization has been on species and ecological communities that are sensitive to hydrological change, and thus could potentially be impacted by the proposed undertaking. Reference was made to the Toronto and Region Conservation Authority's (TRCA) lists of wetland communities, and vegetation and wildlife species, classified as having "High" and "Medium" sensitivity to hydrological change, as included in Appendices 2 and 3, respectively, of their document entitled *Wetland Water Balance Risk Evaluation* (TRCA 2017). NRSI's inventoried vegetation species were also cross-referenced against the TRCA's list of groundwater indicator species in Appendix V. See the TRCA document for further description on the methodology used to classify hydrologically-sensitive species.

5.1 Study Area-wide

5.1.1 Groundwater Conditions Summary

Groundwater modeling prepared by Earthfx (2024a) indicates that groundwater flows from the west to the east, towards the Niagara Escarpment, Horning's Mills and the Pine River valley. Within the Study Area, three groundwater systems are present:

- the shallow system (L1),
- the upper bedrock Guelph Formation (L4), and
- the confined aquifer Gasport Formation (L6).

Throughout most of the Study Area the L1 groundwater system is closest to the surface and interacts with the local wetlands and watercourses. Modelling results show that the L4 (Guelph) groundwater system sits close to or at the same elevation as the L1 system (Earthfx 2024a).

Within the Study Area, six groundwater monitoring stations are present, and the locations are shown in the Impact Assessment Report (Fig. 3.11, Earthfx 2024a). Stations GWP1, GWP2, and GWP4 show that the L1 and L4 (Guelph) groundwater systems are closest to the surface and are the source of groundwater discharge to wetlands and watercourses near the monitoring stations. At station GWP5, all three groundwater systems sit at similar elevations and appear to interact from time to time. Near the escarpment edge the aquifer units thin and pinch, resulting in upward gradients and groundwater discharge to the surface. The L6 (Gasport) aquifer is closest to the surface at GWP5, GWP3, and GWP6, providing the source of water for groundwater discharge on the east side of the Study Area and closest to the escarpment edge near Horning's Mills (Fig. 2.12 – 2.17, Earthfx 2024a). For the purposes of this study, this area in which the Gasport aquifer reaches closest to the surface applies to wetland complexes NAT-18 and NAT-16. See Section 5.0 of the Impact Assessment Report (Earthfx 2024a) for additional details about the local groundwater conditions.

5.1.2 Vegetation Communities and Species

In total, 190 different vegetation community polygons were mapped within the Study Area according to ELC (Lee et al. 1998). Map 3 illustrates ELC vegetation communities mapped throughout the Study Area. Of the 34 wetland community types, the majority (21), represented swamp communities while 13 marsh community types were mapped. Of the latter, the majority were meadow marsh communities while shallow marsh communities were less represented on the landscape. In addition, biologists also mapped Open Water (OA), Shallow Water (SA), and Stonewort Submerged (SAS1-3) communities. None of the mapped ELC communities are considered significant or rare in Ontario (OMNR 2000, OMNR 2015a).

Based on the TRCA list of hydrologically sensitive ELC communities (TRCA 2017), four wetland communities were identified as having high sensitivity to changes in hydrological condition, and 15 wetland communities were identified as having medium sensitivity to changes in hydrological condition. Various other communities that were only identified to the ecosite level (i.e., 33) may also be considered high or medium sensitivity, but the ecosite level is not classified under the TRCA sensitivity rank system. In those cases, following a conservative approach, it has been assumed that the highest sensitivity in the range of potential sensitivities for that ecosite applies. See Table 4 for a list of inventoried wetland communities with medium and high hydrological sensitivity.

Table 4. Hydrologically Sensitive Wetland Communities Inventoried

Sensitivity Rank (TRCA 2017)	ELC Code	ELC Name	NAT Complex	TRCA Assumptions/Basis (TRCA 2017)
High	SWC3-2	White Cedar - Conifer Organic Coniferous Swamp Type	NAT-15	Community slow to recover from hydrological changes
	SWM4-1	White Cedar – Hardwood Organic Mixed Swamp	NAT-19	Community slow to recover from hydrological changes
	SWM6-2	Poplar - Conifer Organic Mixed Swamp Type	NAT-04	Community slow to recover from hydrological changes
	SWM6-2	Poplar - Conifer Organic Mixed Swamp Type	NAT-14	Community slow to recover from hydrological changes
	SWT	Thicket Swamp	NAT-01	Community slow to recover from hydrological changes
	SWT	Thicket Swamp	NAT-02	Community slow to recover from hydrological changes
	SWT	Thicket Swamp	NAT-03	Community slow to recover from hydrological changes
	SWT3	Organic Thicket Swamp	NAT-01	Community slow to recover from hydrological changes
	MAM	Meadow Marsh	NAT-01	Community slow to recover from hydrological changes
	MAM	Meadow Marsh	NAT-02	Community slow to recover from hydrological changes
	MAM	Meadow Marsh	NAT-15	Community slow to recover from hydrological changes
	MAM	Meadow Marsh	Former Bonnefield property	Community slow to recover from hydrological changes
	MAM3	Organic Meadow Marsh	NAT-14	Community slow to recover from hydrological changes
	MAM3	Organic Meadow Marsh	NAT-15	Community slow to recover from hydrological changes
	MAM3	Organic Meadow Marsh	NAT-18	Community slow to recover from hydrological changes
	MAM3	Organic Meadow Marsh	NAT-20	Community slow to recover from hydrological changes
	MAS	Shallow Marsh	NAT-15	Community slow to recover from hydrological changes
	MAS2	Mineral Shallow Marsh	NAT-20	Community slow to recover from hydrological changes
	MAS2	Mineral Shallow Marsh	Former Bonnefield property	Community slow to recover from hydrological changes
	MAS3	Organic Shallow Marsh	NAT-03	Community slow to recover from hydrological changes

Sensitivity Rank (TRCA 2017)	ELC Code	ELC Name	NAT Complex	TRCA Assumptions/Basis (TRCA 2017)
	SWC	Coniferous Swamp	NAT-02	Community slow to recover from hydrological changes
	SWC	Coniferous Swamp	NAT-04	Community slow to recover from hydrological changes
	SWC	Coniferous Swamp	NAT-14	Community slow to recover from hydrological changes
	SWC	Coniferous Swamp	NAT-15	Community slow to recover from hydrological changes
	SWC3	White Cedar Organic Coniferous Swamp	NAT-14	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-01	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-02	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-03	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-04	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-14	Community slow to recover from hydrological changes
	SWM	Mixed Swamp	NAT-15	Community slow to recover from hydrological changes
	SWM4	White Cedar Organic Mixed Swamp	NAT-03	Community slow to recover from hydrological changes
	SWM4	White Cedar Organic Mixed Swamp	NAT-16	Community slow to recover from hydrological changes
	SWM6	Birch-Poplar Organic Mixed Swamp	NAT-01	Community slow to recover from hydrological changes
	SWD	Deciduous Swamp	NAT-02	Community slow to recover from hydrological changes
	SWD	Deciduous Swamp	NAT-20	Community slow to recover from hydrological changes
	SWD4	Mineral Deciduous Swamp	NAT-03	Community slow to recover from hydrological changes
	SWD4	Mineral Deciduous Swamp	NAT-14	Community slow to recover from hydrological changes
	SWD4	Mineral Deciduous Swamp	NAT-19	Community slow to recover from hydrological changes
	SWD4	Mineral Deciduous Swamp	Former Bonnefield property	Community slow to recover from hydrological changes
	SWD7	Birch–- Poplar Organic Deciduous Swamp	NAT-03	Community slow to recover from hydrological changes

Sensitivity Rank (TRCA 2017)	ELC Code	ELC Name	NAT Complex	TRCA Assumptions/Basis (TRCA 2017)
	SWD7	Birch–- Poplar Organic Deciduous Swamp	NAT-20	Community slow to recover from hydrological changes
Medium	MAM3-2	Reed-canary Grass Organic Meadow Marsh Type	NAT-04	Substrate sensitive to change. Organic soils are slow to accumulate
	MAM3-2	Reed-canary Grass Organic Meadow Marsh Type	NAT-15	Substrate sensitive to change. Organic soils are slow to accumulate
	MAM3-2	Reed-canary Grass Organic Meadow Marsh Type	NAT-16	Substrate sensitive to change. Organic soils are slow to accumulate
	MAM3-4	Fowl Manna Grass Organic Meadow Marsh Type	NAT-15	May be sensitive to hydrological change
	MAM3-9	Forb Organic Meadow Marsh	NAT-01	Community tolerant of slight hydrological change
	MAS3-1	Cattail Organic Shallow Marsh	NAT-03	Community tolerant of slight hydrological change
	SAS1-3	Stonewort Submerged Shallow Aquatic	NAT-18	Community tolerant of slight hydrological change
	SAS1-3	Stonewort Submerged Shallow Aquatic	Melancthon Pit #2	Community tolerant of slight hydrological change
	SWC3-1	White Cedar Organic Coniferous Swamp	NAT-04	Community tolerant of slight hydrological change
	SWD7-1	White Birch-Poplar Organic Deciduous Swamp	NAT-01	Community tolerant of slight hydrological change
	SWM3-2	Poplar - Conifer Mineral Mixed Swamp Type	NAT-04	Community tolerant of slight hydrological chang
	SWT2-1	Alder Mineral Thicket Swamp	NAT-04	Community tolerant of slight hydrological change
	SWT3-2	Willow Organic Thicket Swamp	NAT-03	Community tolerant of slight hydrological change
	SWT3-5	Red-osier Organic Thicket Swamp Type	NAT-04	Community tolerant of slight hydrological change
	SWT3-5	Red-osier Organic Thicket Swamp Type	NAT-14	Community tolerant of slight hydrological change
	MAM2	Meadow Marsh	NAT-04	Community tolerant of slight hydrological change
	MAM2	Meadow Marsh	Former Bonnefield property	Community tolerant of slight hydrological change

In total, 1,196 vegetation species were documented throughout the Study Area (Appendix V). Of these, 109 are considered to have medium to high sensitivity to hydrological change (TRCA 2017). Map 4 shows locations of hydrologically-sensitive vegetation species observed within the Study Area natural features. Of these 109 species, 32 are considered to be indicators of groundwater input to the local aquatic/wetland system in which they are found.

In total, one vegetation SAR, Black Ash (*Fraxinus nigra*) was documented within the Study Area. Black Ash is Endangered in Ontario and therefore protected under the ESA. It is also listed as Threatened under Schedule 1 of the federal SARA. Black Ash was specifically documented within the following vegetation communities, as described further below:

- NAT-01 (SWM6, SWD7-1);
- NAT-02 (SWC/SWM, SWD/SWT, as observed from roadside);
- NAT-03 (Property NAT-03-1: SWD7, SWT3-2, SWM4);
- NAT-04 (Property NAT04-13: FOM6-2, SWT3-5 and MAM3 inclusion; NAT04-2: SWM3-2), NAT-14 (SWM6-2);
- NAT-15 (SWC3-2); and,
- NAT-19 (SWM4-1).

See Map 5 for the locations of Black Ash. No vegetation SCC were documented within the Study Area. See Section 6.3 for further discussion about SAR documented in the Study Area.

5.1.3 Terrestrial Wildlife

Birds

In total, 121 bird species are reported from within 10x10km Ontario Breeding Bird Atlas (OBBA) squares that overlap the Study Area (17NJ58, 17NJ68, 17NJ59, 17NJ69) (BSC et al. 2008). Based on the results of the preliminary screening, 13 bird SAR/SCC were identified as having potentially suitable habitat within the Study Area.

In total, 101 bird species were documented throughout the Study Area (Appendix VI). Of these species, three were documented that are SAR (Bank Swallow, Bobolink, Eastern Meadowlark), and five that are SCC (Barn Swallow, Canada Warbler, Eastern Wood-Pewee, Grasshopper Sparrow, Wood Thrush).

Of the recorded bird species, five species (Wood Duck (*Aix sponsa*), Northern Waterthrush (*Parkesia noveboracensis*), Hooded Merganser (*Lophodytes cucullatus*), Sora (*Porzana carolina*), and Marsh Wren (*Cistothorus palustris*)) are considered to have either medium or high sensitivity to hydrological change (TRCA 2017). Hydrologically-sensitive species are presented here due to their increased potential for indirect habitat effects caused by potential changes to the hydrological/hydrogeological regime relative to other bird species.

Herpetofauna

In total, 15 herpetofauna species are reported from within 10x10km Ontario Reptile and Amphibian Atlas (ORAA) squares that contain the Study Area (Ontario Nature 2019). These 15 species comprise eight anuran, three salamander, two snake, and two turtle species. Based on the results of the preliminary screening, two herpetofauna SAR/SCC (Snapping Turtle and Western Chorus Frog (Great Lakes – St. Lawrence/Canadian Shield population)) were identified as having potentially suitable habitat within the Study Area.

Fourteen herpetofauna species were recorded within the Study Area during site investigations. Of these, eight are anuran species, three are turtle species, one is a salamander species, and two are snake species (Appendix VII). The following SAR/SCC were documented within the Study Area:

Species at Risk:

- An NHIC publicly-restricted turtle species (potential observation) – provincially Endangered, federally Threatened (however, see Section 5.4 for further discussion about this observation)

Species of Conservation Concern:

- Northern Ribbonsnake – provincial and federal species of Special Concern
- Snapping Turtle – provincial and federal species of Special Concern
- Western Chorus Frog (Great Lakes/St. Lawrence – Canadian Shield population) – federally Threatened

Of the recorded herpetofauna species, 11 species (Gray Treefrog (*Dryophytes versicolor*), Wood Frog (*Lithobates sylvaticus*), Spring Peeper (*Pseudacris crucifer*), Western Chorus Frog, Northern Leopard Frog (*Lithobates pipiens*), American Bullfrog (*Lithobates catesbeianus*), Green Frog (*Lithobates clamitans*), American Toad (*Anaxyrus americanus*), Spotted

Salamander (*Ambystoma maculatum*), Snapping Turtle, and Midland Painted Turtle (*Chrysemys picta marginata*)) are considered either medium or highly sensitive to hydrological change (TRCA 2017).

Mammals

According to the Mammal Atlas of Ontario (Dobbyn 1994), 44 mammal species are reported from within the 100km atlas block that contains the Study Area (Appendix VIII). Twelve mammal species were documented within the Study Area, all of which are common with secure (S4 or S5) populations in Ontario (OMNR 2021).

Nine mammal SAR/SCC have records of occurring within 100km of the Study Area (see Section 3.3). No mammal SAR/SCC were observed within the Study Area.

The bat SAR Little Brown Myotis, Northern Myotis or Tri-colored Bat may occur in woodlands and other treed features. None of these SAR are anticipated to be sensitive to potential hydrological/hydrogeological effects on adjacent lands, but could be directly impacted by quarry creation and operation on the subject lands.

Only one hydrologically-sensitive mammal species, Muskrat (high sensitivity) (TRCA 2017), was observed within the Study Area.

Insects

According to the Ontario Butterfly Atlas (Macnaughton et al. 2023), 38 butterfly species are reported from within 10km of the Study Area. Twenty-eight (28) odonate (dragonfly and damselfly) species are recorded from within 10km of the Study Area based on the Ontario Odonate Atlas (OOAD 2023). See Appendix IX for the lists of butterfly and odonate species reported within the vicinity of the Study Area.

Of these, one butterfly SCC (Monarch) and one provincially rare odonate species (Riffle Snaketail) have records of occurring within 10km of the Study Area. Based on the results of the preliminary screening, both of these species have the potential to occur in the Study Area.

The TRCA list of hydrologically sensitive species (2017) does not include insect species.

5.1.4 Aquatic Habitat and Fish Community

The aquatic features that occur across the Study Area include a variety of ephemeral, intermittent and permanent watercourses as well as many online and offline ponds. These

watercourses act as an important part of the headwater systems that support the Pine River and Boyne River, with the majority of them occurring as first and second order streams that originate within or in close proximity to the Study Area. As such, many of the watercourses exhibit the characteristics of groundwater-fed creeks and streams, which include the presence of Watercress (*Nasturtium officinale*) and iron staining. Furthermore, most of the watercourses that occur within the Study Area exhibit a coolwater or coldwater thermal regime, as shown on Map 5.

The permanent watercourses within the Study Area provide suitable year-round habitat for a relatively diverse fish community comprised primarily of cool- and coldwater species, including Brook Trout. Fish community sampling completed in July 2022 identified 14 fish species throughout the 10 NAT complexes where sampling was completed (Map 2). Brook Trout (including both juveniles and adults) and Creek Chub (*Semotilus atromaculatus*) were found to be the most widespread species across the Study Area followed by Blacknose Dace (*Rhinichthys atratulus*), Brook Stickleback (*Culaea inconstans*), and Central Mudminnow (*Umbra limi*). Brook Stickleback and Brook Trout were also found to be the most abundant species captured. Fish capture results are presented in Table 5. Trout observations are shown on Map 5.

Brook Trout occur in clear, cool, well-oxygenated streams and lakes and tend to spawn over the shallow gravel beds of headwater streams in areas of groundwater upwelling (Scott and Crossman 1998). The capture of juvenile and adult Brook Trout indicates that many of the watercourses across the Study Area provide suitable spawning, rearing, and foraging habitat that support self-sustaining populations. Brook Trout was the only species captured at several locations (EMS-005/NAT-15, EMS-008/NAT14, and EMS-011/NAT-01) and was the dominant species captured at EMS-001/NAT-04, EMS-004/NAT-15, and EMS-009/NAT-16.

Table 5. Fish Species Captured by Station in 2022

Species		Thermal Preference	EMS-001	EMS-002	EMS-003	EMS-004	EMS-005	EMS-006	EMS-007	EMS-008	EMS-009	EMS-010	EMS-011	Total
			NAT-04	NAT-03	NAT-03	NAT-15	NAT-15	NAT-02/ NAT-03	NAT-03	NAT-14	NAT-16	NAT-03	NAT-01	
Blacknose Dace	*Rhinichthys atratulus*	Coolwater	1	53				1			5	5		65
Brassy Minnow	*Hybognathus hankinsoni*	Coolwater		1										1
Brook Stickleback	*Culaea inconstans*	Coolwater		227	10			3	16			1		257
Brook Trout	*Salvelinus fontinalis*	Coldwater	37			36	44			37	21		9	184
Central Mudminnow	*Umbra limi*	Coolwater		11	15	2		9	3					40
Common Shiner	*Luxilus cornutus*	Coolwater										1		1
Creek Chub	*Semotilus atromaculatus*	Coolwater		30	1			15	1		1	2		50
Cyprinid spp (yoy)	*Cyprinidae*	Coolwater			5				5					10
Dace spp (yoy)	*Leuciscidae spp*	Coolwater			14									14
Fathead Minnow	*Pimephales promelas*	Warmwater		5	2			1				5		13
Finescale Dace	*Chrosomus neogaeus*	Coolwater		2				1						3
Johnny Darter	*Etheostoma nigrum*	Coolwater						4				9		13
Northern Pearl Dace	*Margariscus nachtriebi*	Coolwater		7	1			3						11
Northern Redbelly Dace	*Chrosomus eos*	Coolwater		11	7			6	4		2			30
White Sucker	*Catostomus commersonii*	Coolwater						3						3
Yellow Perch	*Perca flavescens*	Coolwater		1										1
		Total Captured	38	348	55	38	44	46	29	37	29	23	9	
		Species Richness	2	10	6	2	1	10	4	1	4	6	1	

5.2 NAT-01

5.2.1 Vegetation Communities and Species

NAT-01 is a large complex predominantly comprised of wetland habitats, with smaller areas of marsh and upland forest. The complex is located north of County Road 17, in between the 4th and 5th Line, and to the west of 5th Line (Map 3-1). The wetland habitats in general were noted to be high quality, particularly on the NAT01-7 and NAT01-8 properties. The complex was surveyed through detailed on-site investigations where land access was granted, and roadside assessments.

Table 6 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable. Although groundwater indicator species were documented within these vegetation communities, these species are not strongly indicative of groundwater conditions (i.e., they are associated with communities that are often groundwater-influenced, but are not obligate groundwater species).

Table 6. Wetland and Aquatic Vegetation Communities within NAT-01

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWM6	Birch-Poplar Organic Mixed Swamp	High Hydrologically Sensitive Species Inventoried: High – 8 Medium – 37 Groundwater Indicator Species Inventoried: 16	This mid-aged mixed swamp community comprises the majority of the wetland features within the complex. It is located within the complex on the east and west sides of 5th Line. High sensitivity to hydrological change was determined for this community. The SAR, Black Ash (*Fraxinus nigra*), was documented within this community. No other provincially or federally significant species were documented. <u>Canopy</u>: Paper Birch (*Betula papyrifera*), Green Ash (*Fraxinus pennsylvanica*), Balsam Fir (*Abies balsamea*), Red Maple (*Acer rubrum*) <u>Sub-canopy</u>: Eastern White Cedar (*Thuja occidentalis*), Balsam Fir, Red Maple, Black Ash (*Fraxinus nigra*) <u>Understorey</u>: Red-osier Dogwood, Green Ash <u>Groundcover</u>: Bluejoint Reedgrass (*Calamagrostis canadensis*), Fowl Mannagrass (*Glyceria striata*), Spotted Jewelweed (*Impatiens capensis*)
SWD7-1	White Birch-Poplar Organic Deciduous Swamp	Medium Hydrologically Sensitive Species Inventoried: High – 3	This young to mid-aged deciduous swamp community is located in the southeast corner of the NAT01-7 parcel. Medium sensitivity to hydrological change was determined for this community. A single SAR, Black Ash, was documented within this community. No other provincially or federally significant species were documented.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
		Medium – 28 Groundwater Indicator Species Inventoried: 12	Canopy: Balsam Poplar (*Populus balsamifera*), Trembling Aspen (*Populus tremuloides*) Sub-canopy: Green Ash, Balsam Poplar, Red Maple Understorey: Red-osier Dogwood, Green Ash, various Willows (*Salix* spp.) Groundcover: Fowl Mannagrass, Yellow Marsh Marigold (*Caltha palustris*), Sensitive Fern (*Onoclea sensibilis*), various Sedges (*Carex* spp.)
SWT3	Organic Thicket Swamp	Medium-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 7 Groundwater Indicator Species Inventoried: 6	This young to mid-aged swamp community is located in the north portion of the complex. Medium to high sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: Balsam Poplar, Freeman's Maple (*Acer* X *freemanii*) Sub-canopy: Balsam Poplar, Balsam Fir Understorey: various Willows, White Cedar Groundcover: Reed Canary Grass (*Phalaris arundinacea*), various Sedges, Broad-leaved Cattail (*Typha latifolia*)
MAM3-9	Forb Organic Meadow Marsh	Medium Detailed inventory not completed	This vegetation community was identified as a vernal pool habitat inclusion located within the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) / Fresh-Moist White Cedar-Hardwood Mixed Forest (FOM7-2) forested community. Medium sensitivity to hydrological change was determined for the broader FOD5-7/FOM7-2 community. No federally or provincially significant species were documented within this community. Dominant species documented within this community include: Fowl Mannagrass, Spotted Jewelweed, Hemlock Water-parsnip (*Sium suave*), and various Sedges.
MAM	Meadow Marsh	Low-High Detailed inventory not completed	Small areas of marsh are present at various locations in the eastern and southern extent of NAT-01. These communities can vary from low diversity monocultures of Reed Canary Grass to a mixture of forbs and grasses. This early successional community typically progresses toward a thicket swamp community in time. Low to high sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: - Understorey: - Groundcover: Reed Canary Grass, various wetland forbs and graminoids
MAS3-10	Forb Organic Shallow Marsh	High Detailed inventory not completed	This vegetation community was identified as a vernal pool habitat inclusion located within the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7) / Fresh-Moist White Cedar-Hardwood Mixed Forest (FOM7-2) forested community. High sensitivity to hydrological change was determined for the broader FOD5-7/FOM7-2 community.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			No federally or provincially significant species were documented within this community. Dominant species documented within this community include: Fowl Mannagrass, Spotted Joe Pye Weed (*Eutrochium maculatum*), Cottongrass Bulrush (*Scirpus cyperinus*), Hemlock Water-parsnip (*Sium suave*), and various Sedges.
MAS	Shallow Marsh	Low-High Detailed inventory not completed	A permanent shallow water feature is present and contains a small amount of floating and submergent aquatic vegetation. Low to high sensitivity to hydrological change was determined for this community.

5.2.2 Terrestrial Wildlife

Birds

Sixty-three (63) bird species were documented within the NAT-01 complex during site investigations. Of these, two were TRCA-listed hydrologically sensitive bird species. Table 7 provides a summary of TRCA-listed hydrologically sensitive bird species recorded. See Map 2-1 for the bird survey station locations.

Wood Duck was recorded within the NAT-01 complex natural features; however, breeding evidence for this species within the features was not recorded. Northern Waterthrush was recorded at station BMB-01, which surveys the Birch-Poplar Organic Mixed Swamp (SWM6) community. This species was also incidentally recorded within the NAT-01 complex natural features without breeding evidence.

Table 7. NAT-01 TRCA-listed Sensitive Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	n/a (incidental)	1	-	2022	OB
Northern Waterthrush	Medium	BMB-01A	1	SWM6	2022	PO
		BMB-01C	1	SWM6	2022	PR
		n/a (incidental)	1	-	2022	OB

Refer to Appendix VI for a list of all bird species recorded within NAT-01, including their breeding evidence codes.

Several SAR Bobolink individuals (specific number not recorded) were observed within an agricultural field to the immediate north of the eastern "arm" of the NAT-01 complex, on property NAT01-6. This field extends to within 120m of the subject lands. These individuals were recorded during each of the breeding bird surveys completed on the subject lands. The agricultural field on property NAT01-6 can therefore be considered confirmed breeding habitat for the species. See Section 6.1.3.2 for further discussion about these observations.

Multiple individuals of the SCC Grasshopper Sparrow (specific number not recorded) were also observed in the same agricultural field that contained the Bobolinks, on property NAT01-6. As noted above, this field extends to within 120m of the subject lands. These individuals were observed during two breeding bird surveys completed within the study duration; the agricultural field can therefore be assumed to represent breeding habitat for the species. Habitats for SCC may be considered a form of SWH. See Section 6.1.4.1 for further discussion about these observations.

Herpetofauna

Eleven herpetofauna species were documented within the NAT-01 complex during site investigations. Of these, eight were TRCA-listed hydrologically sensitive herpetofauna species. Table 8 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-1 for the survey station locations.

Table 8. NAT-01 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Spotted Salamander	High	SAL-N1-3	-	9	MAM3-9	2022
		SAL-N1-4	-	7	MAM3-9	2022
		SAL-N1-6	-	8	MAS3-10	2022
		SAL-N1-7	-	4	SWT3	2022
		SAL-N1-8	-	42	SWT3	2022
		SAL-N1-9	-	6	SWT3	2022
		SAL-N1-10	-	3	SWT3	2022
Snapping Turtle	High	TBO-01a	-	1	OA	2022
		TBO-01c	-	1	SWT3	2022
American Toad	Medium	ANR-01H	1	5	MAS	2022
		n/a (incidental)	-	-	-	2022
Gray Treefrog	High	ANR-01A	1	1	MAM/SWT or SWM6	2022
		ANR-01C	2	4	SWC/SWM	2021
			1	4		2022
		ANR-01E	1	2	FOC4-3	2022
		ANR-01F	2	4	SWM6	2022
		ANR-01H	1	3	MAS	2022

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
		ANR-01I	1	2	SWM6	2022
		n/a (incidental)	-	-	-	2022
Western Chorus Frog	High	ANR-01B2	1	1	SWT3	2022
		TBO-01C (incidental)	3	N/A[1]	SWT3	2022
Spring Peeper	High	ANR-01A	1	1	MAM/SWT or SWM6	2022
		ANR-01B2	1	5	SWT3 or SWM6	2022
		ANR-01B3	1	1	MAS3-10	2022
		ANR-01C	3	N/A[1]	SWC/SWM	2021
		ANR-01D	3	N/A[1]	SWM6	2022
		ANR-01E	3	N/A[1]	FOC4-3	2022
		ANR-01F	3	N/A[1]	SWM6	2022
		ANR-01H	1	1	MAS	2022
		n/a (incidental)	3	N/A[1]	MAM/SWT or SWM6	2022
			3	N/A[1]	MAS3-10	2022
			3	N/A[1]	SWM6	2022
			3	N/A[1]	FOC4-3	2022
			3	N/A[1]	SWM6	2022
			-	1	SWT3	2022
			-	-	-	2022
Green Frog	Medium	ANR-01B1	1	6	OA	2022
		ANR-01D	1	1	SWM6	2022
		ANR-01H	1	10	MAS	2022
		n/a (incidental)	-	-	SWM6	2022
Wood Frog	High	ANR-01B2	3	N/A[1]	SWT3 or SWM6	2022
		ANR-01B3	2	5	MAS3-10	2022
		ANR-01C	3	N/A[1]	SWC/SWM	2021
			3	N/A[1]		2022
		ANR-01D	2	4	SWM6	2022
		ANR-01E	1	4	FOC4-3	2022
		ANR-01F	1	1	SWM6	2022
		ANR-01H	1	6	MAS	2022
		n/a (incidental)	3	N/A[1]	MAM/SWT or SWM6	2022
			-	2	SWM6	2022
			-	39	MAM3-9	2022
			-	1	MAS3-10	2022
			-	1	MAS3-10	2022

[1]Number of individuals cannot be counted during call codes of rank 3

A complete list of herpetofauna species reported from NAT-01 is provided in Appendix VII.

Anuran Call Survey

In total, six anuran species were recorded at NAT-01: American Toad, Gray Treefrog, Spring Peeper, Green Frog, Wood Frog, and Western Chorus Frog. Western Chorus Frogs recorded within the Study Area are part of the Great Lakes/St. Lawrence-Canadian Shield population, which is designated as Threatened on Schedule 1 of the *Species at Risk Act* (SARA) (Government of Canada 2024). Western Chorus Frog is therefore considered a SCC in Ontario

(OMNR 2010). Western Chorus Frog was recorded at Code 3 within the Organic Thicket Swamp (SWT3, near turtle basking station TBO-1c) on April 12, 2022 outside of the anuran call surveys.

Table 9 provides a summary of call codes and the estimated abundance of each species across surveys. The NAT-01 complex provides high quality habitat for early-season breeding anurans. Spring Peeper was recorded at full chorus (Code 3) at five stations (ANR-01C, -01D, -01E, -01F, and -01G) during the April 2022 survey period, while Wood Frog was recorded at full chorus at two stations (ANR-01B2, and -01C (during both 2021 and 2022), and was recorded at Code 2 at two other stations. The mixed and coniferous swamp communities that comprise much of the complex provide uniformly good habitat for the species due to an abundance of small vernal pool features. Mid- and late-breeding season anuran species occur in relatively lower abundances, but included eight Green Frogs recorded at station ANR-01H (at a Shallow Marsh (MAS) feature).

As noted above, a single individual SCC Western Chorus Frog was recorded at station ANR-01B2, which is located within a Red-osier Organic Thicket Swamp (SWT3); this represents ideal habitat for the species. Habitat for SCC may be considered a form of SWH (OMNR 2015a).

Across the 2021 and 2022 survey periods, the highest species richness was recorded at station ANR-01H, where five species were recorded. Two to three species were recorded at most stations, several of which included Spring Peeper and Wood Frog. Only one species (Gray Treefrog) was recorded at station ANR-01I.

See Map 2-1 for the anuran survey station locations.

Table 9. NAT-01 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Chorus Frog
1	ANR-01A	-	-	-	-	-	-	-
		April 25, 2022	0	0	0	0	0	0
	ANR-01B1	-	-	-	-	-	-	-
		April 25, 2022	0	0	0	0	0	0
	ANR-01B2	-	-	-	-	-	-	-
		April 25, 2022	0	0	0	0	3	1(1)
	ANR-01B3	-	-	-	-	-	-	-
		April 25, 2022	0	0	0	0	2(5)	0
	ANR-01C	April 27, 2021	0	0	3	0	3	0
		April 25, 2022	0	0	0	0	3	0
	ANR-01D	-	-	-	-	-	-	-

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Chorus Frog
		April 25, 2022	0	0	3	0	2(4)	0
	ANR-01E	-	-	-	-	-	-	-
		April 25, 2022	0	0	3	0	1(4)	0
	ANR-01F	-	-	-	-	-	-	-
		April 25, 2022	0	0	3	0	>1(1)	0
	ANR-01H	-	-	-	-	-	-	-
		May 2, 2022	1(3)	0	1(1)	0	1(6)	0
	ANR-01I	-	-	-	-	-	-	-
		May 2, 2022	0	0	0	0	0	0
2	ANR-01A	-	-	-	-	-	-	-
		May 19, 2022	0	1(1)	1(1)	0	0	0
	ANR-01B1	-	-	-	-	-	-	-
		May 19, 2022	0	0	0	0	0	0
	ANR-01B2	-	-	-	-	-	-	-
		May 19, 2022	0	0	1(5)	0	0	0
	ANR-01B3	-	-	-	-	-	-	-
		May 19, 2022	0	0	1(1)	0	0	0
	ANR-01C	-	-	-	-	-	-	-
		May 19, 2022	0	1(2)	1(4)	0	0	0
	ANR-01D	-	-	-	-	-	-	-
		May 19, 2022	0	0	0	0	0	0
	ANR-01E	-	-	-	-	-	-	-
		May 19, 2022	0	0	2(2)	0	0	0
	ANR-01F	-	-	-	-	-	-	-
		May 19, 2022	0	0	0	0	0	0
	ANR-01H	-	-	-	-	-	-	-
		May 30, 2022	1(2)	1(3)	0	1(8)	0	0
	ANR-01I	-	-	-	-	-	-	-
		May 30, 2022	0	1(2)	0	0	0	0
3	ANR-01A	-	-	-	-	-	-	-
		June 24, 2022	0	0	0	0	0	0
	ANR-01B1	-	-	-	-	-	-	-
		June 30, 2022	0	0	0	1(6)	0	0
	ANR-01B2	-	-	-	-	-	-	-
		June 30, 2022	0	0	0	0	0	0
	Anr-01B3	-	-	-	-	-	-	-
		June 30, 2022	0	0	0	0	0	0
	ANR-01C	June 17, 2021	0	2(4)	0	0	0	0
		June 24, 2022	0	1(2)	0	0	0	0
	ANR-01D	-	-	-	-	-	-	-
		June 24, 2022	0	0	0	1(1)	0	0
	ANR-01E	-	-	-	-	-	-	-
		June 24, 2022	0	1(2)	0	0	0	0
	ANR-01F	-	-	-	-	-	-	-
		June 24, 2022	0	2(4)	0	0	0	0
	ANR-01H	-	-	-	-	-	-	-
		July 1, 2022	0	0	0	1(2)	0	0
	Anr-01I	-	-	-	-	-	-	-
		July 1, 2022	0	0	0	0	0	0

Turtle Basking Survey

One turtle species, Snapping Turtle, was recorded at NAT-01. A single adult female Snapping Turtle was observed at station TBO-01C basking subsurface in the Organic Thicket Swamp (SWT3) located on property NAT01-8. A single Snapping Turtle was subsequently recorded on the same property during the June 17, 2022 survey, swimming within the OA pond feature at station TBO-01A. Snapping Turtle is designated as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Habitat for SCC may be considered a form of SWH (OMNR 2015a). However, constructed ponds would not represent SWH.

NRSI biologists did not observe any evidence of turtle nesting (e.g., evidence of backfilled nests; evidence of predated nests and egg shell fragments) and no other turtles were observed on site during site investigations. The owner of property NAT01-8 provided anecdotal information, indicating that Snapping Turtle overwintering occurs within the wetland features on that property and that turtle nesting occurs along the driveway. The property owner also provided an NRSI biologist with photo documentation of three Snapping Turtles within the OA pond feature on the property.

No turtles were observed at stations TBO-01, -01B, or -01D during the 2022 survey period. However, only three turtle basking surveys were completed at station TBO-01D due to property access being granted part-way through the turtle basking survey period.

Salamander Trapping Survey

In 2022, 10 minnow traps were deployed at NAT-01 (Map 2-1). One salamander species, Spotted Salamander, was recorded at this complex. Spotted Salamander was captured at all traps with the exception of N1-1, N1-9, and N1-10. The majority of salamanders were captured at N1-8, where 27 were counted on April 14; 19 were counted on April 15. Seven of the 10 traps at NAT-01 contained salamanders on April 14, compared to three on April 15 and two on April 16.

Two anuran species were also captured within minnow traps. Thirty-seven (37) Wood Frogs were counted at N1-4 during the April 14 survey, while 11 and 1 individuals were counted at N1-6 and N1-5, respectively. Wood Frogs were also recorded at N1-4 and N1-6 on April 16. A single Spring Peeper was captured at N1-8 on April 15.

See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Survey

Amphibian egg mass surveys were not completed at NAT-01. However, NRSI biologists noted the presence of spermatophores at salamander trapping station N-6 during the April 15, 2022 survey.

Other Species

Evidence of five mammal species was observed at NAT-01: Muskrat (direct observation of one individual and a den), Porcupine (*Erethizon dorsatum*) (direct observation of four individuals over two site visits), White-tailed Deer (*Odocoileus virginianus*) (direct observation of at least three individuals), Red Fox (*Vulpes vulpes*) (direct observation of one individual), and Coyote (*Canis latrans*) (scat). All of the mammal species that were recorded are common with secure populations in Ontario (OMNR 2021). One of these mammal species, Muskrat, is a TRCA-listed hydrologically sensitive mammal species. An individual and den was incidentally observed within the MAS community at NAT01-6.

Table 10. NAT-01 TRCA-listed Hydrologically Sensitive Mammal Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Total Number of Individuals	ELC	Observation Year(s)
Muskrat	High	n/a (incidental)	1	MAS	2022

One butterfly species, Mourning Cloak (*Nymphalis antiopa*), was incidentally observed at NAT-01. This species is common with a secure population in Ontario (OMNR 2021).

No odonate species were incidentally observed at NAT-01 during site investigations.

5.2.3 Aquatic Habitat and Fish Community

In general, NAT-01 was not observed to contain any significant watercourses throughout most of its area. No channels were observed crossing 5th Line, which bisects NAT-01 and no channel was observed crossing 4th Line at the northeastern limit of the complex. Instead, it appears that most of the water throughout the northern portion of NAT-01, east of 5th Line collects within the MAS wetland community. However, this area does not provide suitable fish habitat and is not connected to any fish-bearing watercourses. Several ephemeral/intermittent watercourses were observed crossing County Road 17 between 5th Line and 4th Line (AHP-061 through AHP-063). These features divert water south but were not observed to be flowing during field surveys and do not provide suitable fish habitat.

One permanent watercourse, located at the southwest corner of NAT-01, was observed to be flowing during both fall and summer surveys between 2nd Line NE and County Road 17 (AHP-057). The feature flows south and eventually flows through NAT-04. In July 2022, this watercourse exhibited a wetted width ranging from 0.55 to 0.72m with water depths up to approximately 0.13m. Substrates were dominated by silt, detritus and sand with some gravel and the channel was heavily shaded by grasses and forbs growing along the bank. Aquatic habitat was available in the form of undercut banks, woody debris, overhanging bank vegetation, and Watercress. This watercourse was classified as a coolwater feature and nine adult Brook Trout were captured during fish community sampling, ranging from 100 to 148mm in length (EMS-011).

A photographic log of aquatic conditions is provided in Appendix XI.

5.3 NAT-02

5.3.1 Vegetation Communities and Species

NAT-02 is a large complex predominantly comprised of swamp wetland habitats, with smaller areas of marsh and open water wetland. The complex is located south of County Road 17, in between the 3rd and 4th Line (Map 2-2). The complex was surveyed through roadside assessments.

Table 11 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 11. Wetland and Aquatic Vegetation Communities within NAT-02

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWC/SWM	Coniferous Swamp/Mixed Swamp	Medium-High/Medium-High Detailed inventory not completed	This community was delineated through airphoto review and roadside observations. It comprises a large portion of the complex. A portion of the community is adjacent to 3rd Line. Medium-High/Medium-High sensitivity to hydrological change was determined for this community. A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Canopy: White Spruce (*Picea glauca*), Balsam Fir, Balsam Poplar, Tamarack (*Larix laricina*) Sub-canopy: White Cedar, Green Ash, Trembling Aspen Understorey: Red-osier Dogwood, various Willows, White Meadowsweet (*Spiraea alba*) Groundcover: Sensitive Fern, Spotted Jewelweed, various Sedges, Marsh Fern (*Thelypteris palustris*)
SWD/SWT	Deciduous Swamp/Thicket Swamp	Low-High/Low-High Detailed inventory not completed	This community was delineated through airphoto review and roadside observations. Three separate areas of this community exist within the complex, all of which occur, in part, adjacent to 3rd Line. Low-High/low-high sensitivity to hydrological change was determined for this community. A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented. Canopy: Balsam Poplar, Trembling Aspen, Peach-leaved Willow (*Salix amygdaloides*) Sub-canopy: American Elm (*Ulmus americana*), Green Ash, Paper Birch Understorey: Red-osier Dogwood, various Willows, Nannyberry (*Viburnum lentago*) Groundcover: Sensitive Fern, Marsh Fern, Spotted Jewelweed, various Sedges

5.3.2 Terrestrial Wildlife

Birds

Fifty-two (52) bird species were documented within NAT-02 during site investigations. Of these, two were TRCA-listed hydrologically sensitive bird species. Table 12 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-2 for the bird survey station locations.

Two Wood Duck individuals were recorded without breeding evidence at station MBB-02C, which surveys an Open Aquatic (OA) community. Northern Waterthrush was recorded at station BMB-02A in 2022, which surveys a Coniferous Swamp/Mixed Swamp (SWC/SWM)

complex south of County Road 17. Northern Waterthrush was also recorded at BMB-02B, which surveys a SWC/SWM complex west of 3rd Line.

Table 12. NAT-02 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	MBB-02C	2	OA	2021	OB
Northern Waterthrush	Medium	BMB-02A	1	SWC/SWM	2022	PO
		BMB-02B	1	SWC/SWM	2021	PO

Refer to Appendix VI for a list of all bird species recorded within NAT-02, including their breeding evidence codes.

Herpetofauna

Six herpetofauna species were documented within the NAT-02 complex during site investigations. All six herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 13 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-2 for herpetofauna survey station locations.

Table 13. NAT-02 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
American Toad	Medium	ANR-02A	3	N/A[1]	SWC/SWM	2021
		ANR-02B	2	3	SWC/SWM	2021
		ANR-02C	2	3	SWD/SWT	2021
Gray Treefrog	High	ANR-02A	1	1		2021
			1	3		2022
		ANR-02B	2	4	SWC/SWM	2022
		n/a (incidental)	1	1	ANR-02A	2021
Spring Peeper	High	ANR-02A	3	N/A[1]		2021
			2	4		2022
		ANR-02B	3	N/A[1]	SWC/SWM	2021
			3	N/A[1]		2022
		ANR-02C	3	N/A[1]	SWD/SWT	2021
Green Frog	Medium	ANR-02B	1	1	SWC/SWM	2021
			1	1		2022
		ANR-02C	1	2	SWD/SWT	2021
			2	4		2022
		n/a (incidental)	3	N/A[1]	ANR-02A	2022
			3	N/A[1]	ANR-02B	2022
Northern Leopard Frog	High	ANR-02B	1	2	SWC/SWM	2022
Wood Frog	High	ANR-02A	1	2		2022
		ANR-02B	2	8	SWC/SWM	2022
		N/A Incidental	1	1	TBO-02C	2022

[1]Number of individuals cannot be counted during call codes of rank 3.

A complete list of herpetofauna species reported from NAT-02 is provided in Appendix VII.

Anuran Call Survey

In total, six anuran species were recorded at NAT-02: American Toad, Gray Treefrog, Spring Peeper, Green Frog, Northern Leopard Frog, and Wood Frog (*Lithobates sylvaticus*).

Table 14 provides a summary of call codes and the estimated abundance of each species across surveys. Over the course of the 2021 and 2022 survey periods, Spring Peeper was the most abundant species recorded within the complex, being recorded at full chorus (Call Code 3) at ANR-02A, ANR-02B (during both survey years), and ANR-02C. American Toad was recorded at full chorus at station ANR-02A during the May 18, 2021 survey. An estimated eight Wood Frogs were recorded calling at station ANR-02B during the April 25, 2022 survey. Other species were recorded at generally lower abundances.

Station ANR-02B had the highest species richness across survey years, with five species, followed by ANR-02A with four species and ANR-02C with three species. ANR-02B also contained some of the highest relative abundances recorded among species, with Spring Peeper recorded at full chorus and both Wood Frog and American Toad recorded at Call Code 2. These observations were associated with the portion of SWC/SWM swamp complex that approaches the west side of 3rd Line. Spring Peepers were also abundant at ANR-02C, where they were recorded at Call Code 3 while Green Frogs were recorded at Call Code 2 at that station. Station ANR-02C surveys a portion of the large Deciduous Swamp/Thicket Swamp (SWD/SWT) complex that occurs west of 3rd Line; the abundance of Green Frogs suggests smaller open water pools within this feature. See Map 2-2 for the anuran survey station locations.

Table 14. NAT-02 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
1	ANR-02A (south)	-	-	-	-	-	-	-
		May 2, 2022	0	0	2(4)	0	1(2)	0
	ANR-02B	-	-	-	-	-	-	-
		April 25, 2022	0	0	3	0	2(8)	1(2)
	ANR-02C	-	-	-	-	-	-	-
		April 25, 2022	0	0	0	0	0	0

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
2	ANR-02A (south)	May 18, 2021	3	0	3	0	0	0
		May 25, 2022	0	1(3)	1(2)	0	0	0
	ANR-02B	May 18, 2021	2(3)	0	3	0	0	0
		May 25, 2022	0	2(4)	1(7)	0	0	0
	ANR-02C	May 18, 2021	2(3)	0	3	0	0	0
		May 25, 2022	0	0	0	0	0	0
3	ANR-02A (south)	June 17, 2021	0	1(1)	0	0	0	0
		June 24, 2022	0	0	0	0	0	0
	ANR-02B	June 17, 2021	0	0	0	1(1)	0	0
		June 24, 2022	0	0	0	1(1)	0	0
	ANR-02C	June 17, 2021	0	0	0	1(2)	0	0
		June 24, 2022	0	0	0	2(4)	0	0

Turtle Basking Survey

No turtles were observed at roadside station TB-02C during either the 2021 or 2022 surveys (Map 2-2). However, NRSI biologists received anecdotal information from a landowner indicating that Midland Painted Turtle and Snapping Turtle have been observed using the residential pond (OA) in past years, and that Snapping Turtle has been observed nesting in the immediate vicinity (specific location unknown).

Salamander Trapping Survey

NAT-02 was only accessible by roadside. No salamander trapping occurred at this complex.

Amphibian Egg Mass Survey

Amphibian egg mass surveys were not completed at NAT-02.

Other Species

One mammal species, American Mink (*Neogale vison*), was observed at NAT-02. One individual was observed on the road, between NAT03-6 and the SWD/SWT community west of 3rd Line. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

Two butterfly species, Eastern Tailed Blue (*Cupido comyntas*) and Mourning Cloak, were observed at NAT-02. Both of these species are common with secure populations in Ontario (OMNR 2021).

No odonate species were incidentally observed at NAT-02 during site investigations.

5.3.3 Aquatic Habitat and Fish Community

Two permanent watercourses were identified and characterized within NAT-02. The first occurs at the northeast corner of the complex and flows east from the SWC/SWM community, crossing 3rd Line and into NAT-03 (AHP-071). This watercourse was open and flowing during both winter and summer surveys and Watercress was observed within the channel in the vicinity of the 3rd Line crossing. The feature was classified as a coolwater watercourse and provides fish habitat, as confirmed through electrofishing surveys conducted approximately 200m downstream from 3rd Line. These results are discussed within section 5.4.3 since the sampling location occurred near the boundary to NAT-03.

The second watercourse flows north through the southern section of NAT-02 and then crosses 3rd Line before eventually flowing to a series of ponds within NAT-03 (AHP-072/AHP-152). In July 2022 this watercourse exhibited a wetted width ranging from approximately 1.0-1.5m with water depths up to approximately 0.30m. Substrates were dominated by silt, detritus and sand and aquatic habitat was available in the form of pools/riffles, backwater areas, undercut banks, woody debris, overhanging bank vegetation, and Watercress. The feature provides direct fish habitat for a relatively diverse fish community. A total of 10 fish species were captured at this location (EMS-006) in July 2022, primarily comprised of coolwater fish species, the most abundant of which was Creek Chub (*Semotilus atromaculatus*), followed by Central Mudminnow. Based on summer water temperature measurements, the feature exhibits a coolwater thermal regime, which correlates with the capture of coolwater fish species.

A photographic log of aquatic conditions is provided in Appendix XI.

5.4 NAT-03

5.4.1 Vegetation Communities and Species

NAT-03 is a large complex predominantly comprised of swamp wetland habitats, with smaller areas of marsh and open water wetland. The complex is located south of County Road 17, in between 3rd Line and County Road 124 (Map 2-3). The complex was surveyed through detailed on-site investigations where land access was granted, and roadside assessments.

Table 15 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 15. Wetland and Aquatic Vegetation Communities within NAT-03

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWM4	White Cedar Organic Mixed Swamp	High Hydrologically Sensitive Species Inventoried: High – 1 Medium – 26 Groundwater Indicator Species Inventoried: 13	This mid-aged swamp community is located in the northwest portion of the complex. High sensitivity to hydrological change was determined for this community. A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented. Canopy: White Cedar, Balsam Poplar, White Spruce Sub-canopy: Paper Birch, Balsam Fir, Trembling Aspen, Black Ash Understorey: Red-osier Dogwood, Common Elderberry (*Sambucus canadensis*), Alder-leaved Buckthorn (*Endotropis alnifolia*) Groundcover: Sensitive Fern, Fowl Mannagrass, Field Horsetail (*Equisetum arvense*), Dewberry (*Rubus pubescens*)
SWD7	Birch-Poplar Organic Deciduous Swamp	Medium-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 16 Groundwater Indicator Species Inventoried: 11	This young swamp community is located in the north portion of the complex. Medium to high sensitivity to hydrological change was determined for this community. A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Canopy: Balsam Poplar, Trembling Aspen, American Elm Sub-canopy: Balsam Poplar, Black Ash, Paper Birch Understorey: Wild Black Currant (*Ribes americanum*), Red-osier Dogwood, Common Elderberry Groundcover: Fowl Mannagrass, Sensitive Fern, Dewberry
SWD4	Mineral Deciduous Swamp	Low-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 8 Groundwater Indicator Species Inventoried: 3	An area of poplar-dominated swamp is present near the centre of NAT-03. The tree and shrub composition reflects mid-successional conditions and the community has established following past land clearing. A total of 7 species that are sensitive to hydrological change were documented from this community including 3 groundwater indicator species: Common Boneset, Dewberry and Spotted Jewelweed. Low to high sensitivity to hydrological change was determined for this community. Canopy: Balsam Poplar Sub-canopy: Balsam Poplar, Willow species Understorey: Red-osier Dogwood, Willow species, Narrow-leaved Meadowsweet Groundcover: Field Horsetail
SWM/SWT	Mixed Swamp / Thicket Swamp	Medium-High/Medium-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 6 Groundwater Indicator Species Inventoried: 6	This community was delineated through airphoto review and roadside observations. It exists in the north-central and southeast portions of the complex. Medium-high/medium-high sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community, however Black Ash likely occurs. Canopy: Balsam Poplar, White Spruce, Tamarack Sub-canopy: Paper Birch, White Cedar, American Elm Understorey: Red-osier Dogwood, various willows, Common Elderberry Groundcover: Spotted Joe Pye Weed, Spotted Jewelweed, various sedges
SWT3-2	Willow Organic Thicket Swamp	Medium Detailed inventory not completed	This young swamp community is located in the northeast portion of the complex. Medium sensitivity to hydrological change was determined for this community. Surface water drainage is likely being influenced by

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Beavers (*Castor canadensis*) based on various site observations. A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented. Canopy: Balsam Poplar, Peach-leaved Willow, American Elm Sub-canopy: various willows, Speckled Alder (*Alnus incana* ssp. *rugosa*), Balsam Poplar Understorey: various willows, Wild Black Currant, Red-osier Dogwood Groundcover: Broad-leaved Cattail, Swamp Aster (*Symphyotrichum puniceum* var. *puniceum*), Lesser Duckweed (*Lemna minor*)
SWT3-2	Willow Organic Thicket Swamp	Medium Hydrologically Sensitive Species Inventoried: High – 2 Medium – 23 Groundwater Indicator Species Inventoried: 10	The central portion of this feature includes large areas of swamp thicket that line the watercourse. Mineral substrates at the fringe of this community transition to a deep deposit of organic soil through the centre of the swamp. Groundwater indicators including Watercress and Marsh Marigold were noted from this community as well as iron staining in areas of shallow pooled water. A total of 31 species that are considered sensitive to hydrological change were documented. Medium sensitivity to hydrological change was determined for this community. Canopy: Crack Willow, Balsam Poplar Sub-canopy: Willow species, Balsam Poplar Understorey: Willow species, Red-osier Dogwood, White Cedar Groundcover: Reed Canary Grass, Field Horsetail, Sedges
MAS3-1	Cattail Organic Shallow Marsh	Medium Hydrologically Sensitive Species Inventoried: High – 1 Medium – 29 Groundwater Indicator Species Inventoried: 6	The western tributary of NAT-03 passes through a stand of Broad-leaved Cattail that terminates abruptly where a series of ponds and dykes have been created to the east. Medium sensitivity to hydrological change was determined for this community. Canopy: White Cedar Sub-canopy: White Cedar Understorey: Red-osier Dogwood, Willow species Groundcover: Broad-leaved Cattail
MAS3	Organic Shallow Marsh	Medium-High	This young swamp community is located in the north portion of the

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
		Hydrologically Sensitive Species Inventoried: High – 1 Medium – 13 Groundwater Indicator Species Inventoried: 6	complex. Medium to high sensitivity to hydrological change was determined for this community. Surface water drainage is likely being influenced by Beavers based on various site observations. No federally or provincially significant species were documented within this community. Canopy: none Sub-canopy: Pussy Willow (*Salix discolor*), American Elm, Red Maple Understorey: various willows, White Meadowsweet (*Spiraea alba* var. *alba*), Common Elderberry Groundcover: Broad-leaved Cattail, Bluejoint Reedgrass, Reed Canary Grass, Rough Mannagrass (*Glyceria maxima*)

5.4.2 Terrestrial Wildlife

Birds

Forty-one (41) bird species were documented within NAT-03 during site investigations. Of these, three were TRCA-listed hydrologically sensitive bird species. Table 16 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-3 for the bird survey station locations.

A single Hooded Merganser was also observed with evidence of probable breeding (due to agitated behaviour) within the Shallow Aquatic (SA) wetland feature as surveyed from MBB-03D. Four Wood Duck individuals were recorded at this station with evidence of probable breeding. One individual Northern Waterthrush individual was recorded at this station with evidence of possible breeding. No hydrologically sensitive bird species were recorded at any of the other NAT-03 bird survey stations during 2021 or 2022.

Table 16. NAT-03 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Hooded Merganser	High	MBB-03D	1	SA	2022	PR
Wood Duck	Medium	MBB-03D	4	SA	2022	PR
Northern Waterthrush	Medium	MBB-03D	1	SA	2022	PO

Refer to Appendix VI for a list of bird species recorded within NAT-03.

Herpetofauna

Twelve (12) herpetofauna species were documented within NAT-03 across both 2021 and 2022 survey years. One of the incidentally recorded snake species, Northern Ribbonsnake (*Thamnophis sauritus septentrionalis*), is listed as Special Concern in the SARO list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Northern Ribbonsnake was observed in the Mineral Shallow Marsh (MAS2) community at NAT03-5 on April 12, 2022. A single individual SCC Western Chorus Frog was also incidentally recorded at the Deciduous Swamp (SWD4) located within NAT03-5 along 3rd Line on May 9, 2022. Habitat for SCC may be considered a form of SWH (OMNR 2015a).

Of these, eight are TRCA-listed hydrologically sensitive herpetofauna species. Table 17 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-3 for herpetofauna station survey locations.

Table 17. NAT-03 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Snapping Turtle	High	TBO-03F	-	1	OA	2022
		n/a (incidental)	-	1	Road Mortality Assumed SWM/SWT	2021
Midland Painted Turtle	High	TBO-03A	-	1	OA	2022
		TBO-03B	-	1	MAS2	2022
		TBO-03C	-	7	SA	2022
		TBO-03E	-	1	OA	2022
American Toad	Medium	ANR-03C	2	3	SWM/SWT	2021
		ANR-03D	2	7	OA	2022
		n/a (incidental)	-	-	-	2022
Gray Treefrog	High	ANR-03D	1	1	OA	2022
		ANR-03E	1	3	MAS3-1	2022
		ANR-03G	1	1	SWD4/SWT3-2	2022
		ANR-03H	1	1	OA	2022
		n/a (incidental)	1	1	-	2021
			-	-	MAS2	2022
Spring Peeper	High	ANR-03A	3	N/A[1]	SWM/SWT/ MAS3-1	2021
		ANR-03B	1	1	MAM	2021
		ANR-03C	3	N/A[1]	SWM/SWT	2021
		ANR-03D	2	15	OA	2022
		ANR-03E	2	5	MAS3-1	2022
		ANR-03F	2	7	MAS2	2022

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
		ANR-03G	2	6	SWD4/SWT3-2	2022
		ANR-03H	2	3	OA	2022
		n/a (incidental)	3	N/A[1]	-	2021
			3	N/A[1]	TBO-03C	2022
Green Frog	Medium	ANR-03B	1	1	MAM	2021
		ANR-03D	2	6	OA	2022
		ANR-03E	1	4	MAS3-1	2022
		ANR-03F	1	4	MAS2	2022
		ANR-03G	2	7	SWD4/SWT3-2	2022
		ANR-03H	2	5	OA	2022
		n/a (incidental)	-	-	-	2022
Northern Leopard Frog	High	ANR-03A	1	1	SWM/SWT/ MAS3-1	2021
		ANR-03D	2	5	OA	2022
		ANR-03F	1	2	MAS2	2022
		n/a (incidental)	-	-	MAS2	2022
Wood Frog	High	ANR-03D	1	3	OA	2022
		ANR-03E	1	1	MAS3-1	2022

[1]Number of individuals cannot be counted during call codes of rank 3

A complete list of herpetofauna species reported from NAT-03 is provided in Appendix VII.

Anuran Call Surveys

In 2021, four anuran species were recorded at NAT-03: American Toad, Spring Peeper, Green Frog, and Northern Leopard Frog. These species were also recorded in 2022, along with Gray Treefrog and Wood Frog.

Table 18 provides a summary of call codes and the estimated abundance of each species across surveys for each year. Spring Peeper was the most abundant species recorded within the NAT-03 complex, being recorded at full chorus (Call Code 3) at stations ANR-03A, and -03C, and at Call Code 2 at stations ANR-03D, -03E, -03F, and -03G. Several individuals of Green Frog, American Toad and Northern Leopard Frog were also recorded at NAT-03 stations across the 2021 and 2022 survey years. Wood Frog was recorded at relatively lower abundances.

Station ANR-03D consistently had the one of the highest number of individuals heard calling during every survey round, and also had the highest species richness among stations across survey years (six species). This station surveys the Open Aquatic (OA) pond feature. Four species were recorded at station ANR-03E, although with relatively lower abundances among

the species recorded there relative to station ANR-03D. Anuran calling activity was relatively low at stations ANR-03B, where only Spring Peeper and Green Frog were recorded at Call Code 1.

See Map 2-2 and 2-3 for the anuran survey station locations.

Table 18. NAT-03 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
1	ANR-03A	-	-	-	-	-	-	-
		-	-	-	-	-	-	-
	ANR-03B	-	-	-	-	-	-	-
		-	-	-	-	-	-	-
	ANR-03C	-	-	-	-	-	-	-
		-	-	-	-	-	-	-
	ANR-03D	-	-	-	-	-	-	-
		April 25, 2022	2(7)	0	2(11)	0	1(3)	2(5)
	ANR-03E	-	-	-	-	-	-	-
		April 25, 2022	0	0	2(5)	0	1(1)	0
	ANR-03F	-	-	-	-	-	-	-
		April 25, 2022	0	0	1(2)	0	0	1(2)
	ANR-03G	-	-	-	-	-	-	-
		April 25, 2022	0	0	1(1)	0	0	0
	ANR-03H	-	-	-	-	-	-	-
		April 25, 2022	0	0	1(1)	0	0	0
2	ANR-03A	May 18, 2021	0	0	3	0	0	1(1)
		-	-	-	-	-	-	-
	ANR-03B	May 18, 2021	0	0	0	0	0	0
		-	-	-	-	-	-	-
	ANR-03C	May 18, 2021	2(3)	0	3	0	0	0
		-	-	-	-	-	-	-
	ANR-03D	-	-	-	-	-	-	-
		May 25, 2022	0	1(1)	2(4)	0	0	0
	ANR-03E	-	-	-	-	-	-	-
		May 25, 2022	0	1(3)	0	0	0	0
	ANR-03F	-	-	-	-	-	-	-
		May 25, 2022	0	0	2(5)	0	0	0
	ANR-03G	-	-	-	-	-	-	-
		May 25, 2022	0	1(1)	2(5)	0	0	0
	ANR-03H	-	-	-	-	-	-	-
		May 25, 2022	0	1(1)	2(2)	0	0	0
3	ANR-03A	June 17, 2021	0	0	3	0	0	0
		-	-	-	-	-	-	-
	ANR-03B	June 17, 2021	0	0	1(1)	1(1)	0	0
		-	-	-	-	-	-	-
	ANR-03C	June 17, 2021	0	0	0	0	0	0
		-	-	-	-	-	-	-
	ANR-03D	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	2(6)	0	0
	ANR-03E	-	-	-	-	-	-	-

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
		June 28, 2022	0	0	0	1(4)	0	0
	ANR-03F	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	1(4)	0	0
	ANR-03G	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	2(7)	0	0
	ANR-03H	-	-	-	-	-	-	-
		June 24, 2022	0	0	0	2(5)	0	0

Turtle Basking Surveys

Two turtle species were confirmed to occur within NAT-03: Midland Painted Turtle and Snapping Turtle. Midland Painted Turtles were observed during multiple surveys in 2022 at stations TB-03A (the Open Aquatic (OA) pond feature on property NAT03-5), TB-03B (the Mineral Shallow Marsh (MAS2) on property NAT03-5), TB-03C (the large Shallow Aquatic (SA) marsh as viewed from property NAT03-5), and TB-03E (the OA pond feature on property NAT03-6) (Map 2-3). Observed turtle abundance was highest within the SA marsh (TB-03C), where four and three individuals were observed basking on May 11 and June 8, respectively. Only one Midland Painted Turtle was observed at other stations and on other dates.

A single adult male Snapping Turtle was observed swimming in the OA pond located on property NAT03-1 (TBO-03F), adjacent to a White Cedar Organic Mixed Swamp (SWM4) during a turtle basking survey on May 9, 2022. Anecdotally, the property owner also indicated to NRSI biologists that Snapping Turtles have been observed nesting on property NAT03-1. A dead Snapping Turtle was observed alongside County Road 124 at anuran station ANR-03C during the June 17, 2021 site visit. It was presumably following the watercourse and likely made use of the SWM/SWT habitat within the NAT-03 complex. Snapping Turtle is designated as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Habitat for SCC may be considered a form of SWH (OMNR 2015a). However, constructed ponds would not represent SWH.

An NRSI biologist observed a pair of turtles that were possible observations of an NHIC publicly-restricted turtle species. This species is publicly restricted for reasons such as its rarity in Ontario and its sensitivity to poaching, among other impacts. As a result, the name and specific observation locations of restricted species are not publicly identified. They were

generally located in vicinity north of station TB-03C on May 11, 2022. These individuals could not be confirmed as the NHIC-restricted species due to the distance at which they were observed through binoculars, although certain diagnostic characteristics were perceived through the observation. This species is designated as Endangered on the SARO list (MECP 2024); the species and its habitat are therefore regulated under the ESA. This species is not known to occur within the Study Area or elsewhere within Dufferin County. NRSI reported the observation of potential individuals of this species to the NHIC. In a response, the NHIC confirmed that no records for that species occur within Dufferin County (R. Craig, NHIC, pers. comm., July 2022). These turtle observations are therefore undetermined with respect to their species. However, it is possible that the observed individuals represent captive individuals that were released into the environment. Due to the uncertainty surrounding this species observation, this NHIC-restricted species is not addressed further in this report.

No turtles were observed at station TBO-03D, which surveys a portion of the large Willow Organic Thicket Swamp (SWT3-2) community. This area of wetland did not contain large areas of open water that are represented at the other NAT-03 turtle basking stations where turtles were found.

Salamander Trapping Surveys

In 2022, five minnow traps were deployed in NAT-03. Within property NAT-03-05, two were located within the western OA habitat and one was located within the eastern MAS2. Within property NAT-03-06, two were located within the western OA (Map 2-2). No salamanders were captured at the NAT-03 complex trap stations. See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Survey

Amphibian egg mass surveys were not completed at NAT-03.

Other Species

Evidence of four mammal species was observed at NAT-03: Beaver (*Castor canadensis*) (recent chewing within the SWT3-2), Eastern Chipmunk (*Tamias striatus*) (direct observation near the OA on NAT03-6), White-tailed Deer (*Odocoileus virginianus*) (fresh tracks near the SA community), and a bat species (direct observation of two individuals flying overhead) that could not be identified to species. All of the non-bat mammal species that were recorded are common with secure populations in Ontario (OMNR 2021). The unidentified bat species may represent a

SAR bat that is known to occur in the general area (i.e., Little Brown Myotis, Northern Myotis, Tri-colored Bat or Eastern Small-footed Myotis). However, no indirect impacts to SAR bats at NAT-03 are expected to occur as a result of quarry operations; SAR bats at this site are therefore not considered further.

One butterfly species, Eastern Tailed Blue (*Cupido comyntas*), was observed at NAT-03. This species is common with a secure population in Ontario (OMNR 2021).

No odonate species were incidentally observed at NAT-03 during site investigations.

5.4.3 Aquatic Habitat and Fish Community

NAT-03 comprises a broad network of channels that flow to a central location within the north-central portion of the complex and combine to form a series of shallow water ponds and wetland areas. Three primary watercourses flow to this central location.

The first watercourse, as described within Section 5.3.3 crosses 3rd Line at the southwest corner of the complex and flows northeast. This feature was confirmed as fish habitat for a diverse fish community (10 fish species) and was classified as a coolwater feature with Watercress present.

The second watercourse crosses 3rd Line and flows southeast into NAT-03 at the northwest edge of the complex. This watercourse was assessed approximately 200m downstream from 3rd Line (AHP-151). In July 2022 this watercourse exhibited a wetted width ranging from approximately 1.0 to 3.0m with water depths up to approximately 0.26m. Substrates were dominated by sand and silt with some areas of gravel and detritus/muck and aquatic habitat was available in the form of pools/riffles, backwater areas, undercut banks, woody debris, overhanging bank vegetation, and Watercress. The feature provides direct fish habitat for a relatively diverse and abundant fish community. A total of 10 fish species were captured at this location (EMS-002) in July 2022, mainly comprised of coolwater fish species, the most abundant of which was Brook Stickleback, followed by Blacknose Dace and Creek Chub. Based on summer water temperature measurements, the feature exhibits a coolwater thermal regime, which correlates with the capture of coolwater fish species.

The third watercourse appears to originate near the northeastern corner of NAT-03 and flows southwest towards the centre of the complex. This watercourse appears to have been channelized at various locations, but much of the feature is still directly connected to areas of shallow marsh/swamp (AHP-152). This feature provides direct fish habitat for a relatively

diverse fish community. A total of six fish species were captured at this location (EMS-003) in July 2022, mainly comprised of coolwater fish species, the most abundant of which was Central Mudminnow, Brook Stickleback, and juvenile dace species. Based on summer water temperature measurements, the feature exhibits a warmwater thermal regime.

A single watercourse conveys flows from the central portion of NAT-03 to the southeast, eventually crossing County Road 124 at the Shelburne Golf and Country Club. This channel was assessed near the central area of NAT-03 (AHP156) as well as where it crosses County Road 124. The upstream area exhibits a historically channelized form with wetted widths ranging from approximately 0.5-1.3m and water depths up to 0.17m in July 2022. Substrates were dominated by detritus and silt and aquatic habitat was available in the form of shallow pools, backwater areas, undercut banks, woody debris, overhanging bank vegetation, and in-stream aquatic vegetation, including Watercress. The feature provides direct fish habitat for a fish community that was comprised of four fish species in July 2022 (EMS-007), including Brook Stickleback, Central Mudminnow, Northern Redbelly Dace (*Chrosomus eos*) and Creek Chub. Based on summer water temperature measurements, the feature exhibits a warmwater thermal regime. Similar characteristics were observed downstream where the feature crosses County Road 124 (AHP-073), albeit within a more naturalized channel form. At this location the wetted width was approximately 2.25m with water depths measured up to a maximum of 0.19m. One deeper pool was present at the culvert inlet and measured 0.60m deep. Six coolwater species and one warmwater species were captured at this location (EMS-010) and based on summer water temperature measurements, the feature exhibits a warmwater thermal regime. Downstream, and east, from County Road 124 the watercourse flows through two corrugated steel pipes before entering the golf course. These culverts may act as potential barriers to fish movement under low flows.

Overall, it appears that water flowing in to NAT-03 is generally cooler than the water flowing out, suggesting that the network of online ponds that are present through the central portion of the complex likely act to increase water temperatures and shift the overall thermal regime of the watercourse from coolwater to warmwater. Watercress was still noted to be relatively abundant throughout most of the watercourse features. The watercourses flowing to and from the NAT-03 complex were noted to have the most diverse and abundant fish community across the Study Area, comprised mainly of coolwater species. However, no Brook Trout were present at any of the locations sampled within the complex.

A photographic log of aquatic conditions is provided in Appendix XI.

5.5 NAT-04

5.5.1 Vegetation Communities and Species

NAT-04-13 is a large complex predominantly comprised of swamp wetland habitats, with smaller areas of marsh wetland and lowland and upland forests. The complex is located south of County Road 17, and east of 5th Line. The complex was surveyed through detailed on-site investigations where land access was granted, and roadside assessments. See Map 2-4.

Natural feature cover on property NAT-04-02 is approximately 80ha in size and includes a mixture of swamp, marsh and upland forest. All of the wetland units are mapped as unevaluated wetland. A well-defined watercourse is present in the western half of the feature and a poorly defined drainage path crosses the eastern half of the feature which is impeded by a series of beaver dams and a soil berm near the southeast extent of the feature. Site drainage moves north to south. A total of 58 species with low or medium sensitivity to hydrological change were documented from this feature in 2022 including 21 groundwater indicator species. American Golden-saxifrage (*Chrysosplenium americanum*) is considered to be highly sensitive to hydrological change and a strong indicator of groundwater influence. This species is occasional throughout the swamp thicket in the north of the feature where it prefers saturated organic substrates. Species with medium sensitivity that are also groundwater indicators include Yellow Marsh Marigold (*Caltha palustris*), Interior Sedge (*Carex interior*), Tussock Sedge (*C. stricta*), Porcupine Sedge (*C. hystericina*), Yellow Sedge (*C. flava*), Naked Mitrewort (*Mitella nuda*) and Purple Avens (*Geum rivale*).

The only prolific non-native invasive species that was observed is Reed Canary Grass which is most common along watercourse channels. The swamp communities contain a large number of Black Ash, many of which are affected by Emerald Ash Borer (*Agrilus planipennis*) (EAB). Black Ash is designated as Endangered in Ontario (MECP 2024); consequently, this species and its habitat are regulated under the ESA.

Table 19 presents a summary of the wetland ELC communities that were characterized within each of the two accessible properties of the NAT-04 complex. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 19. Wetland and Aquatic Vegetation Communities within Property NAT-04-13

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWC3-1	White Cedar Organic Coniferous Swamp	Medium Hydrologically Sensitive Species Inventoried: High – 0 Medium – 4 Groundwater Indicator Species Inventoried: 4	To the south of the pond, a stand of White Cedar is present on saturated organic soil. Soil auger pits examined within this feature showed water backfilling to near surface level which was similar to the elevation of the standing water in the pond. This swamp receives flow from the north and conveys it south. Medium sensitivity to hydrological change was determined for this community. Canopy: White Cedar, Yellow Birch, Balsam Fir Sub-canopy: White Cedar, Balsam Fir Understorey: White Cedar Groundcover: Sensitive Fern, Spotted Jewelweed, Fowl Manna Grass
SWT3-5 (MAM3-2 complex)	Red-Osier Organic Thicket Swamp (Reed Canary Grass Organic Meadow Marsh complex)	Medium (Medium) Hydrologically Sensitive Species Inventoried: High – 0 Medium – 2 Groundwater Indicator Species Inventoried: 0	Further south of the pond, the White Cedar swamp transitions to a thicket swamp with sparse cover of Red-osier Dogwood and Willow. Small areas of Reed Canary Grass marsh occur among the areas of shrub cover. The areas of marsh contained shallow standing water through the spring. Medium (medium) sensitivity to hydrological change was determined for this community. Canopy: White Cedar, Trembling Aspen Sub-canopy: - Understorey: Red-Osier Dogwood, Salix species Groundcover: Reed Canary Grass, Jewelweed species, Field Horsetail
SWM3-2	Poplar - Conifer Mineral Mixed Swamp Type	Medium Hydrologically Sensitive Species Inventoried: High – 0 Medium – 12 Groundwater Indicator Species Inventoried: 6	The core area of the NAT-04 feature includes two types of treed swamp communities. This mixed swamp is more restricted to the feature edges and is situated on mineral soil. Tree canopy is relatively open which allows for a diverse shrub layer and ground cover. A total of 15 species that are sensitive to hydrological changes were documented from this community, 5 of which are groundwater indicators. Medium sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen, White Cedar Sub-canopy: Trembling Aspen, White Cedar Understorey: Trembling Aspen, Red-osier Dogwood

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Groundcover: Sensitive Fern, Field Horsetail, Fowl Mannagrass
SWM6-2	Poplar - Conifer Organic Mixed Swamp Type	High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 18 Groundwater Indicator Species Inventoried: 9	The SWM6-2 community is located centrally within the NAT-04 feature. In comparison to the mineral swamp that characterizes the edges of the feature, the soil in the central area is comprised of deep, saturated organics. One SAR, Black Ash, is present by the hundreds throughout the understorey. Abundant browse by White-tailed Deer was noted throughout this core area of swamp. High sensitivity to hydrological change was determined for this community. Canopy: Balsam Fir, Trembling Aspen, Paper Birch Sub-canopy: Balsam Fir, Trembling Aspen, Black Ash Understorey: Balsam Fir, Red-osier Dogwood Groundcover: Evergreen Wood Fern, Spinulose Wood Fern, Sedges
SWC/SWM	Coniferous Swamp/Mixed Swamp	Medium-High/Medium-High Detailed inventory not completed	The southern portion of NAT-04 was assessed from the roadside and aerial photography interpretation. A large portion of this area exists as mixed swamp with varying amounts of Trembling Aspen, Balsam Fir, White Cedar and Paper Birch. Medium-high/medium-high sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen, Balsam Fir, White Cedar, Paper Birch Sub-canopy: - Understorey: - Groundcover: -
SWT2-1	Alder Mineral Thicket Swamp	Low-Medium Detailed inventory not completed	Sections of the watercourse along the west side of NAT-04 include stands of Speckled Alder growing in the creek floodplain. The placement of soil parallel to the creek bank suggests that this area is periodically disturbed when municipal drain clean-outs occur. Low to medium sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen Sub-canopy: -

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Understorey: Speckled Alder Groundcover: Dewberry, Goldenrods
SWT3-5	Red-osier Organic Thicket Swamp Type	Medium Hydrologically Sensitive Species Inventoried: High – 2 Medium – 16 Groundwater Indicator Species Inventoried: 8	A large portion of the eastern half of NAT-04 is comprised of thicket swamp growing on organic soil. The microtopography throughout this area is pocked with small depressions of shallow standing water among the grass hummocks and thatch. The 19 species identified as sensitive to hydrological change include conservative species such as Tuckerman's Sedge, Water Horsetail and Drooping Wood Reed. The SAR, Black Ash, constitutes the majority of the sparse tree canopy cover. Medium sensitivity to hydrological change was determined for this community. Canopy: Black Ash Sub-canopy: Black Ash, Balsam Fir Understorey: Red-osier Dogwood, Common Elderberry Groundcover: Fowl Mannagrass, Spotted Joe Pye Weed, Reed Canary Grass
MAM3-2	Reed-canary Grass Organic Meadow Marsh Type	Medium Detailed inventory not completed	A small area of Reed Canary Grass marsh is present along the watercourse in the far northern extent of the feature. Although surrounded by diverse mixed swamp, this inclusion is a low diversity monoculture of this invasive grass species. Medium sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: - Understorey: - Groundcover: Reed Canary Grass
MAM2	Meadow Marsh	Low-Medium Detailed inventory not completed	In the southwest extent of NAT-04, adjacent to 5th Line, a marsh is present on both side of the watercourse. Although dominated by non-native Reed Canary Grass, a good diversity of other wetland grasses and forbs were noted from the roadside. Low to medium sensitivity to hydrological change was determined for this community. Canopy: American Elm, Balsam Fir

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Sub-canopy: - Understorey: Bebb's Willow Groundcover: Reed Canary Grass, Broad-leaved Cattail, Swamp Aster

5.5.2 Terrestrial Wildlife

Birds

Forty-six (46) bird species were documented within NAT-04 during site investigations. Of these, none were TRCA-listed hydrologically sensitive bird species. Refer to Appendix VI for a list of all bird species recorded within NAT-04, including their breeding evidence codes.

Herpetofauna

Nine herpetofauna species were documented within NAT-04 across both 2021 and 2022 survey years. A complete list of herpetofauna species reported from NAT-04 is provided in Appendix VII. One of the incidentally recorded snake species, Northern Ribbonsnake, is listed as Special Concern in the SARO list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Northern Ribbonsnake was observed crossing the creek in the Mineral Cultural Meadow (CUM1) at NAT-04-13 on April 14, 2022. Western Chorus Frog was also incidentally recorded as calling from the area of the Open Aquatic (OA) pond or the adjacent White Cedar Organic Coniferous Swamp (SWC3-1) at the north end of the complex; a calling code was not recorded as part of this observation. Habitat for SCC may be considered a form of SWH (OMNR 2015a).

Of these, eight are TRCA-listed hydrologically sensitive herpetofauna species. Table 20 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-4 for herpetofauna station survey locations.

Table 20. NAT-04 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Midland Painted Turtle	High	TBO-04A	-	1	OA/SWC3-1	2021
		TBO-04A	-	2	OA/SWC3-1	2022
	Medium	ANR-04A	2	3	-	2021

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
American Toad		ANR-04D	1	1	FOD8-1 with SWT2-1 inclusion	2022
		ANR-04E	1	2	SWM3-2	2022
		ANR-04F	1	2	SWT3-5	2022
		ANR-04G	1	1	SWM6-2 with MAM3-2 inclusion	2022
		ANR-04H	1	1	SWT3-5	2022
		n/a (incidental)	-	-	FOM6-2 with SWT3-5 and MAM3 inclusions	2022
			-	-	FOC4-1	2022
Gray Treefrog	High	ANR-04E	2	8	SWM3-2	2022
		ANR-04F	2	5	SWT3-5	2022
		ANR-04G	2	5	SWM6-2 with MAM3-2 inclusion	2022
		ANR-04H	1	3	SWT3-5	2022
		n/a (incidental)	-	-	FOM6-2 with SWT3-5 and MAM3 inclusions	2022
			-	-	FOC4-1	2022
			-	-	SWT3-5	2022
Spring Peeper	High	ANR-04A	3	N/A[1]	-	2021
			1	2	-	2022
		ANR-04B	3	N/A[1]	SWC/SWM	2021
			2	3	SWC/SWM	2022
		ANR-04D	2	5	FOD8-1 with SWT2-1 inclusion	2022
		ANR-04E	1	3	SWM3-2	2022
		ANR-04F	1	5	SWT3-5	2022
		ANR-04G	1	6	SWM6-2 with MAM3-2 inclusion	2022
		ANR-04H	2	5	SWT3-5	2022
		n/a (incidental)	3	N/A[1]	FOD8-1 with SWT2-1 inclusion	2022
			3	N/A[1]	SWM3-2	2022
			3	N/A[1]	SWT3-5	2022
			3	N/A[1]	SWT3-5	2022
			3	N/A[1]	OA/SWC3-1	2022
Green Frog	Medium	ANR-04H	1	4	SWT3-5	2022
		N/A Incidental	-	-	SWT3-5 with MAM3-2 inclusion	2022
Northern Leopard Frog	High	ANR-04B	1	2	SWC/SWM	2021
		n/a (incidental)	-	-	-	2022
Wood Frog	High	ANR-04E	1	1	SWM3-2	2022
		ANR-04F	1	4	SWT3-5	2022
		ANR-04H	1	5	SWT3-5	2022

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
		n/a (incidental)	-	-	-	2022
Western Chorus Frog	High	n/a (incidental)	-	-	OA/SWC3 (at TBO-04A)	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

In 2021, three anuran species were recorded at NAT-04: American Toad, Northern Leopard Frog, and Spring Peeper.

In 2022, five anuran species were recorded at NAT-04 during call surveys: American Toad, Gray Treefrog, Spring Peeper, Green Frog, and Wood Frog. A Western Chorus Frog was also incidentally heard calling within the Red-osier Organic Thicket Swamp (SWT3-5) during field investigations, outside of the anuran call survey (April 22, 2022). This represents ideal habitat for the species. Habitat for SCC may be considered a form of SWH (OMNR 2015a). Table 21 provides a summary of call codes and the estimated abundance of each species across surveys for both years. See Map 2-4 for the anuran survey station locations.

Table 21. NAT-04 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
1	ANR-04A	April 27, 2021	0	0	0	0	0	0
		May 2, 2022	0	0	1(2)	0	0	0
	ANR-04B	April 27, 2021	0	0	2(4)	0	0	1(2)
		May 2, 2022	0	0	0	0	0	0
	ANR-04D	-	-	-	-	-	-	-
		April 25, 2022	1(1)	0	2(4)	0	0	0
	ANR-04E	-	-	-	-	-	-	-
		April 25, 2022	1(1)	0	1(1)	0	1(1)	0
	ANR-04F	-	-	-	-	-	-	-
		April 25, 2022	1(2)	0	1(2)	0	1(4)	0
	ANR-04G	-	-	-	-	-	-	-
		April 25, 2022	1(1)	0	1(5)	0	0	0
	ANR-04H	-	-	-	-	-	-	-
		April 25, 2022	1(1)	0	2(5)	0	1(5)	0
2	ANR-04A	May 18, 2021	2(3)	0	3	0	0	0
		May 25, 2022	0	0	0	0	0	0
	ANR-04B	May 18, 2021	0	0	3	0	0	0
		May 25, 2022	0	0	2(3)	0	0	0
	ANR-04D	-	-	-	-	-	-	-
		May 25, 2022	0	0	1(1)	0	0	0
	ANR-04E	-	-	-	-	-	-	-

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
		May 25, 2022	1(1)	2(8)	1(2)	0	0	0
	ANR-04F	-	-	-	-	-	-	-
		May 25, 2022	0	2(5)	1(3)	0	0	0
	ANR-04G	-	-	-	-	-	-	-
		May 25, 2022	0	2(5)	1(1)	0	0	0
	ANR-04H	-	-	-	-	-	-	-
		May 30, 2022	0	1(3)	0	1(4)	0	0
3	ANR-04A	June 17, 2021	0	0	0	0	0	0
		June 28, 2022	0	0	0	0	0	0
	ANR-04B	June 12, 2021	0	0	0	0	0	0
		June 28, 2022	0	0	0	0	0	0
	ANR-04D	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	0	0	0
	ANR-04E	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	0	0	0
	ANR-04F	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	0	0	0
	ANR-04G	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	0	0	0
	ANR-04H	-	-	-	-	-	-	-
		June 28, 2022	0	0	0	0	0	0

During the May 18, 2021 survey, full choruses of Spring Peeper were heard at roadside stations ANR-04A and ANR-04B. These stations survey portions of the western Coniferous Swamp community (SWC, represented by ANR-04A), and western Mineral Meadow Marsh (MAM2, represented by ANR-04B). During the April 27, 2021 survey, a full chorus (Call Code 3) of Spring Peepers was also heard calling beyond 100m from ANR-04B, within the MAM2 community. Similar to 2022, no anurans were heard calling at either of the stations during the June 17, 2021 survey.

In 2022, choruses of Spring Peeper were heard calling beyond 100m from stations ANR-04D, ANR-04E, ANR-04F, and ANR-04H during the April 25, 2022 survey. These areas of highest calling activity likely corresponded to the Alder Mineral Thicket Swamp inclusion (SWT2-1) (ANR-04D), northern and southern Poplar-Conifer Organic Mixed Swamp communities (SWM6-

2) (ANR-04E and ANR-04F), Red-osier Organic Thicket Swamp (SWT3-5) (ANR-04F), and the northern White Cedar Organic Coniferous Swamp (SWC3-1) (ANR-04H).

No anurans were heard calling at any of the stations during the June 28, 2022 survey. Biologists noted that water within stations ANR-04E, ANR-04F, and ANR-04G had dried up by the third survey round.

Turtle Basking Surveys

In 2022, one turtle species was observed at NAT-04: Midland Painted Turtle. Two individuals were observed at TBO-04a during the June 8, 2022 survey. This station surveys the SWC3-1 coniferous swamp and adjacent OA pond feature. A single Midland Painted Turtle was observed on April 6, 2021, at the roadside station TBO-04A (Map 2-4). No turtles were recorded at other survey stations or on other dates within the NAT-04 complex.

Salamander Trapping Surveys

In 2022, five minnow traps were deployed at NAT-04, specifically within property NAT04-13. Traps were established within the Fresh-Moist Hardwood-Hemlock Mixed Forest (FOM6-2) (with Red-osier Organic Thicket Swamp (SWT3-5) and Organic Meadow Marsh (MAM3) inclusions) community (Map 2-4). No salamanders were captured at the NAT-04 complex trap stations. See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Survey

Amphibian egg mass surveys were not completed at NAT-04.

Other Species

Three mammal species were recorded during site investigations at NAT-04: Eastern Cottontail (*Sylvilagus floridanus*) (direct observation), Eastern Chipmunk (direct observation), and White-tailed Deer (indirect observation).

Four butterfly species were observed at NAT-04: Common Checkered Skipper (*Pyrgus communis*), Spring Azure (*Celastrina ladon*), Mourning Cloak, and Painted Lady (*Vanessa cardui*). None of these species are considered federally or provincially significant, and all have secure populations in Ontario (OMNR 2021).

One odonate species, Twelve-Spotted Skimmer (*Libellula pulchella*), was incidentally observed at NAT-04 during site investigations. This species is common with a secure population in Ontario (OMNR 2021).

5.5.3 Aquatic Habitat and Fish Community

The primary watercourse within NAT-04 flows south as a permanent feature through a straightened channel along the western edge of the complex (AHP-150). In July 2022 the wetted width ranged from 2.2-2.5m with water depths up to approximately 0.09m. Substrates were dominated by cobble with some gravel, detritus and sand. Aquatic habitat was available in the form of riffles, cobble/gravel substrates, and Watercress in addition to some woody debris. This watercourse was classified as a coldwater feature and appears to provide ideal nursery and rearing habitat for Brook Trout. During fish community sampling a total of 37 young-of-year (yoy) and juvenile Brook Trout were captured ranging from 33 to 68mm in length (EMS-001). The presence of yoy and juvenile Brook Trout at this location suggest that spawning is likely to occur within the watercourse.

A secondary watercourse appears to originate within the southeast section of NAT-04. Due to access restrictions this feature could not be assessed within the complex. However, the feature was assessed from the roadside approximately 1.3km downstream where it crosses south under Sideroad 5. At this location the feature was flowing during both winter and summer visits and Watercress was observed throughout the channel. Summer water temperature measurements characterize the feature as coldwater, suggesting that the upstream stretch, including its origin within NAT-04, is groundwater-fed. This watercourse flows into a larger watercourse southeast of Sideroad 5 and 4th Line, which is known to support Brook Trout. It is likely that the feature, which receives flow from NAT-04, also supports Brook Trout throughout its lower reach.

A photographic log of aquatic conditions is provided in Appendix XI.

5.6 NAT-14

5.6.1 Vegetation Communities and Species

NAT-14 is a relatively smaller complex and is predominantly comprised of various wetland habitat types, including swamp, marsh, and shallow water wetland. Forested upland habitats also exist within the complex. The complex is located north and south of Sideroad 15, in

between 3rd Line and County Road 124. The complex was surveyed through detailed on-site investigations where land access was granted, and roadside assessments.

NAT-14 is approximately 16ha in size and includes a large area of mixed swamp on organic soil as well as swamp thicket and small areas of conifer-dominant swamp. All of the wetland units are mapped as unevaluated wetland. A manicured pond is also present adjacent to a residence on the south side of Sideroad 15. The vascular plant surveys conducted in 2022 documented a total of 35 species that are considered sensitive to hydrological change including Bristle-stalked Sedge (*Carex leptalea*) and Two-seeded Sedge (*C. disperma*), both of which are conservative species with high sensitivity to change. Other notable species with medium tolerance to change include Showy Lady's-slipper (*Cypripedium reginae*), Water Speedwell (*Veronica anagallis-aquatica*), Yellow Sedge, Inland Sedge (*C. interior*) and Tussock Sedge. Most of the hydrologically sensitive species and groundwater indicators occur within 50m of the watercourse or lining the roadside ditches.

At NAT-14, groundwater seepage features occur as broad bands of saturated organic soil within the mixed and conifer-dominated swamp communities along the watercourse, both on the north and south side of Sideroad 15. Seepage was particularly evident on the south side of the road where water was emanating from a gentle slope and slowly trickling across the organic substrate to reach the watercourse.

Table 22 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 22. Wetland and Aquatic Vegetation Communities within NAT-14

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWM6-2	Poplar - Conifer Organic Mixed Swamp Type	High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 17 Groundwater Indicator Species Inventoried: 11	An area of mid-age mixed swamp is present on the north side of Sideroad 15. The feature supports a diversity of common wetland shrubs and forbs with soil conditions becoming wetter closer to the watercourse. A number of mid-age Black Ash, a SAR, occur throughout this community. The accumulation of organic soil is approximately 50cm deep, underlain by poorly drained silty clay. High sensitivity to hydrological change was determined for this community. High

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			sensitivity to hydrological change was determined for this community. Canopy: White Cedar, Trembling Aspen, Tamarack, Balsam Fir Sub-canopy: White Cedar, Trembling Aspen, Black Ash Understorey: Red-osier Dogwood, Willow species, Currant species, White Cedar Groundcover: Tall Mannagrass, Sedges, Swamp Aster, Field Horsetail
SWD4	Mineral Deciduous Swamp Ecosite	Low-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 15 Groundwater Indicator Species Inventoried: 7	Near the northwest corner of the NAT-14 complex, a linear stand of Trembling Aspen includes a swamp that transitions to a lowland poplar forest further northwest. This feature appears to be a topographic depression that directs surface water from the fields to the northwest toward the watercourse to the southeast. During the 2022 surveys, recent tree harvesting had occurred which resulted in a flush of wetland forbs and grasses that would typically be suppressed by tree canopy. This community resembles the SWM6-2 swamp, but with much lower conifer cover and mineral-based soil. Conditions become wetter to the east closer to the watercourse. A total of 16 species with a medium sensitivity to hydrological change were noted, 7 of which are groundwater indicators. Low to high sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen, White Cedar Sub-canopy: Trembling Aspen, Paper Birch Understorey: Red-osier Dogwood, Trembling Aspen Groundcover: Goldenrod species, Sensitive Fern, Swamp Aster
SWT3-5	Red-osier Organic Thicket Swamp Type	Medium Detailed inventory not completed	A small inclusion of swamp thicket is present to the east of the manicured pond. Overflow from the pond, which has a berm at the east end, flows into the swamp thicket community. Beneath a shallow layer of organic material, the silty-clay soil contains marl, indicating groundwater upwelling. The pond itself may be spring-fed or maintained by seepage from the gentle east-facing slope. Many of the 17 species with a medium sensitivity to hydrological change were observed in this inclusion of the larger SWM6-2 community. Medium sensitivity to hydrological change was determined for this community.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Canopy: Trembling Aspen Sub-canopy: - Understorey: Red-osier Dogwood, Willow species Groundcover: Field Horsetail, Swamp Aster, Spotted Joe Pye Weed
SWC3	White Cedar Organic Coniferous Swamp	Medium-High Detailed inventory not completed	This community was delineated through airphoto review and roadside observations. It exists in the west portion of the complex south of Sideroad 15. Medium to high sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: White Cedar, White Spruce, Balsam Poplar Sub-canopy: White Cedar, Green Ash, Balsam Fir Understorey: Red-osier Dogwood, various willows, Green Ash Groundcover: Spotted Jewelweed, Swamp Aster, Rough-stemmed Goldenrod (*Solidago rugosa*), Inland Sedge
SWC/SWM	Coniferous Swamp / Mixed Swamp	Medium-High/Medium-High Detailed inventory not completed	This community was delineated through airphoto review and roadside observations. It exists in the central portion of the complex north of Sideroad 15. Medium-high/medium-high sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: White Cedar, White Spruce, American Elm Sub-canopy: White Cedar, Green Ash, Balsam Poplar Understorey: Red-osier Dogwood, various willows, Green Ash Groundcover: Spotted Jewelweed, Wild Lily-of-the-valley (*Maianthemum canadense*), Bulblet Fern (*Cystopteris bulbifera*)
MAM3	Organic Meadow Marsh	Medium-High Detailed inventory not completed	This community was delineated through airphoto review and was not viewable from the roadside. It exists in the east portion of the complex north of Sideroad 15. Medium to high sensitivity to

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			hydrological change was determined for this community.
SA	Shallow Water	-	This community was delineated through airphoto review and was not viewable from the roadside. It exists in the east portion of the complex north of Sideroad 15.
OA	Open Water	-	These communities were delineated through airphoto review and were not viewable from the roadside. The features were constructed and manicured ponds and exist in the west portion of the complex south of Sideroad 15. It is expected that groundwater provides some or all of the water in these features.

5.6.2 Terrestrial Wildlife

Birds

Fifty-four (54) bird species were documented within NAT-14 during site investigations. Of these, two were TRCA-listed hydrologically sensitive bird species. Table 23 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-5 for the bird survey station locations.

One individual Marsh Wren was observed at station MBB14-B, which surveys the Shallow Aquatic (SA) wetland associated with the watercourse channel north of its crossing of Sideroad 15. This species was observed once during the 2022 survey period, representing evidence of possible breeding within the vicinity of the station. In 2021, Northern Waterthrush was recorded with evidence of confirmed breeding (i.e., an individual was observed carrying food) at station MBB-14A, which surveys the Poplar-Conifer Mixed Swamp (SWM6-2) complex with Red-osier Thicket Swamp (SWT3-5) inclusion. In 2022, Northern Waterthrush was recorded during both surveys at this station.

Table 23. NAT-14 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Marsh Wren	Medium	MBB-14B	1	SA	2022	PO
Northern Waterthrush	Medium	BMB-14A	1	SWM6-2 (with SWT3-5 inclusion)	2021	CO
		BMB-14A	4		2022	PR

Refer to Appendix VI for a list of all bird species recorded within NAT-14, including their breeding evidence codes.

Herpetofauna

Six herpetofauna species were documented within NAT-14, across 2021 and 2022 survey years. A complete list of herpetofauna species reported from NAT-14 is provided in Appendix VII.

All six herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 24 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-5 for herpetofauna station survey locations.

Table 24. NAT-14 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
American Toad	Medium	ANR-14D	2	5	SA	2021
		ANR-14E	2	4	SWM6-2 (SWT3-5 inclusion)	2021
		ANR-14F	1	1	MAM	2022
		n/a (incidental)	1	1	OA	2021
Gray Treefrog	High	ANR-14B	1	4	OA	2021
Spring Peeper	High	ANR-14A	2	6	SWC	2022
		ANR-14C	1	1	MAM/SWD	2022
		ANR-14D	3	N/A[1]	SA	2021
			2	5		2022
		ANR-14E	2	7	SWM6-2 (SWT3-5 inclusion)	2021
			2	6		2022
		n/a (incidental)	3	N/A[1]	OA	2021
Green Frog	Medium	ANR-14D	1	1	SA	2021
			2	3		2022
Northern Leopard Frog	High	ANR-14B	1	1	OA	2022
		ANR-14D	1	1	SA	2022
		ANR-14E	1	1	SWM6-2 (SWT3-5 inclusion)	2022
Wood Frog	High	ANR-14C	1	1	MAM/SWD	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

In total, six anuran species were recorded at NAT-14 between the 2021 and 2022 survey years: American Toad, Gray Treefrog, Spring Peeper, Green Frog, Northern Leopard Frog and Wood

Frog. Table 25 provides a summary of call codes and the estimated abundance of each species across surveys.

Spring Peeper was the most abundant species recorded across NAT-14 stations, although the species was only recorded at full chorus (Call Code 3) at one station (ANR-14D). Several individuals (at Call Code 2) were counted at stations ANR-14A, -14D, and -14E during the 2021 and 2022 survey years. Multiple American Toads (at Call Code 2) were also recorded at stations ANR-14D and -14E during the May 18, 2021 survey. The other species were recorded at generally low abundances. Little calling activity was detected during the June survey visit during both years.

The greatest species richness was recorded at station ANR-14D, where four species were recorded. This station also contained the greatest abundance of calling individuals, where Spring Peepers were recorded at full chorus and where multiple American Toads were heard calling. Spring Peeper and American Toad were also recorded at Call Code 2 at stations ANR-14A and -14E. By contrast, relatively little calling activity was recorded at ANR-14B, and only a single American Toad was recorded calling at station ANR-14F across both survey years.

Table 25. NAT-14 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
1	ANR-14A	-	-	-	-	-	-	-
		April 25, 2022	0	0	2(6)	0	0	0
	ANR-14B	April 21, 2021	0	0	0	0	0	0
		May 2, 2022	0	0	0	0	0	0
	ANR-14C	-	-	-	-	-	-	-
		May 2, 2022	0	0	1(1)	0	1(1)	0
	ANR-14D	April 21, 2021	0	0	3	0	0	0
		April 25, 2022	0	0	2(5)	0	0	1(1)
	ANR-14E	April 21, 2021	0	0	2(3)	0	0	0
		April 25, 2022	0	0	0	0	0	0
	ANR-14F	-	-	-	-	-	-	-
		April 25, 2022	1(1)	0	0	0	0	0
2	ANR-14A	-	-	-	-	-	-	-
		May 30, 2022	0	0	0	0	0	0
	ANR-14B	May 18, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	1(1)
	ANR-14C	-	-	-	-	-	-	-
		May 19, 2022	0	0	0	0	0	0
	ANR-14D	May 18, 2021	2(5)	0	2(7)	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-14E	May 18, 2021	2(4)	0	1(4)	0	0	0
		May 19, 2022	0	0	2(6)	0	0	1(1)
	ANR-14F	-	-	-	-	-	-	-
		May 19, 2022	0	0	0	0	0	0

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
3	ANR-14A	-	-	-	-	-	-	-
		July 1, 2022	0	0	0	0	0	0
	ANR-14B	June 30, 2021	0	1(4)	0	0	0	0
		July 1, 2022	0	0	0	0	0	0
	ANR-14C	-	-	-	-	-	-	-
		July 1, 2022	0	0	0	0	0	0
	ANR-14D	June 30, 2021	0	0	0	1(1)	0	0
		July 1, 2022	0	0	0	2(3)	0	0
	ANR-14E	June 30, 2021	0	0	0	0	0	0
		July 1, 2022	0	0	0	0	0	0
	ANR-14F	-	-	-	-	-	-	-
		July 1, 2022	0	0	0	0	0	0

Turtle Basking Surveys

No turtles were observed basking at either station TBO-14A or -14B during the 2021 and 2022 survey periods. TBO-14A surveys the manicured pond located on property NAT14-3, while TBO-14B surveys the watercourse crossing and associated riparian Shallow Aquatic (SA) wetland habitat at Sideroad 15 (Map 2-5).

Salamander Trapping Surveys

In 2022, two minnow traps were deployed in NAT-14. Each trap was established within opposite ends of the manicured pond located on property NAT14-3 (Map 2-5). No salamanders were observed at NAT-14 complex trap stations. See Appendix X for a summary of salamander trap check results collected across all site visits.

Other Species

One mammal species, Beaver, was recorded during site investigations at NAT-14. A dam was observed within the Shallow Aquatic (SA) community on June 16, 2022.

One butterfly species, Mourning Cloak, was observed at NAT-14. This species is not considered federally or provincially significant; it has a secure population in Ontario (OMNR 2021).

No odonate species were incidentally observed at NAT-14 during site investigations.

5.6.3 Aquatic Habitat and Fish Community

One permanent watercourse flows generally east through the coniferous swamp and marsh ecotypes associated with NAT-14. The feature was assessed at several locations along 3rd Line (AHP-018, AHP-019, and AHP-157), west of the complex and then along Sideroad 15 at two locations where it crosses the central portion (AHP-017) and at the eastern extent (AHP-016). The feature generally flows through a natural channel apart from a section of hardened channel associated with the residential property east of 3rd Line, and south of Sideroad 15. Historically, this property has acted as a trout hatchery and rearing operation (G. Hunter, Hunter and Associates, pers. comm., March 2024), which pulls water from the natural channel and diverts it through a series of rearing ponds and buildings. Apart from this residential property, the majority of the watercourse flows through coniferous swamp within NAT-14, but transitions to open meadow marsh habitat throughout the eastern section. Aerial imagery prior to 2021 shows shallow ponded water extending north from Sideroad 15 through MAM3 at the eastern extent of NAT-14. This was attributed to beaver activity during site surveys in 2021 and 2022, at which time the pond was no longer present but evidence of a beaver dam was observed. The watercourse provides direct fish habitat and was open and flowing during both winter and summer surveys between 2020 and 2022. Substrates throughout the watercourse range from gravel and cobble, primarily in the vicinity of 3rd Line to sand and silt, which was dominant at the crossings of Sideroad 15 through the central and eastern areas of NAT-14. Aquatic habitat is provided by riffle/pool habitat, cobble and gravel substrates, woody debris, undercut banks, overhanging bank vegetation, and Watercress, which was observed in moderate abundance throughout the watercourse. Summer water temperature measurements characterize the feature as both coolwater and coldwater, which was dependent on the location assessed. The watercourse was classified as coldwater at the crossing of Sideroad 15 in the central section of NAT-14 but was coolwater at the eastern extent of the complex. Fish community sampling was conducted adjacent to 3rd Line, upstream from NAT-14 (EMS-008). In total, 37 Brook Trout were captured, including yoy and adults ranging from ranging from 55 to 150mm in length. This suggests that the watercourse likely provides spawning habitat, in addition to rearing and foraging habitat.

A photographic log of aquatic conditions Is provided in Appendix XI.

5.7 NAT-15

5.7.1 Vegetation Communities and Species

NAT-15 includes two tributaries in deeply incised valleys that converge at a mill pond at the northeast end of Horning's Mills. The feature is approximately 35ha in size and includes large areas of palustrine swamp in both watercourse reaches. The wetland units are part of the Terra Nova PSW Complex. The broad floodplains contain deep deposits of organic soil that support coniferous and mixed swamp. The eastern "arm" of this feature was also observed to contain some visible seepages that support groundwater-associated plant species within these organic swamp bottomlands. Both Wild Calla (*Calla palustris*) and Rough-leaved Goldenrod (*Solidago patula*) are considered highly sensitive and were observed to be rare and occasional in the surveyed habitat, respectively. Other notable species that occur occasionally throughout the swamps and marshes include Marsh Seedbox (*Ludwigia palustris*), Water Horsetail (*Equisetum fluviatile*), Hemlock Water-parsley (*Sium suave*), Marsh Bedstraw (*Galium palustre*) and Woolly Sedge (*Carex pellita*). These are among 36 observed species that are considered to have medium sensitivity to hydrological change. Vegetation surveys conducted in 2022 in the eastern arm found the vegetation composition to be of very high quality and the habitat is an exemplary bottomland with groundwater influence demonstrated by the prevalence of conservative species throughout.

Table 26 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 26. Wetland and Aquatic Vegetation Communities within NAT-15

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWC3-2	White Cedar— Conifer Organic Coniferous Swamp Type	High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 9 Groundwater Indicator Species Inventoried: 6	A large portion of the eastern arm of NAT-15, to the north of Sideroad 15, is comprised of high-quality coniferous swamp. The groundcover includes a rich assemblage of forbs and graminoids that occur on a complex microtopography of moss-covered hummocks and depressions. The 9 documented species that are sensitive to hydrological change include 6 groundwater indicator species. The hydrology of this feature is the result of a combination of the watercourse and groundwater

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			inputs. During the 2022 surveys, this community was among the most botanically-rich throughout the Study Area. High sensitivity to hydrological change was determined for this community. A single federally significant species, Black Ash, was documented within this community. Young Black Ash trees and saplings primarily occur in mixed stands and where canopy gaps occur among dense conifer cover. However, Emerald Ash borer has killed essentially all mature Black Ash trees and no large diameter, fruit-producing trees were observed. Canopy: White Cedar, White Spruce, Balsam Fir Sub-canopy: White Cedar, Balsam Fir Understorey: White Cedar, Balsam Fir, Mountain Maple, Sugar Maple Groundcover: Sensitive Fern, Common Oak Fern, Fowl Mannagrass, Brownish Sedge
SWC/SWM	Coniferous Swamp/ Mixed Swamp	Medium-High/Medium-High Detailed inventory not completed	The upper reaches of NAT-15 were not surveyed due to land access limitations. A review of aerial photography and existing wetland mapping suggests that the bottomland areas contain conifer or mixed swamp communities. It is likely that the structure and species composition of these areas resembles the SWC3-2 community. Where direct land access was not available, a roadside assessment was completed. Medium-high/medium-high sensitivity to hydrological change was determined for this community. Canopy: White Cedar, White Spruce, Balsam Poplar, Yellow Birch Sub-canopy: White Cedar, American Basswood (*Tilia americana*), Green Ash, American Elm Understorey: Green Ash, Red-osier Dogwood, Bittersweet Nightshade Groundcover: Spotted Jewelweed, Yellow Marsh Marigold, Panicled Aster, Purple Meadow-rue
MAM3-2	Reed-canary Grass Organic Meadow Marsh Type	Medium Detailed inventory not completed	A marsh community is present at the Sideroad 15 crossing of the western arm of NAT-15. A total of 11 species that are sensitive to

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			hydrological change were observed from the roadside including 6 species that are considered groundwater indicators. During the 2022 surveys, a local landowner noted to NRSI biologists that the western arm of NAT-15 exhibits flashy surface water flow during the spring melt. Medium sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: American Elm, Green Ash Understorey: Red-osier Dogwood Groundcover: Reed Canary Grass, Sedges, Purple Meadow-rue
MAM3-4	Fowl Manna Grass Organic Meadow Marsh Type	Medium Hydrologically Sensitive Species Inventoried: High – 1 Medium – 12 Groundwater Indicator Species Inventoried: 8	A marsh community is present within the eastern reach of NAT-15, to the north of Sideroad 15. The eastern edge of this community is defined by the edge of the watercourse where patches of Watercress were observed. The deep organic soil remains saturated throughout the growing season. A total of 15 species considered to be sensitive to hydrological change, 8 of them groundwater indicators, were observed in this community. Medium sensitivity to hydrological change was determined for this community. Canopy: White Cedar, Balsam Fir Sub-canopy: White Cedar, Balsam Fir Understorey: White Cedar, Balsam Fir Groundcover: Fowl Mannagrass, Reed Canary Grass, Broad-leaved Cattail
MAM/MAS	Meadow Marsh/Shallow Marsh	Medium-High/Medium-High Detailed inventory not completed	An area of marsh is present in the westerm arm of the feature, to the north of Sideroad 15. This area was not surveyed due to land access limitations, but it is likely that the groundcover is a mixture of graminoids. Wetter portions of the feature (MAS) may include robust emergent species such as Broad-leaved Cattail. Medium-high/medium-high sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: -

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Understorey: - Groundcover: Reed Canary Grass, Sedges
SA	Shallow Water	-	Two areas of permanent shallow water are present within NAT-15. The long-established dam near the end of Mill Lane retains water in the mill pond reservoir with vegetation limited to the fringe of the feature. A second shallow water feature is present in the western arm of the NAT-15 feature and appears to be a section of the watercourse with a berm in place to hold water in an excavated pond. Canopy: - Sub-canopy: - Understorey: - Groundcover: -
Forest			
FOC2-2	Dry– Fresh White Cedar Coniferous Forest Type	-	Within the eastern reach of NAT-15, the eastern forested slope is comprised of a low diversity stand of White Cedar and sparse groundcover. Both White Cedar and Balsam Fir are groundwater indicators and suggest that the slope contributes groundwater input to the adjacent wetland and watercourse. Canopy: White Cedar Sub-canopy: White Cedar Understorey: White Cedar, Balsam Fir Groundcover: Large False Solomon's Seal, Wild Lily-of-the-valley, Giant Blue Cohosh
FOC4-1	Fresh– Moist White Cedar Coniferous Forest Type	-	To the north and east of the dam reservoir, a low-lying conifer forest community occurs on gentle slopes that is a transitional zone between the adjacent tableland and the watercourse. Small areas of conifer plantation and meadow marsh are present in the upper and lower elevations of this community respectively. With the exception of White Cedar, all of the 11 species noted to be sensitive to hydrological change, including 6 groundwater indicator species, occur within the marsh inclusion at the upstream extent of the reservoir. Canopy: White Cedar, Black Cherry Sub-canopy: White Cedar, Black Cherry

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Understorey: White Cedar, Alternate-leaved Dogwood, Black Cherry Groundcover: Sedges (*Carex* spp.), Horsetails (*Equisetum* spp.)
FOD5-10	Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type	-	The eastern reach of NAT-15, to the north of Sideroad 15, includes a steep forested slope. The slope is approximately 10m high with a well-defined transition to wetland communities at the toe-of-slope. No groundwater indicator species were documented from this community and it is not sensitive to hydrological change. Canopy: Sugar Maple, Paper Birch, American Basswood, Black Cherry Sub-canopy: Sugar Maple, Paper Birch Understorey: Sugar Maple, American Basswood, White Cedar Groundcover: Large False Solomon's Seal, Yellow Trout-lily, Long-stalked Sedge, Canada Yew
FOM4	Dry– Fresh White Cedar Mixed Forest Ecosite	-	The FOD5-10 slope described above transitions to a mixed forest slope with greater cover of Eastern White Cedar and a patchier groundcover. The presence of groundwater indicators including White Cedar and Bulblet Fern situated on the slope suggests that the complex of wetlands in the floodplain to the east are receiving groundwater input from this portion of the slope. Canopy: White Cedar, Black Cherry, Sugar Maple, Yellow Birch Sub-canopy: White Cedar, Sugar Maple Understorey: White Cedar, Sugar Maple Groundcover: Large False Solomon's Seal, Evergreen Wood Fern, Giant Blue Cohosh
Cultural			
CUP3	Coniferous Plantations	-	A mature Eastern White Pine plantation is located north of Sideroad 15. The plantation south of Sideroad 15, to the east of the reservoir, is comprised of White Pine, Norway Spruce and Scots Pine. Both communities are upland and do not contain species that are sensitivity to hydrological change.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			Canopy: Eastern White Pine, Norway Spruce, Scots Pine Sub-canopy: n/a Understorey: n/a Groundcover: n/a

5.7.2 Terrestrial Wildlife

Birds

Fifty-seven (57) bird species were documented within NAT-15 during site investigations. Of these, two were TRCA-listed hydrologically sensitive bird species. Table 27 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-6 for the bird survey station locations

Northern Waterthrush was recorded during both 2021 surveys at station MBB-15A, which surveys a Meadow Marsh (MAM3) wetland south of Sideroad 15. This represents evidence of probable breeding. In 2022, Northern Waterthrush was recorded during both surveys at station MBB-15D, which surveys the Fowl Manna Grass Meadow Marsh (MAM3-4). This represents evidence of probable breeding (i.e., a permanent territory). In 2022, an individual Northern Waterthrush was also recorded within the large Coniferous Swamp/Mixed Swamp (SWC/SWM) complex. Three Wood Duck individuals were recorded with evidence of possible breeding at MBB-15B, which surveys the large Shallow Aquatic (SA) wetland south of Sideroad 15.

Table 27. NAT-15 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	MBB-15B	3	SA	2022	PO
Northern Waterthrush	Medium	MBB-15A	3	MAM3	2021	PR
		MBB-15D	2	MAM3-4	2022	PR
		BMB-15E	1	SWC/SWM	2022	PO

Refer to Appendix VI for a list of all bird species recorded within NAT-15, including their breeding evidence codes.

Herpetofauna

Five herpetofauna species were documented within NAT-15, across 2021 and 2022 survey years. A complete list of herpetofauna species reported from NAT-14 is provided in Appendix VII.

All five herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 28 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-6 for herpetofauna station survey locations.

Table 28. NAT-15 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Snapping Turtle	High	TBO-15B	-	1	MAM3-4	2022
		incidental (n/a)	-	1	SWC/SWM	2022
American Toad	Medium	ANR-15B	2	3	MAM3	2021
		ANR-15E	1	1	MAM3-4	2022
		n/a (incidental)	2	4	-	2021
Gray Treefrog	High	ANR-15B	1	1	MAM3	2021
Spring Peeper	High	ANR-15A	1	1	MAM3-2	2021
		ANR-15B	2	7	MAM3	2021
			2	5		2022
		ANR-15C	1	2	SWC3-2	2022
		ANR-15D	1	4	MAM3-2	2022
		n/a (incidental)	1	1	-	2021
Northern Leopard Frog	High	ANR-15C	1	1	SWC3-2	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

In 2021, two anuran species were recorded at NAT-15: American Toad and Spring Peeper. In 2022, these species were also recorded, along with Northern Leopard Frog. Wood Frog was also recorded incidentally between anuran call surveys.

Table 29 provides a summary of call codes and the estimated abundance of each species across surveys. See Map 2-6 for the anuran survey station locations.

Spring Peeper was recorded with the greatest relative abundance among species, but it was not recorded calling at full chorus at any station within the NAT-15 complex. Spring Peeper was recorded at a Call Code 2 at stations ANR-15B (in both 2021 and 2022 survey years); this

species occurred in lower numbers or was absent at other stations. Three Green Frogs were also heard calling at station ANR-15B during the May 19, 2021 survey. Altogether, anuran breeding activity was relatively low at NAT-15 complex stations.

Station ANR-15B yielded the greatest species richness (four species) and anuran relative abundance among stations. ANR-15B primarily surveys Organic Meadow Marsh (MAM3) located south of the east tributary branch crossing of Sideroad 15. By contrast, only a single Spring Peeper was recorded at each of stations ANR-15A and -15D, a single American Toad was recorded at station ANR-15E, and no anurans were heard calling at station ANR-15F. These results suggest that the habitats surveyed by these stations are not important for anuran breeding.

Table 29. NAT-15 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals			
			American Toad	Gray Treefrog	Spring Peeper	Northern Leopard Frog
1	ANR-15A	April 21, 2021	0	0	1(1)	0
		May 2, 2022	0	0	0	0
	ANR-15B	April 21, 2021	0	0	2(4)	0
		May 2, 2022	0	0	2(5)	0
	ANR-15C	April 21, 2021	0	0	0	0
		May 2, 2022	0	0	0	0
	ANR-15D	-	-	-	-	-
		May 2, 2022	0	0	1(2)	0
	ANR-15E	-	-	-	-	-
		May 2, 2022	0	0	0	0
	ANR-15F	-	-	-	-	-
		May 2, 2022	0	0	0	0
2	ANR-15A	May 19, 2021	0	0	0	0
		May 19, 2022	0	0	0	0
	ANR-15B	May 19, 2021	2(3)	1(1)	2(3)	0
		May 19, 2022	0	0	0	0
	ANR-15C	May 19, 2021	0	0	0	0
		May 19, 2022	0	0	1(2)	1(1)
	ANR-15D	-	-	-	-	-
		May 19, 2022	0	0	1(2)	0
	ANR-15E	-	-	-	-	-
		May 30, 2022	1(1)	0	0	0
	ANR-15F	-	-	-	-	-
		May 30, 2022	0	0	0	0
3	ANR-15A	June 30, 2021	0	0	0	0
		July 1, 2022	0	0	0	0
	ANR-15B	June 30, 2021	0	0	0	0
		July 1, 2022	0	0	0	0
	ANR-15C	June 30, 2021	0	0	0	0
		July 1, 2022	0	0	0	0
	ANR-15D	-	-	-	-	-
		July 1, 2022	0	0	0	0
	ANR-15E	-	-	-	-	-

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals			
			American Toad	Gray Treefrog	Spring Peeper	Northern Leopard Frog
		June 30, 2022	0	0	0	0
	ANR-15F	-	-	-	-	-
		June 30, 2022	0	0	0	0

Turtle Basking Surveys

In 2022, one turtle species was observed at NAT-15: Snapping Turtle. A single adult female Snapping Turtle was observed basking in the Fowl Manna Grass Organic Meadow Marsh Type (MAM3-4), as surveyed from station TBO-15B, during a turtle basking survey completed on May 5, 2022. A single adult female Snapping Turtle was observed in the Coniferous Swamp/Mixed Swamp complex (SWC/SWM) located to the immediate north of Sideroad 15 during the May 11, 2022 survey. No turtles were observed within wetland or aquatic features to the south of Sideroad 15 during field surveys.

Snapping Turtle is designated as a species of Special Concern on the SARO list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Habitat for SCC may be considered a form of SWH (OMNR 2015a).

Salamander Trapping Survey

In 2022, one trap was deployed at NAT-15 within the MAM3-4 community (Map 2-6). No salamander species were captured at this trap station during the 2022 salamander trapping period.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at NAT-15.

Other Species

Five mammal species were observed at NAT-15: American Mink (two individuals directly observed travelling along the edge of the Shallow Aquatic (SA) community, within the Fresh-Moist White Cedar Coniferous Forest (FOC4-1) community), Red Squirrel (*Tamiasciurus hudsonicus*) (direct observation), Eastern Chipmunk (direct observation), Beaver (chewing marks on trees), and Coyote (heard calling). A complete list of mammals reported from the study rea and vicinity is included in Appendix VIII.

Three butterfly species were observed at NAT-15: Eastern Comma (*Polygonia comma*), Eastern Tailed Blue, and Mourning Cloak. All three of these species are common with secure populations in Ontario (OMNR 2021).

No odonate species were incidentally observed at NAT-15 during site investigations.

5.7.3 Aquatic Habitat and Fish Community

NAT-15 is comprised of two permanent watercourses that flow south and connect to form one permanent watercourse downstream of the existing mill pond dam, historically known as "Little Wonder Pond" (Ricker 1932), approximately 40m north of Mill Line. The dam is approximately 6.0m in height and acts to inundate 250 and 270m of the downstream sections of the east and west watercourses, respectively and creates a barrier to upstream fish movement. Water flows over the dam to the channel below, creating a waterfall.

The west watercourse was assessed at its crossing of County Road 124 (AHP-009/AHP-160), upstream of the NAT-15 complex, and at Sideroad 15 within the complex (AHP-012). At its crossing of County Road 124 the watercourse flows through a heavily forested riparian buffer within a well-defined channel. Substrates are dominated by cobble, gravel and sand and aquatic habitat is available in the form of riffle/pool habitats, cobble/gravel, overhanging bank vegetation, and Watercress. No fish community sampling was conducted at this location but five adult Brook Trout were observed on July 21, 2022. At its crossing of Sideroad 15 the west watercourse exhibits a narrower channel form compared to upstream and flows through meadow marsh, which is characterized by dense bank grasses/forbs and a general lack of tree canopy. Substrates are dominated by gravel, cobble and sand and aquatic habitat is available in the form of riffle/pool habitats, cobble/gravel, dense overhanging bank vegetation, undercut banks and instream vegetation. Young-of-year Brook Trout were observed on July 19, 2021 at Sideroad 15, which indicates that conditions are suitable for Brook Trout spawning throughout the west branch within and/or upstream from NAT-15. At a minimum, the west watercourse provides rearing and foraging habitat for a self-sustaining Brook Trout population. The watercourse was classified as coldwater based on summer temperature measurements, which is supported by the presence of Brook Trout.

The east watercourse was assessed approximately 400m upstream from Sideroad 15 (AHP-153) and at its crossing of Sideroad 15 (AHP-011). At the upstream assessment location, the watercourse flows mainly through coniferous swamp where it exhibits a relatively wide, shallow

channel form with cobble, gravel, and sand substrates and abundant woody debris. A small portion of the feature flows through meadow adjacent to the cedar swamp, where it was assessed. The channel exhibits a narrower and deeper form through the meadow with a wetted width ranging from approximately 1.5 to 2.2m and water depths up to 0.34m. Substrates are comprised of cobble, gravel and sand with some silt and muck and aquatic habitat includes riffles/pools, cobble/gravel, undercut banks, backwater areas, and overhanging bank vegetation. During fish community surveys completed on July 20, 2022 a total of 36 Brook Trout were captured including yoy, juvenile and adult Brook Trout ranging from 28 to 150mm in length (EMS-004). Two Central Mudminnows were also captured. The watercourse was classified as coldwater based on summer temperature measurements, which is supported by the presence of Brook Trout and Watercress, which was noted to be abundant throughout the channel. Downstream, at the crossing of Sideroad 15, the channel flows through meadow marsh where banks are heavily vegetated by grasses and forbs. Substrates are dominated by silt, muck and detritus and aquatic habitat includes pools, backwater areas, undercut banks, overhanging bank vegetation and instream vegetation, including Watercress. Young-of-year Brook Trout were observed on July 19, 2021 at Sideroad 15, which indicates that conditions are suitable for Brook Trout spawning throughout the east branch within and/or upstream from NAT-15. The west branch was classified as coldwater at Sideroad 15 based on summer temperature measurements, which is supported by the presence of Brook Trout.

South of the dam the east and west branches combine to form a single channel (AHP-013/AHP-154), which forms one of the two main branches to the Pine River that occur within the Study Area). In July 2022 the wetted width ranged from 2.5 to 4.0m with water depths up to approximately 0.5m. Substrates were dominated by gravel, cobble and sand with some boulder. Aquatic habitat was available in the form of riffles and pools, backwater areas, cobble/gravel substrates, undercut banks, overhanging bank vegetation, and abundant watercress. The waterfall and base of the dam also provide unique cover and oxygenation for this reach. During fish community sampling a total of 44 Brook Trout were captured, including yoy, juveniles, and adults ranging from 45 to 210mm in length (EMS-005). The presence of yoy and juvenile Brook Trout at this location suggest that spawning is occurring within the watercourse downstream of the dam. The watercourse was classified as a coldwater feature downstream of the dam, which suggests that there is adequate cooling throughout NAT-15 from groundwater inputs to counteract any potential warming effects within the headpond due to solar radiation.

A photographic log of aquatic conditions is provided in Appendix XI.

5.8 NAT-16

5.8.1 Vegetation Communities and Species

NAT-16 is a relatively smaller complex and is comprised entirely of swamp, marsh, shallow water wetland types. The complex is located north and south of River Road, on the eastern edge of Horning's Mills. The complex was surveyed through roadside assessments.

Table 30 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 30. Wetland and Aquatic Vegetation Communities within NAT-16

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWM4	White Cedar Organic Mixed Swamp	High Detailed inventory not completed	This community exists to the north and south of River Road, and was delineated through airphoto review and roadside observations. High sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: White Cedar, Crack Willow (*Salix euxina*), Trembling Aspen Sub-canopy: White Cedar, Manitoba Maple (*Acer negundo*), American Elm Understorey: Green Ash, Red-osier Dogwood, Common Elderberry Groundcover: Spotted Jewelweed, various Sedges, Spotted Joe Pye Weed
MAM3-2	Reed Canary Grass Organic Meadow Marsh	Medium Detailed inventory not completed	This community exists to the north of River Road, and was delineated through airphoto review and roadside observations. Medium sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: n/a Sub-canopy: American Elm, White Cedar Understorey: Green Ash, Red-osier Dogwood Groundcover: Reed Canary Grass, various Sedges, Spotted Joe Pye Weed

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
SA	Shallow Water	-	Two communities exist south of River Road. These communities were delineated through airphoto review and roadside observations. These features may be constructed/manicured. No federally or provincially significant species were documented within this community. Canopy: n/a Sub-canopy: n/a Understorey: n/a Groundcover: Stonewort (*Chara* sp.), Floating Pondweed (*Potamogeton natans*), Curly-leaved Pondweed (*Potemogeton crispus*), various Sedges, Lesser Duckweed.

5.8.2 Terrestrial Wildlife

Birds

Forty-four (44) bird species were documented within NAT-16 during site investigations. Of these, four were TRCA-listed hydrologically sensitive bird species. Table 31 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-7 for the bird survey station locations

All hydrologically sensitive bird species were observed at the large Shallow Aquatic (SA) pond feature that is located to the south of River Road. Eight Hooded Mergansers, representing a family group, were observed showing evidence of confirmed breeding due to the presence of fledged young. Northern Waterthrush was recorded at station MBB-16A in both 2021 and 2022. Sora was potentially heard within the SA feature during the June 22, 2022 marsh bird survey completed at station MBB-16A. However, the vocalization was distant and of short-duration, so could not be confirmed to species with certainty.

Table 31. NAT-16 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Hooded Merganser	High	MBB-16A	8 (family group incl. young)	SA	2022	CO
Wood Duck	Medium	MBB-16A	1	SA	2021	PO

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Sora	Medium	n/a (incidental)	1	SA	2022	OB
Northern Waterthrush	Medium	MBB-16A	1	SA	2021	PO
		MBB-16A	1	SA	2022	PO
		n/a (incidental)	1	-	-	OB

Refer to Appendix VI for a list of all bird species recorded within NAT-16, including their breeding evidence codes.

Herpetofauna

Five herpetofauna species were documented within NAT-16 across 2021 and 2022 survey years. A complete list of herpetofauna species reported from NAT-16 is provided in Appendix VII.

All five herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 32 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-7 for herpetofauna station survey locations.

Table 32. NAT-16 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Snapping Turtle	High	TBO-16A	-	3	SA	2021
		n/a (incidental)	-	1	B	2021
American Toad	Medium	ANR-16B	1	1	MAM3-2	2022
		n/a (incidental)	3	N/A[1]	SA	2021
Gray Treefrog	High	ANR-16B	3	N/A[1]	MAM3-2	2022
		n/a (incidental)	1	2	SA	2021
Spring Peeper	High	ANR-16A	3	N/A[1]	SA	2021
			2	4		2022
		ANR-16B	1	2	MAM3-2	2022
		n/a (incidental)	3	N/A[1]	SA	2021
Green Frog	Medium	ANR-16B	1	1	MAM3-2	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

In total, four anuran species were recorded at the NAT-16 complex during the 2021 and 2022 survey years. Table 33 provides a summary of call codes and the estimated abundance of each species across surveys. See Map 2-7 for the anuran survey station locations. Note that following the April 25, 2022 survey, station ANR-16A was discontinued because it was considered to be too close to station ANR-016B.

Gray Treefrog was the most abundant species between the two survey stations, where it was recorded at full chorus at station ANR-16B during the May 30, 2022 survey. Spring Peeper was recorded at a Call Code 2 at station ANR-16A. However, overall and in relation to other NAT complexes within the Study Area, anuran call activity was relatively low within the NAT-16 features. American Toad and Green Frog were each represented by a single individual. Each year, no calling activity was recorded at either station during the third anuran survey. The third anuran survey completed in 2022 was slightly late in relation to the standard protocol requirement for these surveys to be completed in June (BSC 2009a), instead falling on July 1.

Table 33. NAT-16 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals			
			American Toad	Gray Treefrog	Spring Peeper	Green Frog
1	ANR-16A	April 21, 2021	0	0	3	0
		April 25, 2022	0	0	2(4)	0
	ANR-16B	April 21, 2021	0	0	0	0
		April 25, 2022	1(1)	0	0	0
2	ANR-16A	May 19, 2021	0	0	2(4)	0
		-	-	-	-	-
	ANR-16B	May 19, 2021	0	0	0	0
		May 30, 2022	0	3	1(2)	1(1)
3	ANR-16A	-	-	-	-	-
		-	-	-	-	-
	ANR-16B	-	-	-	-	-
		July 1, 2022	0	0	0	0

Turtle Basking Surveys

During 2021 roadside surveys, one turtle species was observed at NAT-16: Snapping Turtle. Two adult Snapping Turtles were observed basking at the water surface within the large Shallow Aquatic (SA) pond feature south of River Road during a turtle basking survey on April

21, 2021. A single Snapping Turtle was subsequently observed basking at the water surface in the SA community during the survey completed May 12, 2021. Snapping Turtle is designated as a species of Special Concern on the SARO list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Habitat for SCC may be considered a form of SWH (OMNR 2015a).

No turtles were observed within NAT-16 during 2022 surveys.

Salamander Trapping Survey

NAT-16 was only accessible by roadside. No salamander trapping occurred at this complex.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at NAT-16.

Other Species

Two mammal species were observed at NAT-16: Red Squirrel (direct observation) and Muskrat (direct observation). Muskrat is a TRCA-listed hydrologically sensitive mammal species. An individual was incidentally observed swimming in the Shallow Aquatic (SA) community. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

Table 34. NAT-16 TRCA-listed Hydrologically Sensitive Mammal Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Total Number of Individuals	ELC	Observation Year(s)
Muskrat	High	n/a (incidental)	1	SA	2022

No butterfly or odonate species were incidentally observed at NAT-16 during site investigations.

5.8.3 Aquatic Habitat and Fish Community

Two permanent watercourses occur within NAT-16. The primary watercourse flows south through cedar swamp, crosses River Road, and then turns and flows east through a relatively large online pond created by a dam, which is located at its eastern extent, adjacent to River Road. This dam creates a barrier to upstream fish movement. The watercourse was assessed where it crosses River Road (AHP-022). At this location the channel exhibits a wetted width ranging from approximately 3.0 to 4.0m and water depths up to 0.63m, although the relatively deep water is likely a result of channel erosion due to the culvert. Upstream and downstream

from the culvert, the channel exhibits a narrower and more shallow form. Substrates are comprised mainly of gravel and sand, and aquatic habitat includes pools, undercut banks, backwater areas, woody debris, and overhanging bank vegetation. A beaver dam was also present at the time of the assessment approximately 7.0m downstream from River Road, which may inhibit upstream/downstream fish movement but is not expected to prevent it. During fish community surveys on July 22, 2022 a total of 21 Brook Trout were captured including juvenile and adult Brook Trout ranging from 69 to 235mm in length. Three additional species were also captured, including Blacknose Dace, Creek Chub, and Northern Redbelly Dace (EMS-009). The watercourse was classified as coolwater based on summer temperature measurements. The online pond was not assessed, but is expected to provide direct fish habitat to the fish community upstream of the dam, which includes Brook Trout.

A second permanent watercourse flows into the primary watercourse within NAT-16 north of Mill Street. This feature originates within NAT-18 to the west and crosses Main Street, flowing east along the north side of Mill Street (AHP-023/AHP-164), eventually flowing to NAT-16. The watercourse occurs as a channelized feature along the north side of Mill Street. During the July 21, 2022 assessment, the wetted width was approximately 2.4m and the maximum water depth was 0.31m. Substrates were dominated by cobble and gravel, which provided cover, in addition to overhanging bank vegetation and riffle/pool habitats. Watercress was also observed at this location. The watercourse was classified as coolwater based on summer temperature measurements and was confirmed as fish habitat based on the visual observation of several cyprinids.

A photographic log of aquatic conditions is provided in Appendix XI.

5.9 NAT-18

5.9.1 Vegetation Communities and Species

NAT-18 is a relatively smaller complex and is comprised entirely of swamp, marsh, and open water pond features. The complex is located east and west of Main Street within Horning's Mills. The complex was surveyed through roadside assessments.

Table 35 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 35. Wetland and Aquatic Vegetation Communities within NAT-18

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
MAM3	Organic Meadow Marsh	Medium-High Detailed inventory not completed	This community exists to the east of Main Street, and was delineated through airphoto review and roadside observations. Medium to high sensitivity to hydrological change was determined for this community. No federally or provincially significant species were documented within this community. Canopy: n/a Sub-canopy: White Cedar, American Elm, Trembling Aspen Understorey: Pussy Willow, Red-osier Dogwood Groundcover: Broad-leaved Cattail, Panicled Aster, Reed Canary Grass, Spotted Jewelweed
SAS1-3	Stonewort Submerged Shallow Aquatic	Medium Detailed inventory not completed	This community exists to the east of Main Street, and was delineated through airphoto review and roadside observations. Medium sensitivity to hydrological change was determined for this community. Canopy: n/a Sub-canopy: n/a Understorey: n/a Groundcover: Stonewort
SA	Shallow Water	-	Several communities exist within the complex. These communities were delineated through airphoto review and roadside observations. These features may be constructed/manicured. Canopy: n/a Sub-canopy: n/a Understorey: n/a Groundcover: Lesser Duckweed, Stonewort, Broad-fruited Burreed (*Sparganium eurycarpum*)
OA	Open Water	-	This community was delineated through airphoto review and was not viewable from the roadside. The feature appears to be a constructed/manicured pond.

5.9.2 Terrestrial Wildlife

Birds

Forty-six (46) bird species were documented within NAT-18 during site investigations. Of these, two were TRCA-listed hydrologically sensitive bird species. Table 36 provides a summary of

the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-8 for the bird survey station locations. See Map 2-8 for the bird survey station locations

Wood Duck was observed on one occasion, showing evidence of possible breeding within or nearby to the Organic Meadow Marsh (MAM3) and Stonewort Submerged Shallow Aquatic (SAS1-3) wetland communities. Hooded Merganser was also observed on one occasion, showing evidence of possible breeding within or nearby to the Open Aquatic (OA) community.

Table 36. NAT-18 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Hooded Merganser	High	n/a (incidental)	2	OA	2022	PO
Wood Duck	Medium	MBB-18C	1	MAM3/SAS1-3	2022	PO

Refer to Appendix VI for a list of all bird species documented within NAT-18, including their breeding evidence codes.

Herpetofauna

Five herpetofauna species were recorded at NAT-18 across 2021 and 2022 survey years. A complete list of herpetofauna species reported from NAT-18 is provided in Appendix VII.

All five herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 37 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-8 for herpetofauna station survey locations.

Table 37. NAT-18 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
American Toad	Medium	ANR-18A	2	4	SA/SAS1-3	2021
		ANR-18B	1	3	mixed and coniferous forest/SA	2021
Gray Treefrog	High	ANR-18A	1	5	SA/SAS1-3	2021
Spring Peeper	High	ANR-18A	1	4	SA/SAS1-3	2022
		ANR-18B	2	5	mixed and coniferous forest/SA	2021
			2	8		2022
Green Frog	Medium	ANR-18A	1	1	SA/SAS1-3	2022

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Wood Frog	High	ANR-18B	2	7	mixed and coniferous forest/SA	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

In total, five anuran species were recorded at the two roadside survey stations within the NAT-18 complex. Table 38 provides a summary of call codes and the estimated abundance of each species across surveys. See Map 2-8 for the anuran survey station locations.

No species were recorded at full chorus at either station ANR-18A or -18B. Spring Peeper and Wood Frog were recorded with the highest estimated abundances, with up to eight and seven individuals, respectively. Smaller numbers of American Toad, Gray Treefrog, and Green Frog were also recorded. Four species were recorded at station ANR-18A, which surveys the MAM3, SAS1-3 and Shallow Aquatic (SA) wetland features east of Main Street, while three species were recorded at station ANR-18B, which surveys mixed/coniferous forest and the east end of the large SA feature west of Main Street.

Table 38. NAT-18 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals				
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog
1	ANR-18A	-	-	-	-	-	-
		May 2, 2022	0	0	1(4)	0	0
	ANR-18B	-	-	-	-	-	-
		May 2, 2022	0	0	2(8)	0	2(7)
2	ANR-18A	May 19, 2021	2(4)	1(2)	0	0	0
		May 30, 2022	0	0	0	0	0
	ANR-18B	May 19, 2021	1(3)	0	2(5)	0	0
		May 30, 2022	0	0	0	0	0
3	ANR-18A	June 30, 2021	0	1(3)	0	0	0
		July 1, 2022	0	0	0	1(1)	0
	ANR-18B	June 30, 2021	0	0	0	0	0
		July 1, 2022	0	0	0	0	0

Turtle Basking Surveys

One station, TBO-18, was established to survey the MAM3 and the adjacent SAS1-3 wetland as could be viewed from roadside (Map 2-8). No turtles were recorded at station TBO-18 during the course of field surveys.

Salamander Trapping Surveys

NAT-18 was only accessible by roadside. No salamander trapping occurred at this complex.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at NAT-18.

Other Species

One mammal species, Red Squirrel (direct observation), was incidentally observed at NAT-18. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

No butterfly or odonate species were incidentally observed at NAT-18 during site investigations.

5.9.3 Aquatic Habitat and Fish Community

The aquatic habitat present throughout NAT-18 includes several online ponds and a single permanent watercourse, which connects the ponds and crosses Main Street at several locations as it meanders in a northerly direction. Historically, the watercourse has been heavily altered, specifically where the ponds have been constructed to collect and hold upwelling groundwater. A trout hatchery was constructed east of Main Street, which utilized the ponds to produce Rainbow Trout and Brook Trout. These ponds have replaced the swamp/wetland habitat that existed historically and act to divert the groundwater to the existing watercourse along the east side of Main Street.

The watercourse originates southwest of the NAT-18 complex and flows through a shallow pond before flowing east under Main Street (AHP-163). The channel experiences significant cooling along the east side Main Street due the presence of a large seepage area. Water temperatures measured within the watercourse immediately west (upstream) and east (downstream) of the Main Street culvert on July 21, 2022 were 18°C and 13°C, respectively, showing a difference of 5°C. The channel is relatively narrow and shallow at this location and does not appear to provide direct fish habitat. Watercress was observed in high abundance and was directly associated with the seepage area. The channel flows north, through the hatchery pond and then northwest from the pond through meadow marsh (AHP-076), crossing Main Street again approximately 30m south of Fieldway Court (AHP-165). West of Main Street, the creek exhibits a more distinct channel form with a wetted width of approximately 0.5-1.0m. Substrates in that location consist of gravel and sand, which may provide direct fish habitat, although fish

presence was not confirmed. A small area of groundwater seepage was also noted along the west side of Main Street approximately 30m south of the main channel. Groundwater along this reach collects and flows north along the road embankment and outlets to the main channel. Water measurements collected on July 21, 2022 were 12°C within the roadside tributary and 16.5°C within the main channel. Overall, the channel was classified as coldwater at the locations where it crosses Main Street and Watercress was abundant.

The watercourse flows northwest from Main Street to a large pond (SA), which is included as part of the NAT-18 complex, approximately 350m downstream. From this pond the watercourse flows northeast, crossing Main Street near the intersection with Mill Street, and eventually flows to NAT-16. The watercourse at this location is characterized in Section 5.8.3. The watercourse appears to experience some warming due to the online pond west of Main Street. The thermal regime was noted to experience a change from coldwater upstream of the pond (16.5°C) to coolwater downstream of the pond (21°C).

A photographic log of aquatic conditions is provided in Appendix XI.

5.10 NAT-19

5.10.1 Vegetation Communities and Species

NAT-19 is a single isolated tract of contiguous treed habitats, predominantly comprised of swamp wetland, with smaller areas of upland forest. The feature is located north of County Road 17, in between the 3rd and 4th Line, and a portion of the feature occurs within lands owned by Strada (Melancthon Pit #2 site). The wetland habitats in general were noted to be high quality. The feature was surveyed through detailed on-site investigations.

Table 39 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 39. Wetland and Aquatic Vegetation Communities within NAT-19

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWM4-1	White Cedar – Hardwood Organic Mixed Swamp	High Hydrologically Sensitive Species Inventoried: High – 1	This community comprises the majority of the natural feature. High sensitivity to hydrological change was determined for this community.

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
		Medium – 25 Groundwater Indicator Species Inventoried: 9	A single federally significant species, Black Ash was documented within this community. No other provincially or federally significant species were documented. Canopy: White Cedar, Balsam Fir, Red Maple Sub-canopy: Balsam Firm, American Elm, Yellow Birch Understorey: Wild Black Currant, Red-osier Dogwood, Choke Cherry Groundcover: Dewberry, various Sedges, Fowl Mannagrass, Sensitive Fern
SWD4	Mineral Deciduous Swamp	Low-High Hydrologically Sensitive Species Inventoried: High – 0 Medium – 2 Groundwater Indicator Species Inventoried: 2	Low to high sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen, Balsam Poplar, Creek Willow Sub-canopy: Trembling Aspen, Balsam Poplar Understorey: Red-osier Dogwood, Trembling Aspen Groundcover: Reed Canary Grass, Spotted Joe Pye Weed

5.10.2 Terrestrial Wildlife

Birds

Twenty-seven (27) bird species were documented within NAT-19 during site investigations. Of these, one species was a TRCA-listed hydrologically sensitive bird species. Table 40 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-9 for the bird survey station locations.

Northern Waterthrush was recorded during both 2022 surveys at station BMB-19B, which surveys the White Cedar-Hardwood Mixed Swamp (SWM4-1) and Fresh-Moist White Cedar Coniferous Forest (FOC4-1). Therefore, this species displayed evidence of probable breeding within this community. In 2022, an individual Northern Waterthrush was recorded at station BMB-19C, which surveys the SWM4-1 community from a more central location.

Table 40. NAT-19 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Northern Waterthrush	Medium	BMB-19B	2	FOC4-1/SWM4-1	2022	PR
		BMB-19C	1	SWM4-1	2022	PO

Refer to Appendix VI for a list of all bird species recorded within NAT-19, including their breeding evidence codes.

Herpetofauna

Two herpetofauna species were documented within NAT-19 during the 2022 survey year. A complete list of herpetofauna species reported from NAT-19 is provided in Appendix VII.

Both of these species are TRCA-listed hydrologically sensitive herpetofauna species. Table 41 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-9 for herpetofauna station survey locations.

Table 41. NAT-19 TRCA-listed Hydrologically Sensitive Herpetofauna Species.

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Gray Treefrog	High	ANR-19B	2	5	SWM4-1	2022
		ANR-19C	2	7	FOD5-9	2022
Spring Peeper	High	ANR-19A	3	N/A[1]	SWM4-1	2022
		ANR-19C	1	3	FOD5-9	2022
		n/a (incidental)	3	N/A[1]	SWM4-1	2022

[1]Number of individuals cannot be counted during call codes of rank 3

<u>Anuran Call Surveys</u>

Anuran surveys were only completed in 2022 at the NAT-19 complex. Only two species (Gray Treefrog and Spring Peeper) were recorded among the three stations. The low species richness may have been a reflection of the largely homogeneous habitat that exists through much of the NAT-19 complex features, a general lack of open water features, and only a single year's worth of data. It should also be noted that the first survey, which is to be completed in April according to survey protocol (BSC 2009a), was slightly late and completed on May 2, 2022. Additional early anuran breeding activity, such as by Wood Frog, may therefore have been missed within this complex.

Of the two observed species, Spring Peeper was recorded at full chorus (Code 3) at station ANR-19A during the May 2 survey, but was recorded at low abundance or was absent elsewhere and during subsequent surveys. Multiple Gray Treefrogs were recorded at stations ANR-19C and -19B, with an estimated seven and five individuals, respectively. No Gray Treefrogs were recorded at station ANR-19A.

Table 42. NAT-19 Anuran Call Survey Results

Survey Round	Survey Date	Survey Station	Maximum Call Code and Estimated Number of Individuals	
			Gray Treefrog	Spring Peeper
1	May 2, 2022	ANR-19A	0	3
		ANR-19B	0	0
		ANR-19C	0	1(3)
2	May 30, 2022	ANR-19A	0	0
		ANR-19B	2(5)	0
		ANR-19C	2(7)	0
3	June 30, 2022	ANR-19A	0	1(3)
		ANR-19B	0	0
		ANR-19C	0	0

Turtle Basking Survey

One turtle basking station, TBO-19, was established in 2022 to survey the White Cedar-Hardwood Organic Mixed Swamp (SWM4-1) (Map 2-9). This station was sited to occur adjacent to open water pools within the swamp feature that provide suitable turtle habitat. No turtles were recorded at station TBO-19 during the course of field surveys

Salamander Trapping Survey

No salamander trapping was completed within the NAT-19 complex.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at the NAT-19 complex. The NAT-19 natural features are located well away from roadsides.

Other Species

One mammal species, Porcupine (direct observation of young), was incidentally observed at NAT-19. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

No butterfly or odonate species were incidentally observed at NAT-19 during site investigations.

5.10.3 Aquatic Habitat and Fish Community

No watercourses are mapped within the NAT-19 complex. As such, no aquatic habitat assessment or fish community characterization surveys were completed at NAT-19.

5.11 NAT-20

5.11.1 Vegetation Communities and Species

The NAT-20 feature is a combination of three wetland units totaling over 8ha in size. All of the wetland units are mapped as unevaluated wetland. Surface water is directed to the wetland units by way of short, intermittent drainage features through agricultural fields or a roadside ditch; however, none of the units are connected to a permanent watercourse and all three exist in topographic depressions that retain water. Surveys conducted in 2022 focused only on the easternmost wetland unit due to site access limitations. In total, 11 common wetland species that have low to medium sensitivity to hydrological change were identified at this complex. Of the 11 species, four are considered indicators of groundwater influence.

Table 43 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 43. Wetland and Aquatic Vegetation Communities within NAT-20

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
SWD7	Birch–- Poplar Organic Deciduous Swamp Ecosite	Medium-High Detailed inventory not completed	A swamp feature is present on the east side of 5th Line. The surrounding conifer plantations suggest that this feature is part of retired agricultural land that is being restored to natural cover. No groundwater indicator species were observed from the roadside. Medium to high sensitivity to hydrological change was determined for this community. Canopy: Balsam Poplar, American Elm, Crack Willow Sub-canopy: Balsam Poplar, American Elm Understorey: Red-osier Dogwood, Willow species Groundcover: Reed Canary Grass
SWD	Deciduous Swamp	Medium-High	Several areas of swamp were verified to be present through roadside

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
		Detailed inventory not completed	assessment and aerial photography interpretation. The canopy includes a variety of deciduous tree species. Medum to high sensitivity to hydrological change was determined for this community. Canopy: Balsam Poplar, American Elm, Green Ash Sub-canopy: - Understorey: - Groundcover: -
MAM2-2	Reed-canary Grass Mineral Meadow Marsh Type	Low Detailed inventory not completed	The eastern extent of the NAT-20 feature includes a marsh situated in a depression within an undulating forest. The fringe of the feature includes a dense cover of wetland grasses and sedges that transitions to a central area of deeper water (MAS2). Of the 7 species that are considered sensitive to hydrological change, Sensitive Fern, Common Boneset and Spotted Jewelweed are considered groundwater indicator species. The marsh contains a shallow deposit of organics above mineral soil. Low sensitivity to hydrological change was determined for this community. Canopy: Balsam Poplar, Yellow Birch Sub-canopy: - Understorey: Red-osier Dogwood, Willow species, Narrow-leaved Meadowsweet Groundcover: Reed Canary Grass, Ostrich Fern, Sensitive Fern
MAM3	Organic Meadow Marsh Ecosite	Medium-High Detailed inventory not completed	An area of marsh is present within the centre of the swamp feature east of 5th Line. Recent drainage excavation of the drainage feature near the roadside exposed deep organic substrates along the grass-lined channel. Medium to high sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: - Understorey: - Groundcover: Reed Canary Grass
MAS2	Mineral Shallow Marsh Ecosite	Low-High Detailed inventory not completed	Within the eastern NAT-20 feature, the deeper central portion of the MAM2-2 marsh contains a shallow marsh inclusion. Herbaceous species cover is sparse and large concentrated to the periphery of the marsh with an unvegetated central area of deeper water. Low to high

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
			sensitivity to hydrological change was determined for this community. Canopy: - Sub-canopy: - Understorey: - Groundcover: Hemlock Water-parsnip, Fowl Mannagrass, Dark-green Bulrush

5.11.2 Terrestrial Wildlife

Birds

Thirty-two (32) bird species were documented within NAT-20 during site investigations. Of these, one species was a TRCA-listed hydrologically sensitive bird species. Table 44 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-10 for the bird survey station locations.

Wood Duck was recorded on one occasion incidentally within the Reed Canary Grass Mineral Meadow Marsh (MAM2-2) or its Mineral Shallow Marsh (MAS2) inclusion. No evidence of breeding was observed.

Table 44. NAT-20 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	n/a (incidental)	4 (two pairs)	MAM2-2 (MAS2 inclusion)	2022	OB

Refer to Appendix VI for a list of all bird species recorded within NAT-20, including their breeding evidence codes.

Herpetofauna

Seven herpetofauna species were documented within NAT-20 during the 2022 survey year. A complete list of herpetofauna species reported from NAT-20 is provided in Appendix VII.

All seven herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 45 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-10 for herpetofauna station survey locations.

Table 45. NAT-20 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Spotted Salamander	High	SAL-N20-1	-	9	MAM2-2 w MAS2 incl.	2022
Snapping Turtle	High	TBO-20	-	1	MAM2-2 w MAS2 incl.	2022
Midland Painted Turtle	High	TBO-20	-	1	MAM2-2 w MAS2 incl.	2022
Gray Treefrog	High	ANR-20B	3	N/A[1]	MAM2-2 w MAS2 incl.	2022
Spring Peeper	High	n/a (incidental)	-	-	MAM2-2 w MAS2 incl.	2022
Northern Leopard Frog	High	n/a (incidental)	-	-	MAM2-2 w MAS2 incl.	2022
Wood Frog	High	n/a (incidental)	-	-	MAM2-2 w MAS2 incl.	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

Anuran surveys were only completed in 2022 at the NAT-20 complex. One roadside station (ANR-20B) was surveyed as shown on Map 2-10. Station ANR-20A, which was located adjacent to the southeast complex wetland features, was removed due to surveyor safety considerations. Only one species, Gray Treefrog, was recorded between the two anuran stations established within this complex. Gray Treefrog was recorded at full chorus (Call Code 3) at station ANR-20B.

Table 46. NAT-20 Anuran Call Survey Results

Survey Round	Survey Date	Survey Station	Maximum Call Code and Estimated Number of Individuals
			Gray Treefrog
1	April 25, 2022	ANR-20B	-
2	May 30, 2022	ANR-20B	3
3	June 24, 2022	ANR-20B	-

Turtle Basking Surveys

In 2022, two turtle species were observed at NAT-20: Snapping Turtle and Midland Painted Turtle. A single adult Snapping Turtle was observed basking in the Reed-canary Grass Mineral

Meadow Marsh (MAM2-2) with Mineral Shallow Marsh (MAS2) inclusion as surveyed from station TBO-20 (Map 2-10) during a turtle basking survey on May 12, 2022. Snapping Turtle is designated as a species of Special Concern on the SARO list (MECP 2024); it is therefore considered a SCC in Ontario (OMNR 2010). Habitat for SCC may be considered a form of SWH (OMNR 2015a).

A single Midland Painted Turtle was observed basking within the wetland feature surveyed at TBO-20 during the June 17, 2022 survey.

Salamander Trapping Survey

In 2022, two minnow traps were deployed at NAT-20 within the MAM2-2 (with MAS2 inclusion), shown as N20-1 and N20-2 on Map 2-10. One salamander species, Spotted Salamander, was observed. This species was only captured at trap N20-1. Specifically, one individual was captured on April 14 while eight individuals were captured on April 15. No salamanders were captured on any other dates, and none were captured at N20-2.

See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at the NAT-20 complex.

Other Species

Two mammal species were incidentally observed at NAT-20: Woodchuck (*Marmota monax*) (direct observation) and Coyote (calling). A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

No butterfly or odonate species were incidentally observed at NAT-20 during site investigations.

5.11.3 Aquatic Habitat and Fish Community

No watercourses are mapped within the NAT-20 complex. As such, no aquatic habitat assessment or fish community characterization surveys were completed at NAT-20.

5.12 NAT-21

5.12.1 Vegetation Communities and Species

The natural features that comprise NAT-21 include two units of the provincially significant Melanchthon Wetland Complex #1. With the exception of the linear drainage ditches that direct

surface water to the southwest, there are no defined watercourses through the feature (Map 2-11).

The wetland to the south of 4th Line NE is comprised of swamp and marsh communities. The predominant swamp communities include treed swamp characterized by mid-age poplar (*Populus* sp.) canopy and thicket swamp containing a mixture of willow (*Salix* sp.) and dogwood (*Cornus* sp.). Localized areas of deciduous swamp that include a high proportion of maple (*Acer* sp.) and birch (*Betula* sp.) are present throughout the feature and often intergrade with other swamp types. A central portion of the feature includes a large number of standing snag trees that suggest water level fluctuation has occurred historically resulting in swamp communities transitioning toward marsh communities. Conifer and mixed swamp communities are also present throughout and include a high proportion of Balsam Fir, White Cedar and small amounts of Tamarack. Large areas of graminoid marsh, situated along linear drainage channels, are present in the far western and eastern portions of the feature. These areas are dominated by Reed Canary Grass and cattail. A third area of marsh, likely dominated by cattail, is present near the northern terminus of Sideroad 270 in the vicinity of three rural residential lots. An informal dump site appears to be present to the east of the central marsh, near the edge of the wetland and accessed from the end of Sideroad 270. An aggregate extraction site that appears to have been idle for 5-10 years is present in the north-central portion of the feature.

To the north of 4th Line NE, the large wetland feature is comprised of three swamp community types with small areas of graminoid marsh limited to a small pond in the far east and along drainage ditches in the west. The northern portion of the wetland is predominantly poplar swamp with a series of shallow water features along County Road 21, likely the result of past peat mining activities. Stands of Tamarack swamp are present near the intersection of County Road 21 and 6th Line NE and along the periphery of the peat extraction area. The central portion of the wetland is dominated by Balsam Fir and White Cedar with smaller amounts of Tamarack and deciduous trees throughout. The canopy appears intact and this area is likely to be the least disturbed within the Study Area. Further, it may exhibit a higher diversity in plant species in comparison to the other swamp communities within the NAT-21 complex which are generally younger and subject to recent disturbance. The third swamp type is comprised of thicket stands of willow or dogwood which cover much of the southern portion of the wetland feature.

5.12.2 Terrestrial Wildlife

Birds

Bird surveys were not completed at the NAT-21 complex. Three bird species were incidentally recorded during site investigations.

Herpetofauna

Herpetofauna surveys completed at the NAT-21 complex were limited to anuran call surveys. A total of four anuran species were recorded. See below for details.

All four herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 47 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-11 for herpetofauna station survey locations. ELC communities are not provided in Table 47 since vegetation community mapping was not completed for NAT-21.

Table 47. NAT-21 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	Observation Year(s)
Gray Treefrog	High	ANR-21B	1	2	2022
Spring Peeper	High	ANR-21A	1	2	2022
		ANR-21B	3	N/A[1]	2022
		n/a (incidental)	3	N/A[1]	2022
Wood Frog	High	ANR-21A	1	1	2022
Green Frog	Medium	n/a (incidental)	-	-	2022

[1]Number of individuals cannot be counted during call codes of rank 3

<u>Anuran Call Survey</u>

Anuran surveys were only completed in 2022 at the NAT-21 complex, conducted at two back-to-back roadside survey stations at 4th Line NE. Three species (Gray Treefrog, Spring Peeper, and Wood Frog) were recorded during the 2022 survey period. Overall, anuran calling activity at these stations was relatively low with the exception of station ANR-21B, where a full chorus (Call Code 3) of Spring Peepers was recorded within the adjacent swamp features. Two Gray Treefrogs and a single Wood Frog were recorded at these stations. See Map 2-11 for the anuran survey station locations.

Table 48. NAT-21 Anuran Call Survey Results

Survey Round	Survey Date	Survey Station	Maximum Call Code and Estimated Number of Individuals		
			Gray Treefrog	Spring Peeper	Wood Frog
1	April 25, 2022	ANR-21A	0	1(2)	1(1)
		ANR-21B	0	3	0
2	May 19, 2022	ANR-21A	0	0	0
		ANR-21B	1(2)	1(4)	0
3	June 24, 2022	ANR-21A	0	0	0
	June 24, 2022	ANR-21B	0	0	0

Turtle Basking Survey

Turtle basking surveys were not completed at the NAT-21 complex.

Salamander Trapping Survey

Salamander trapping was not completed at the NAT-21 complex.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at the NAT-21 complex.

5.12.3 Aquatic Habitat and Fish Community

Other than a roadside drainage channel along 4th Line NE and the linear channels within the swamp community created through historic peat extraction, as described above, defined watercourse features are absent within the NAT-21 complex. No aquatic habitat assessment or fish community characterization surveys were completed at NAT-21.

5.13 Former Prince Property

5.13.1 Vegetation Communities and Species

Natural features in the former Prince property are dominated by deciduous forest and pine plantation communities located at the east end of the property. The deciduous forest community extends off-property to the north and east. Smaller areas of cultural habitats and a small marsh exist within the agricultural areas. The small marsh feature represents a dug cattle watering hole that is now naturalizing; it is not considered significant. The agricultural fields were previously used as cattle pasture and for row crops (NRSI 2017), and were observed to be fallow in 2022. Although OMNR LIO mapping identifies the presence of wetland within the on-

site woodland feature (OMNR 2023), field studies confirmed the absence of any wetland habitat within the treed areas (NRSI 2017).

A summary of ELC vegetation communities identified within the former Prince property is provided in Table 49 and shown on Map 2-12.

Table 49. Vegetation Communities within the Former Prince Property

ELC Ecosite Type	ELC Description	Environmental Characteristics
Forest		
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest Type	This mid-aged vegetation community comprises most of the natural feature. Topography within this feature is characterized as rolling upland habitat. Human use and disturbance of this community is minimal and limited to recreational activity (i.e., walking trails, hunting). Canopy: Sugar Maple, Black Cherry, American Beech Sub-canopy: Sugar Maple, Black Cherry, American Beech Understorey: Alternate-leaved Dogwood, Sugar Maple, Red Elderberry Groundcover: Pale Jewelweed, Giant Blue Cohosh, Alternate-leaved Dogwood
Cultural		
CUM1	Mineral Cultural Meadow	This vegetation community occurs in three separate areas within the agricultural fields. The polygon nearest to 4th Line is associated with the former rural residence which has since been demolished. Topography within the features is characterized by rolling upland habitat. Canopy: n/a Sub-canopy: Manitoba Maple, White Spruce, Common Apple Understorey: Tartarian Honeysuckle, Black Raspberry, Common Lilac Groundcover: Smooth Brome, Smooth Bedstraw, Tall Goldenrod A distinct habitat inclusion exists within the community closest to 4th Line: Mineral Meadow Marsh (MAM2). The MAM2 inclusion is dominated by Reed Canary Grass, Slender Stinging Nettle, and Panicled Aster. This small feature represents a former cattle watering hole that has since naturalized, and is not considered a significant feature.
CUP3-2	White Pine Coniferous Plantation	This young-aged vegetation community occurs within the property and was formerly used as cattle pasture. Topography within the feature is characterized as rolling upland habitat. Human and agricultural-related disturbances were evident within the feature, namely garbage/debris dumping, and broken tree limbs from former cattle occupation. Canopy: Eastern White Pine, Norway Spruce Sub-canopy: n/a Understorey: Choke Cherry, Red Elderberry, Alternate-leaved Dogwood Groundcover: Herb-robert, Bittersweet Nightshade, White Bedstraw

5.13.2 Terrestrial Wildlife

Birds

Twenty-six (26) bird species were documented within the former Prince property during site investigations. Of these, none were TRCA-listed hydrologically sensitive bird species.

Species of Conservation Concern

One bird SCC, Eastern Wood-Pewee, was recorded within the former Prince property. A single male Eastern Wood-Pewee was recorded within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1) during a single breeding bird survey completed on June 13, 2022. This species therefore displayed evidence of possible breeding within the woodland habitat (Birds Canada et al. 2021). However, since the woodland was identified as probable breeding habitat for the species based on previous NRSI fieldwork (NRSI 2017), the woodland is therefore again considered to represent probable breeding habitat for Eastern Wood-Pewee.

Other Bird Species

No bird SAR were recorded within the former Prince property. All other bird species recorded within the former Prince property are relatively common and have secure populations in Ontario (OMNR 2021). Notable, somewhat less common bird species that were recorded include Winter Wren (*Troglodytes hiemalis*) (observed with possible breeding evidence), American Kestrel (*Falco sparverius*) and Ruffed Grouse (*Bonasa umbellus*), and Belted Kingfisher (*Megaceryle alcyon*), which were observed without breeding evidence. Refer to Appendix VI for a list of all bird species recorded within the former Prince Property, including their breeding evidence codes.

Herpetofauna

Herpetofauna surveys were not completed at the former Prince property. A complete list of herpetofauna species reported from the former Prince property is provided in Appendix VII.

Anuran Call Surveys

Anuran call surveys were not completed on the former Prince property due to a lack of wetland habitat within the site.

Turtle Basking Surveys

Turtle basking surveys were not completed on the former Prince property due to a lack of wetland and open water habitats within the site.

Salamander Trapping Surveys

No salamander trapping occurred at the former Prince property due to a lack of suitable habitat.

Amphibian Egg Mass Surveys

Amphibian egg mass surveys were not completed at the former Prince property due to a lack of suitable habitat.

Mammals

One mammal species, Eastern Chipmunk (direct observation), was incidentally observed at the former Prince property. The woodland within the former Prince property represents potential roosting habitat for SAR bats. The on-site woodland was not assessed for potential bat habitat (i.e., through completion of a cavity tree assessment) as part of the NEA scope of work. See below for further discussion about potential bat-related significant habitat constraints associated with the woodland. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

Insects

No butterfly or odonate species were incidentally observed at the former Prince Property.

5.13.3 Aquatic Habitat and Fish Community

No watercourses are located within the former Prince property. As such, no aquatic habitat assessment or fish community characterization surveys were completed at this site.

5.14 Former Bonnefield Property

5.14.1 Vegetation Communities and Species

Natural features in the former Bonnefield Property are dominated by a deciduous forest community located at the east end of the property, and extending off-property to the east and north into the Melancthon Pit #1 site. Smaller areas of pine plantation and marsh also exist within the forest community, as well as the presence of a small vernal pool. NRSI previously characterized these features in association with the ARA pit-above-water table license

application for the former Prince and Bonnefield properties (NRSI 2017). Active aggregate extraction outside of the deciduous forest community was observed within the property in 2022, confirming that the former agricultural areas, hedgerows, and cultural meadow that were previously documented on-site (NRSI 2017) have been removed.

A summary of ELC vegetation communities identified within the former Bonnefield property is provided in Table 50 and shown on Map 2-13.

Table 50. Vegetation Communities within the Former Bonnefield Property

ELC Ecosite Type	ELC Description	Environmental Characteristics
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest Type	This mid-aged vegetation community comprises most of the natural feature. Topography within this feature is characterized as rolling upland habitat. Human use and disturbance of this community is minimal and limited to recreational activity (i.e., walking trails, hunting). Canopy: Sugar Maple, Black Cherry, American Beech Sub-canopy: Sugar Maple, Black Cherry, American Beech Understorey: Sugar Maple, Alternate-leaved Dogwood, Red Elderberry Groundcover: Giant Blue Cohosh, Yellow Trout-lily, Dewey's Sedge Three distinct habitat inclusions exist within this vegetation community: White Pine Coniferous Plantation (CUP3-2), Mineral Shallow Marsh (MAS2), and Mineral Meadow Marsh (MAM2). The CUP3-2 inclusion is dominated by Eastern White Pine, Choke Cherry, and Herb-robert. The MAS2 inclusion is dominated by Reed Canary Grass, Small-leaved Watercress (*Nasturtium microphyllum*), and Devil's Beggarticks. The MAM2 inclusion is dominated by Marsh Fern, Spotted Joe Pye Weed, and Dwarf Clearweed. In addition, a small vernal pool feature, estimated 10m x 10m, was identified within the southwest portion of this community. Wetland vegetation was not observed within the vernal pool, and minimal surface water was present during all visits to the property.

5.14.2 Terrestrial Wildlife

Birds

Hydrologically-Sensitive Species

Thirty-five (35) bird species were documented within the former Bonnefield property during site investigations. Of these, one (Wood Duck) was a TRCA-listed hydrologically sensitive bird species. This species was not observed with evidence of breeding within the property. Table

51 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-13 for the bird survey station locations.

Table 51. Former Bonnefield Property TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	n/a (incidental)	1	MAM/MAS2	2022	OB
			-	MAM/MAS2		

Species of Conservation Concern

One bird SCC, Eastern Wood-Pewee, was recorded within the former Bonnefield property. A single male Eastern Wood-Pewee was recorded within the woodland during each of the breeding bird surveys completed on June 10, 2021 and June 17, 2022. Although this species was only recorded once during a single breeding season, since it was recorded over two consecutive breeding seasons and because the woodland was identified as probable breeding habitat for the species based on previous NRSI fieldwork (NRSI 2017), the woodland is therefore again considered to represent probable breeding habitat for Eastern Wood-Pewee.

Other Bird Species

No bird SAR were recorded within the former Bonnefield property. All other bird species recorded within the former Bonnefield property are relatively common and have secure populations in Ontario (OMNR 2021). Notable, somewhat less common bird species that were recorded include Winter Wren (observed with possible breeding evidence), and Ruffed Grouse, and Belted Kingfisher, which were observed without breeding evidence. Refer to Appendix VI for a list of all bird species recorded within the former Bonnefield property, including their breeding evidence codes.

Herpetofauna

Five herpetofauna species were recorded within the former Bonnefield property during the 2021 and 2022 survey years. A complete list of herpetofauna species reported from this property is provided in Appendix VII.

All five herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 52 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-13 for herpetofauna station survey locations.

Table 52. Former Bonnefield Property TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Spotted Salamander	High	SAL-S3	-	24	MAS2	2022
		SAL-S4	-	6	MAS2	2022
		SAL-S5	-	10	MAS2	2022
		SAL-S6	-	24	MAS2	2022
		SAL-S7	-	1	MAS2	2022
		SAL-S8	-	9	MAM2	2022
		SAL-S9	-	5	MAM2	2022
		SAL-S10	-	15	MAM2	2022
Gray Treefrog	High	ANR-09	1	1	MAS2	2022
Spring Peeper	High	ANR-09	3	N/A[1]	MAS2	2021
			3	N/A[1]		2022
		n/a (incidental)	3	N/A[1]	MAM2	2021
			-	-	MAM2	2022
Green Frog	Medium	ANR-09	1	1	MAS2	2022
Wood Frog	High	ANR-09	3	N/A[1]		2021
		n/a (incidental)	3	N/A[1]	MAM2	2021
			-	2	MAM2	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Surveys

Long-term annual anuran monitoring was initiated at the former Bonnefield property in 2018 as a condition of the ARA license that was granted to Strada Aggregates for above-water table aggregate extraction on the former Prince and Bonnefield properties. This monitoring was in addition to anuran call surveys completed for the NEA in 2016 (NRSI 2017). Annual call survey monitoring has been completed at ANR-09, which surveys the small, isolated pockets of Mineral Shallow Marsh (MAS2) and Mineral Meadow Marsh (MAM2) within the interior of the on-site woodland (Map 2-13). Monitoring at the former Bonnefield property has been consolidated with long-term monitoring completed at Melancthon Pit #2 and is summarized in the *Integrated Monitoring Plan for Melancthon Pit #2 and the Bonnefield Property Pit, Summary of 2022 Biological Survey Results* (NRSI 2023).

Across the entire duration of anuran monitoring at the site (2016-2022), six species have been recorded using the former Bonnefield property wetland features: American Toad, Western Chorus Frog, Gray Treefrog, Spring Peeper, Green Frog, and Wood Frog. The SCC Western Chorus Frog was only recorded during the 2018 survey period. See the Integrated Monitoring Plan anuran monitoring report (NRSI 2023) for a complete summary of anuran species occurrence and trends in relative abundance for the former Bonnefield property wetlands across the 2016-2022 monitoring period.

During the 2021-2022 survey years that are the focus of this NEA, four anuran species were recorded at the former Bonnefield property wetlands: Gray Treefrog, Spring Peeper, Green Frog, and Wood Frog. Table 53 provides a summary of maximum call codes and the estimated abundance of each species across surveys for the 2021-2022 period at station ANR-09.

Spring Peeper was the most abundant species, being recorded at up to full chorus (Call Code 3) during each of the April and May surveys. Wood Frog was also abundant, being recorded at full chorus during the April 8, 2021 survey. Due to this species' relatively brief "explosive" breeding window, it is expected that the April 12, 2022 survey missed the Wood Frog calling activity, and is not to be interpreted as the species being absent. Wood Frog has been recorded at high abundances during previous survey years (NRSI 2023). Only single individuals of Gray Treefrog and Green Frog were recorded at the station during the 2021-2022 period. Anuran species richness and relative abundance at station ANR-09 has previously been recognized to meet OMNR targets (OMNR 2015a) that render it SWH for woodland amphibian breeding habitat (NRSI 2017).

Table 53. Former Bonnefield Property Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals			
			Gray Treefrog	Spring Peeper	Green Frog	Wood Frog
1	ANR-09	April 8, 2021	0	3	0	3
		April 12, 2022	0	2(5)	0	0
2	ANR-09	May 17, 2021	0	2(3)	0	0
		May 19, 2022	0	3	0	0
3	ANR-09	June 24, 2021	0	0	0	0
		June 16, 2022	1(1)	0	1(1)	0

Turtle Basking Surveys

One turtle basking station was established in 2021 within the former Bonnefield Property to survey the Mineral Shallow Marsh (MAS2) wetland that is located within the on-site woodland feature (Map 2-13). No turtles were recorded at this station during either of the 2021 or 2022 survey years.

Salamander Trapping Surveys

In 2022, eight minnow traps were deployed at the former Bonnefield property. These trap stations were set up throughout the isolated MAS2 wetlands that are located interior to the woodland on the property. One species, Spotted Salamander, was recorded at this property.

This species was captured on April 14, 15, and 16, 2022. Spotted Salamander was captured in all eight traps during the course of the survey period. The majority of individuals were captured at trap stations S3 (24 individuals) and S6 (23 individuals) on April 14. In total, 78 salamanders were recorded on April 14, followed by 18 on April 15 and 2 on April 16. Three Wood Frogs were also captured in traps during the survey period.

See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Surveys

One amphibian egg mass survey station was established in 2021 within the MAS2 wetland community on the former Bonnefield property as shown on Map 2-13. No egg masses were observed at this location during field surveys.

Mammals

No mammal species were incidentally observed at the former Bonnefield property. The woodland within the former Bonnefield property represents potential roosting habitat for SAR bats. The on-site woodland was not assessed for potential bat habitat (i.e., through completion of a cavity tree assessment) as part of the NEA scope of work. See below for further discussion about potential bat-related significant habitat constraints associated with the woodland.

A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

Insects

No butterfly or odonate species were incidentally observed at the former Bonnefield property.

5.14.3 Aquatic Habitat and Fish Community

No watercourses are located within the former Bonnefield property. As such, no aquatic habitat assessment or fish community characterization surveys were completed at this site.

5.15 Melancthon Pit #2

5.15.1 Vegetation Communities and Species

Several wetland features exist within the actively operating Melancthon Pit #2 property. One of the wetland communities, SWD4, is contiguous with the NAT-19 complex. The wetland features

were surveyed through detailed on-site investigations. NRSI previously characterized these features in association with the Melancthon Pit #2 ARA license application (NRSI 2010).

Table 54 presents a summary of the wetland ELC communities that were characterized. Dominant species are listed in order of relative abundance. Significant species and hydrologically sensitive or groundwater indicator species are noted where applicable.

Table 54. Wetland and Aquatic Vegetation Communities within Melancthon Pit #2

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
Wetland			
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	Low Hydrologically Sensitive Species Inventoried: High – 0 Medium – 1 Groundwater Indicator Species Inventoried: 0	Two small isolated units exist within the property. Low sensitivity to hydrological change was determined for this community. Canopy: n/a Sub-canopy: n/a Understorey: various Willows, Red-osier Dogwood Groundcover: Reed Canary Grass, Panicled Aster, Redtop (*Agrostis gigantea*), Spotted Joe Pye Weed
SAS1-3	Stonewort Submerged Shallow Aquatic	Medium Detailed inventory not completed	Two small isolated units exist within the property. The features exist as shallow aquatic features lined with Crack Willow. Medium sensitivity to hydrological change was determined for this community. Canopy: Crack Willow Sub-canopy: Crack Willow Understorey: Red-osier Dogwood Groundcover: Stonewort, Flatstem Pondweed (*Potamogeton zosteriformis*), Broad-fruited Burreed

ELC Ecosite Type	ELC Description	Hydrological Sensitivity Ranking (TRCA 2017)	Environmental Characteristics
SWD4	Mineral Deciduous Swamp	Low-High Detailed inventory not completed	An area of deciduous swamp is present at the far western extent of the NAT-19 feature. The community includes treed areas interspersed with meadow marsh openings. The edge of the wetland includes numerous 2-3m high mounds that may be the result of past introduction of fill material that has resulted in a complex topography that transitions to level low-lying area in the eastern extent of the community. A narrow band of cultural meadow, dominated by cool season forage grasses, is present along the western boundary between the active aggregate pit and the wetland. Low to high sensitivity to hydrological change was determined for this community. Canopy: Trembling Aspen, Balsam Poplar Sub-canopy: Trembling Aspen, Balsam Poplar Understorey: Red-osier Dogwood, Willow species Groundcover: Reed Canary Grass, Spotted Joe Pye Weed, Rough-leaved Goldenrod, Beggars Ticks species

5.15.2 Terrestrial Wildlife

Birds

Hydrologically-Sensitive Species

Forty-three (43) bird species were documented within Melancthon Pit #2 during site investigations. Of these, one (Wood Duck) was a TRCA-listed hydrologically sensitive bird species. This species was not observed with evidence of breeding within the property. Table 55 provides a summary of the TRCA-listed hydrologically sensitive bird species recorded. See Map 2-14 for the bird survey station locations.

Table 55. Melancthon Pit #2 TRCA-listed Hydrologically Sensitive Bird Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Number of Individuals	ELC	Observation Year(s)	Breeding Code
Wood Duck	Medium	n/a (incidental)	-	-	-	OB

Species at Risk

Two bird SAR were documented within the Melancthon Pit #2 site during field surveys: Eastern Meadowlark and Bank Swallow.

Eastern Meadowlark was recorded on multiple dates within two separate habitat locations on the property. Specifically, an individual Eastern Meadowlark was observed within open meadow lands off-property to the immediately southeast of the subject lands during a bird survey completed on June 10, 2021. An Eastern Meadowlark was documented within the southern Mineral Cultural Meadow (CUM1) on the subject lands during the June 9, 2022 survey, as observed from MBB-02 (Map 2-14). Since the on-property CUM1 is contiguous with the off-property open lands, and because the species were documented on these lands during two consecutive breeding seasons, the entire contiguous area is considered confirmed breeding habitat for Eastern Meadowlark (Map 5-14). Eastern Meadowlark was also recorded within the northern CUM1 cultural meadow on the Melancthon Pit #2 site (north of the Fresh-Moist White Cedar Coniferous Forest (FOC4-1)) on multiple occasions during the 2022 survey season: incidentally during salamander surveys completed on April 5, 6, and 15, and during the 1st breeding bird survey on June 9 as surveyed from BMB-03 (Map 2-14). Although this species was only recorded once during the 2022 bird breeding season (it was not recorded during the 2nd breeding bird season), following a precautionary approach the northern CUM1 community is considered confirmed breeding habitat for Eastern Meadowlark (Map 5-14).

Bank Swallows were recorded on one occasion within the Melancthon Pit #2 site, during the 1st breeding bird survey completed on June 9, 2022. Specifically, 12 individuals were observed flying into and out of a material stockpile located within an operational area of the pit. The specific stockpile material was not recorded. This observation suggests the presence of a cavity nest. See Map 5-14 for the approximate location of the stockpile that provided the nesting habitat.

Species of Conservation Concern

One bird SCC, Wood Thrush, was recorded within the Melancthon Pit #2 site during the 1st breeding bird survey on June 10, 2021. A single singing male Wood Thrush was recorded from survey station MBB-02 and was recorded within the wooded feature along the eastern edge of the site (i.e., the western edge of the NAT-19 wooded swamp complex), likely within the Mineral Deciduous Swamp (SWD4) ecosite. Since Wood Thrush was not recorded again during the 2nd breeding survey in 2021, and was also not recorded during the 2022 breeding bird surveys.

The single 2021 observation therefore represents evidence of "possible" breeding by the species within the wooded habitat. However, the lack of subsequent documentation of this species suggests that Wood Thrush likely did not maintain a breeding territory within or near the fringing wooded features that form the east end of the Melancthon Pit #2 site.

Other Bird Species

All other bird species recorded at Melancthon Pit #2 are relatively common and have secure populations in Ontario (OMNR 2021). Notable, somewhat less common bird species that were recorded include Winter Wren (observed with possible breeding evidence), and Ruffed Grouse, Belted Kingfisher, and Common Raven (*Corvus corax*), which were observed without breeding evidence. Refer to Appendix VI for a list of all bird species recorded within Melancthon Pit #2, including their breeding evidence codes.

Herpetofauna

Seven herpetofauna species were documented within the Melancthon Pit #2 site during the 2021 and 2022 survey years. A complete list of herpetofauna species reported from Melancthon Pit #2 is provided in Appendix VII.

All seven herpetofauna species are TRCA-listed hydrologically sensitive herpetofauna species. Table 56 provides a summary of TRCA-listed hydrologically sensitive herpetofauna species recorded. See Map 2-14 for herpetofauna station survey locations.

Table 56. Melancthon Pit #2 TRCA-listed Hydrologically Sensitive Herpetofauna Species

Species	Hydrological Sensitivity Ranking (TRCA 2017)	Station ID	Maximum Call Code	Total Number of Individuals	ELC	Observation Year(s)
Spotted Salamander	High	SAL-S1	-	3	SAS1-3	2022
		SAL-S2	-	10	SAS1-3	2022
American Toad	Medium	ANR-01	2	3	SAS1-3	2022
Gray Treefrog	High	ANR-01	2	5	SAS1-3	2022
		ANR-02	1	2	MAM2-2	2022
		ANR-05	3	N/A[1]	SAS1-3	2022
		ANR-07B	1	2	SWD4	2022
		ANR-08	1	2		2022
		n/a (incidental)	3	N/A[1]	-	2022
Spring Peeper	High	ANR-01	3	N/A[1]	SAS1-3	2021
		ANR-02	3	N/A[1]	MAM2-2	2022
		ANR-03	3	N/A[1]	-	2021
			3	N/A[1]		2022
		ANR-04	3	N/A[1]	MAM2-2	2021
			3	N/A[1]		2022
		ANR-05	3	N/A[1]	SAS1-3	2021

			3	N/A[1]		2022
		ANR-07A	1	1	SWD4	2022
		ANR-07B	1	2	SWD4	2021
		ANR-08	2	7		2022
		n/a (incidental)	1	1	SAS1-3	2021
			-	-	SAS1-3	2022
Green Frog	Medium	ANR-05	1	2	SAS1-3	2021
Northern Leopard Frog	High	ANR-01	1	2	SAS1-3	2021
			1	1		2022
		ANR-05	1	1	SAS1-3	2021
			1	3		2022
		ANR-07B	1	1	SWD4	2022
		ANR-08	1	1		2022
Wood Frog	High	ANR-01	2	5	SAS1-3	2021
		ANR-02	2	3	MAM2-2	2022
		ANR-03	3	N/A[1]	-	2021
		ANR-04	3	N/A[1]	MAM2-2	2021
			1	3		2022
		ANR-05	1	3	SAS1-3	2022
		ANR-07A	1	1	SWD4	2022
		ANR-07B	2	4	SWD4	2021
		n/a (incidental)	-	2	SAS1-3	2022

[1]Number of individuals cannot be counted during call codes of rank 3

Anuran Call Survey

NRSI has undertaken anuran call surveys at nine stations within the site (Map 2-14) since 2013 as part of a separate long-term monitoring program that was established as a condition of the ARA license awarded to Strada for the Melancthon Pit #2 aggregate operation. In addition to anuran surveys completed in 2009 to inform the Melancthon Pit #2 NEA (NRSI 2010), one year of pre-extraction monitoring was undertaken, followed by operational-stage monitoring beginning in 2014 (NRSI 2023). See Map 2-14 for the anuran survey station locations.

Across the entire duration of anuran monitoring at the site (2009-2022), seven species have been recorded using the on-site wetland features: American Toad, Western Chorus Frog, Gray Treefrog, Spring Peeper, Green Frog, Wood Frog, and Northern Leopard Frog. The SCC Western Chorus Frog was only recorded within the site in 2009. All other species have been recorded as occurring within the site relatively consistently across monitoring years. See the *Integrated Monitoring Plan for Melancthon Pit #2 and the Bonnefield Property Pit, Summary of 2022 Biological Survey Results* (NRSI 2023) for a complete summary of anuran species occurrence and trends in relative abundance for the Melancthon Pit #2 site across the 2009-2022 monitoring period.

During the 2021-2022 survey years that are the focus of this NEA, six anuran species were recorded at Melancthon Pit #2: American Toad, Gray Treefrog, Spring Peeper, Green Frog,

Wood Frog, and Northern Leopard Frog. Table 57 provides a summary of maximum call codes and the estimated abundance of each species across surveys for the 2021-2022 period across Melancthon Pit #2 anuran call survey stations.

Spring Peeper was the most abundant species recorded across stations, followed by Wood Frog and Gray Treefrog; this is also consistent with observations made during past monitoring years at the site. Spring Peeper was recorded at full chorus (Call Code 3) at stations ANR-01, -02, -03 (both years), -04 (both years), and -05 (both years). It was also recorded at Call Code 2 at station ANR-08. Wood Frog was recorded at full chorus at stations ANR-03 and -04, both during the 2021 monitoring year; up to five individuals have also been recorded at ANR-01. Gray Treefrog was recorded at full chorus at ANR-05 during the June 16, 2022 survey, and up to five individuals have also been recorded at ANR-01. American Toad, Green Frog, and Northern Leopard Frog are consistently observed at low abundances on-site when they are detected.

Multiple years of monitoring have demonstrated that stations surveying the small meadow marsh and pond features within the north end of the site (the MAM2-2 and SAS1-3 features, as surveyed by ANR-01, -02, -03, -04, and -05) consistently exhibit the highest species richness and relative abundances among stations. During the 2021-2022 survey period, five species were recorded at ANR-01 and -05. However, four species were also recorded at station ANR-07B, albeit at lower relatively abundances. No species were recorded at ANR-06 over the two-year period, and low species abundance was recorded at ANR-07A; these results are consistent with long-term monitoring trends and suggest these surveyed habitats are not important for anuran breeding.

Table 57. Melancthon Pit #2 Anuran Call Survey Results

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
1	ANR-01	April 8, 2021	0	0	2(6)	0	2(5)	1(1)
		April 12, 2022	0	0	0	0	0	
	ANR-02	April 8, 2021	0	0	0	0	0	0
		April 12, 2022	0	0	3	0	2(3)	0
	ANR-03	April 8, 2021	0	0	3	0	3	0
		April 12, 2022	0	0	3	0	0	0
	ANR-04	April 8, 2021	0	0	3	0	3	0
		April 12, 2022	0	0	3	0	1(3)	0
	ANR-05	April 8, 2021	0	0	2(7)	0	1(3)	0
		April 12, 2022	0	0	0	0	0	0

Survey Round	Survey Station	Survey Date	Maximum Call Code and Estimated Number of Individuals					
			American Toad	Gray Treefrog	Spring Peeper	Green Frog	Wood Frog	Northern Leopard Frog
	ANR-06	April 8, 2021	0	0	0	0	0	0
		April 12, 2022	0	0	0	0	0	0
	ANR-07A	April 8, 2021	0	0	0	0	0	0
		April 12, 2022	0	0	1(1)	0	1(1)	0
	ANR-07B	April 8, 2021	0	0	1(2)	0	2(4)	0
		April 12, 2022	0	0	0	0	0	0
	ANR-08	April 8, 2021	0	0	0	0	0	0
		April 12, 2022	0	0	2(5)	0	0	0
2	ANR-01	May 17, 2021	2(3)	0	3	0	0	1(1)
		May 19, 2022	0	0	0	0	0	0
	ANR-02	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-03	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-04	May 17, 2021	0	0	3	0	0	0
		May 19, 2022	0	0	1(1)	0	0	0
	ANR-05	May 17, 2021	0	0	3	0	0	1(1)
		May 19, 2022	0	0	3	0	0	0
	ANR-06	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-07A	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-07B	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	0	0	0	0
	ANR-08	May 17, 2021	0	0	0	0	0	0
		May 19, 2022	0	0	2(2)	0	0	0
3	ANR-01	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	2(5)	0	0	0	1(1)
	ANR-02	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	1(2)	0	0	0	0
	ANR-03	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	0	0	0	0	0
	ANR-04	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	0	0	0	0	0
	ANR-05	June 24, 2021	0	0	0	1(2)	0	0
		June 16, 2022	0	3	0	0	0	1(3)
	ANR-06	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	0	0	0	0	0
	ANR-07A	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	0	0	0	0	0
	ANR-07B	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	1(2)	0	0	0	1(1)
	ANR-08	June 24, 2021	0	0	0	0	0	0
		June 16, 2022	0	1(2)	0	0	0	1(1)

Turtle Basking Survey

Two stations were established within the Melancthon Pit #2 site: TBO1 located at the northernmost SAS1-3 pond (also referred to as the “North Pond”), and TBO2 located at the southernmost SAS1-3 pond (also referred to as the “South Pond”) (Map 2-14). No turtles were recorded at either station during the 2021 or 2022 survey periods.

Salamander Minnow Trapping

In 2022, two minnow traps were deployed at Melancthon Pit #2. Both traps (“S1” and “S2”) were established at the SAS1-3 “South Pond” (Map 2-14). One salamander species, Spotted Salamander, was recorded at this site. This species was found in both traps on two survey dates. One individual was captured within trap S1, and six individuals within trap S2, on April 14. Two individuals were captured within trap S1, and four individuals within trap S2, on April 15. See Appendix X for a summary of salamander trap check results collected across all site visits.

Amphibian Egg Mass Survey

Three amphibian egg mass survey stations were established in 2021 within the Melancthon Pit #2 site as shown on Map 2-14. Amphibian egg masses were only found at one of these stations (Melancthon station #2). This station was located within the southernmost Reed Canary Grass Mineral Meadow Marsh (MAM2-2). On April 14, 2021, 40 egg masses associated with Wood Frog were observed. They were located within a small area of standing water approximately 40cm deep. On April 29, 2021, one egg mass associated with Wood Frog was observed at the same location. The egg mass was observed in an isolated area of standing water approximately 0.9m deep.

Mammals

One mammal species, Coyote (tracks), was incidentally observed at Melancthon Pit #2. A complete list of mammals reported from the Study Area and vicinity is included in Appendix VIII.

Woodland and other treed features within the Melancthon Pit #2 site represent potential roosting habitat for SAR bats. The on-site woodlands were not assessed for potential bat habitat (i.e., through completion of a cavity tree assessment) as part of the NEA scope of work. See below for further discussion about potential bat-related significant habitat constraints associated with the woodland and treed features.

Insects

One butterfly species, Monarch (direct observation), was incidentally observed at Melancthon Pit #2. As mentioned in Section 3.2, this species is a provincial and federal species of Special Concern. However, the property is not considered to provide significant habitat for this species due to a lack of large meadow habitats containing an abundance of its host plant, milkweed (*Asclepias* spp.).

No odonate species were incidentally observed at Melancthon Pit #2.

5.15.3 Aquatic Habitat and Fish Community

No watercourses are located within the Melancthon Pit #2 site. As such, no aquatic habitat assessment or fish community characterization surveys were completed at this site.

6.0 Natural Feature Significance and Sensitivity

Nature feature cover is abundant and widespread throughout the Study Area, interspersed within a largely agricultural landscape. Deciduous, coniferous and mixed swamps are heavily represented among the Study Area natural feature cover types, coinciding with the headwaters of the Pine River and Boyne River riparian systems. Several of these swamps are relatively large and intact, have been subject to relatively little disturbance over the years, and as such represent high quality ecological communities. Rare and environmentally conservative (intolerant of ecological change) vegetation species are widespread among these features. Meadow marsh wetlands are also common, and to a lesser extent, shallow marshes and open aquatic wetlands/ponds. The majority of the Pine and Boyne River tributary system that drains the Study Area comprises cool- or coldwater watercourses that provide habitat for thermally sensitive species such as Brook Trout. These features are intrinsically connected to the shallow groundwater regime, as has been demonstrated through observations of groundwater indicator vegetation species and seepages. Accordingly, these features may be susceptible to alterations in the shallow groundwater regime. Hydrologically-sensitive flora and fauna species were documented within natural features, to varying degrees of diversity and abundance, throughout the Study Area. See below for further discussion about the hydrological sensitivity of the Study Area natural features and habitats.

The subject lands themselves also contain significant natural features in the form of upland deciduous forests and small, fragmentary wetland pockets. The subject lands forests represent former agricultural woodlots, which, on a broader Study Area scale, represent important contributions to the natural landcover on the landscape. The subject lands are primarily approved for above-water table sand and gravel extraction, and the on-site natural features have been retained outside of the extraction limits of the existing aggregate pit. See below for further discussion about the significance and sensitivity of the subject lands natural features. Due to the varying scales and forms of potential ecological impact associated with the Study Area external lands natural features versus those within the subject lands themselves, they are discussed separately.

6.1 External Lands

6.1.1 Hydrologically-Sensitive Wetlands and Species

The quality of the wetland communities and the plant diversity is variable across the study area. Intact swamp communities with complex microtopography, accumulations of organic soil and

conservative species representation are found in NAT-02, NAT-14, NAT-15, and NAT-16. These wetland features also exhibit the greatest degree of groundwater influence and sensitivity to change. The wetlands located within NAT-01, NAT-03, NAT-04, and NAT-19 are relatively high quality but contain fewer groundwater-obligate or dependent species and the diversity in these communities is somewhat tolerant to fluctuation in the hydrological conditions. Wetlands within NAT-20, as well as the small wetland pockets on the former Bonnefield property and Melanchton Pit #2 site, did not contain a high proportion of conservative species or groundwater indicator species and overall, these wetlands are most tolerant of hydrological change. The assessment of NAT-18 was conducted from the roadside and although several groundwater-associated species were observed, these species frequently occur in roadside ditches that are excavated to below the water table. The wetlands within this small complex may contain additional groundwater indicator species and species that would be sensitive to hydrological change.

The vascular plant surveys conducted by NRSI documented more than 100 species that have been identified as having medium or high sensitivity to hydrological change (TRCA 2017). A subset of these species is also associated with groundwater-influenced wetlands, as categorized in TRCA (2017). A small number of the species have Coefficient of Conservatism values of 7 or higher, indicating that the plant occupies a narrow ecological niche and is intolerant of habitat degradation (Oldham et al. 1995).

Strong groundwater indicator species (i.e., species that only grow where groundwater inputs exist), including Eastern Rough Sedge (*Carex scabrata*), Watercress, and Marsh Marigold, occur in large numbers in NAT-02, NAT-14, NAT-15, and NAT-16. Other plant species that can be associated with groundwater-influenced wetlands, but don't necessary require groundwater inputs, include Showy Lady's Slipper, American Water-pennywort, American Golden-saxifrage and a suite of sedges including Two-seeded Sedge, Yellow Sedge, Porcupine Sedge, Inland Sedge, Bristle-stalked Sedge. Complexes that support these and other groundwater-associated species, but lack the strong groundwater indicators, include NAT-01, NAT-03, and NAT-04.

Typical habitats include mixed swamp (Birch-Poplar Organic Mixed Swamp (SWM6) and White Cedar Organic Coniferous Swamp (SWC3-1)) in various locations, deciduous swamp (White Birch – Poplar Organic Deciduous Swamp (SWD7-1)) within the NAT-01 feature, coniferous swamp (White Cedar – Conifer Organic Coniferous Swamp (SWC3-2)) largely within the NAT-15 feature and organic swamp thickets. All of these communities are situated on deep organic

soils and support high species diversity overall. A decrease in groundwater input to these communities could potentially result in these groundwater indicator species decreasing in cover and vigour. A prolonged disruption in groundwater input could result in some species disappearing from a feature and therefore having reduced representation within the Study Area. As the seed bank lies in damp organic soil that provides excellent conditions for wetland seed stratification and germination, it is likely that the seed bank turnover is rapid and few species would remain present as seed for an extended number of years.

A number of species with high Coefficient of Conservatism values were documented and these species require a very specific hydrology and community composition. Some of the species, which have values of 7-10 (10 being the absolute highest conservatism value) include: Marsh Horsetail (*Equisetum palustre*), Rush Aster (*Symphyotrichum boreale*), Swamp Fly Honeysuckle (*Lonicera oblongifolia*), Mud Sedge (*Carex limosa*), Water Speedwell, Three-leaved Solomon's Seal (*Maianthemum trifolium*), Eastern Mannagrass (*Glyceria septentrionalis*), Linear-leaved Willowherb (*Epilobium leptophyllum*), Water Dock (*Rumex britannica*), Round-leaved Goldenrod, Small Forget-me-not (*Myosotis laxa*), Great Blue Lobelia (*Lobelia siphilitica*) and Marsh Bellflower (*Palustricodon aparinoides*). These species are generally not groundwater dependent, but could be impacted by hydrological fluctuation and changes in vegetation community structure.

Speckled Alder is identified as having medium sensitivity to hydrological change and is also a groundwater indicator. This species occurs in varying density within parts of the mixed swamp/swamp thicket (SWM/SWT) community in NAT-03. In areas of open or partially shaded canopy, Speckled Alder can form dense thickets and substantial impact to this species could result in changes at the vegetation community level. The widespread decline of Speckled Alder would lead to an increase in the cover of wetland graminoids and forbs.

Shallow aquatic marsh communities are localized and relatively small within the study area. Although macrophyte species such as Flatstem Pondweed, Floating Pondweed, Lesser Bladderwort (*Utricularia minor*), Green-fruited Burreed (*Sparganium emersum*) and Broad-fruited Burreed are not groundwater-dependent, these species would be impacted by a drawdown in surface water elevation. The root system of the pondweed species is fully submerged but these species prefer a certain water depth. The remaining species are typically emergent aquatics that inhabit the edges of shallow marshes and backwater sections of watercourses. For these species, minor drawdown of the water level may affect the saturation

of the soil and in turn would result in reduced plant vigour. As these species prefer the margins of shallow water features, each has some capacity to colonize newly exposed shoreline and littoral zones if the surface water elevation was to shift slightly. While groundwater may contribute to maintaining the shallow inundated conditions for these species, none are explicitly dependent on this input.

6.1.2 Watercourses and Fish Habitats

The majority of the watercourses that were investigated within the Study Area exhibit characteristics associated with groundwater influence, which includes a permanent flow regime and consistent flow throughout the year, the presence of Watercress, iron staining, cool- and coldwater thermal regimes, and/or the presence of coldwater fish species, including Brook Trout (Map 6-1 through 6-12). Due to their interrelatedness, many of these identifying characteristics were found at the same locations. No watercourses were identified within the subject lands themselves.

Groundwater is integral for sustaining aquatic ecosystems by supplying baseflow (the lowest flows of late summer to winter) and maintaining water temperatures and other water quality requirements, including dissolved oxygen, that are conducive for fish (Hynes 1983, Blackport et al. 1995). Groundwater plays a vital role in the habitat of Brook Trout, a species highly dependent on clean, coldwater environments. Brook Trout are sensitive to changes in water temperature and quality, making groundwater a crucial factor in their survival, optimal growth and to carry out their various life history stages (e.g., spawning, incubation etc.). Groundwater discharge can help maintain stable stream temperatures, especially during hot and dry periods, providing essential refuges for Brook Trout populations. Additionally, groundwater inputs contribute to stream flow, ensuring sufficient oxygen levels and habitat connectivity for the fish.

Brook Trout populations were confirmed within watercourses associated with five NAT complexes where fish sampling was conducted, or where incidental observations were made. These included NAT-01, NAT-04, NAT-14, NAT-15, and NAT-16. These NAT complexes align with the hydrologically-sensitive wetlands discussed in Section 6.1. In addition to Brook Trout, 13 other fish species were confirmed within the Study Area, including 12 coolwater species and one warmwater species. These additional species are generally more tolerant to changes in aquatic habitat conditions and can occur within a wider range of water temperatures and higher upper thermal limits. The watercourses with the most abundant and species-rich fish communities were associated with NAT-03, which still contains a relatively high-quality wetland,

but one that was noted to contain fewer groundwater-dependent plant species. In comparison to the NAT-03 watercourses, the watercourses where Brook Trout were found supported a much less diverse and abundant fish community, often only containing Brook Trout.

The most intact swamp communities that exhibited the highest degree of groundwater influence and sensitivity to change (NAT-01 and NAT-15) were also noted to support healthy Brook Trout populations either within or immediately downstream from these complexes, which included both adult and yoy/juvenile individuals. The watercourses associated with the Terra Nova PSW complex (NAT-15), in particular, all exhibited coldwater thermal regimes at the assessment locations associated with the complex, and Brook Trout were captured immediately upstream from, within, and at the downstream extents of the complex. While there is a dam located at the southern extent of NAT-15, which has inundated a portion of the watercourses at its upstream side, it doesn't appear to be having a significant effect on the quality of sensitive fish habitat downstream from the dam. Summer water temperature measurements on its downstream side indicate a coldwater thermal regime, although it does create an impassable barrier for upstream fish movement. Further, both adult and juvenile Brook Trout were captured at the downstream side of the dam, which suggests that there is still high-quality habitat available up to the dam that supports a self-sustaining Brook Trout population. Assessment locations associated with NAT-15 were all characterized by cold, clear water, and Watercress was noted to be abundant at the majority of them. The large wetland complex associated with NAT-01 is bisected by 5th Line and was only noted to have a single permanent watercourse associated with it, which flows south from the southwestern extent of the complex where it crosses 2nd Line and County Road 17. The assessment locations along this watercourse, which also flows south through NAT-04, were largely classified as coldwater and confirmed to support Brook Trout. Adult and juvenile Brook Trout were captured at 2nd Line while only juvenile and yoy Brook Trout were captured at NAT-04, indicating that those reaches provide suitable habitat for a variety of life stages, including spawning and rearing habitat.

While the majority of the watercourses assessed within the Study Area were classified as either cool- or coldwater based on summer water temperature measurements, there were some watercourses that were classified as warmwater even though groundwater indicators (e.g., Watercress) were observed within them and their upper reaches were classified as coolwater. This was observed within NAT-03, which contained the only warmwater reaches associated with the NAT complexes. While these features did support coolwater fish populations, no Brook Trout were observed. It appears that the wetlands and open water areas existing within NAT-03

are likely having a warming effect on the watercourses where they meet and flow southeast towards County Road 124. In addition, the available habitat was more limited throughout the downstream reach under summer conditions as water depths were observed to be relatively low in comparison to other cool- and coldwater watercourses.

Consistent baseflows are important for maintaining the quantity of living space, cover and food (Blackport et al. 1995). The relationship between the annual flow regime of a watercourse and the quality of trout habitat has been well-documented. In general, a base flow of 55% of the average annual daily flow is considered excellent, a base flow of 25 to 50% is considered fair, and a base flow of <25% is considered poor for maintaining quality trout habitat (Raleigh 1982).

In streams and ponds, areas of groundwater upwelling have been shown to be highly preferred by Brook Trout (Webster and Eiriksdottier 1976; Carline and Brynildson 1977) since these areas typically provide optimal habitat for the species, which is characterized by clear, cold water with relatively stable flow and temperature regimes among various other physical attributes (e.g. silt-free rocky substrates, 1:1 riffle and pool sequencing, abundant instream cover etc.) (Raleigh 1982). The optimal water temperature range for growth and survival of juvenile and adult Brook Trout is roughly 11-16°C, although they will occur in temperatures up to approximately 20°C and can withstand temperatures up to 24°C for short durations. However, warm water temperatures are still considered to be the single most important factor limiting Brook Trout distribution and production (Raleigh 1982). Brook Trout spawn in the fall (October/November) and eggs incubate within gravel redds over the course of the winter with fry emerging from January to April, depending on the local temperature regime (Brasch et al. 1958). Consistent groundwater expression is crucial during this period to maintain water temperatures within the optimal range for egg incubation, which is roughly 4.5-11.5°C (Raleigh 1982).

It is important to consider the potential effects from the quarry activities on groundwater quality and quantity throughout the study area, especially since the groundwater system currently supports healthy, self-sustaining Brook Trout populations in many of the watercourses surrounding the subject property. The excavation process can alter the hydrogeological characteristics of an area, leading to changes in groundwater flow patterns and the potential for contamination from sediment, chemicals, and other pollutants. Changes to groundwater expression in the study area could result in less baseflow to sensitive watercourses, which could; reduce the overall habitat quantity and quality, reduce coldwater inputs, thereby raising water temperatures in the summer and lowering them in the winter, and lowering dissolved

oxygen levels. Potential changes could affect all life history stages of Brook Trout within the study area including eggs, fry, juveniles, and adults.

6.1.3 Species at Risk

Three SAR were confirmed to occur through completion of field surveys within the Study Area's external lands:

- Black Ash
- Eastern Meadowlark
- Bobolink

A fourth SAR, an NHIC-restricted turtle species, was believed to have been observed by an NRSI biologist, but could not be unequivocally verified. However, as stated in Section 5.4.2, this species is not being considered further. The other above-listed species are described further below.

As stated above, quarry-related impacts to SAR or their habitats on the external lands (>120m from the subject lands) would likely only occur as indirect impacts associated with changes in the hydrological/hydrogeological regime of natural features. Accordingly, wildlife field surveys, in terms of methods and survey locations, were designed to focus on species that may be susceptible to these indirect impacts. This summary, therefore, is not intended to represent a comprehensive list of SAR that occupy the Study Area's external lands. However, as discussed below, SAR observations that were made within 120m of the subject lands were accounted for to address potential impacts of pit/quarry operation on the 120m adjacent lands.

6.1.3.1 Black Ash

Black Ash was designated as Endangered on the SARO list (MECP 2024), and is listed as Threatened on Schedule 1 of the SARA (Government of Canada 2024). Black Ash was observed to be relatively widespread throughout the Study Area, having been documented in six NAT complexes and multiple vegetation communities. This species was observed within a variety of deciduous, mixed and thicket swamp communities, and generally corresponded to portions of the Study Area that comprise higher quality and less ecologically disturbed natural features. The relative abundance of this species varied among the vegetation communities it was found in, and often did not represent a dominant species. However, numerous individuals were observed within the SWM6-2 and SWT3-5 communities of NAT-04, and within the SWC6-

2 community of NAT-14. Black Ash within the Study Area has been significantly impacted by the effects of Emerald Ash Borer.

See Map 5 for the location of communities at which Black Ash was observed. The specific locations of Black Ash trees were not inventoried as part of the NEA scope. Rather, the entire communities in which the Black Ash trees were documented should be considered habitat for the species given its scattered distribution and opportunities for regeneration within these habitat types. This approach is consistent with the recommended area to be considered for a habitat regulation for Black Ash as described in the species' Recovery Strategy (Catling et al. 2022).

Black Ash is also considered to be a species with a medium sensitivity to hydrological change (TRCA 2017). Specifically, this species requires moist, mucky or peaty soils (Michigan Flora Online 2011), but this species is not dependent on groundwater contributions. While Black Ash may occur within features that receive groundwater inputs, the moist soil regime that it requires may be created through other hydrological inputs, such as surface runoff.

6.1.3.2 Bobolink and Eastern Meadowlark

Due to the similar habitat requirements and consistent policy protections afforded to these species under the ESA, Bobolink and Eastern Meadowlark are discussed together. Bobolink and Eastern Meadowlark are each designated as Threatened in Ontario (MECP 2024; consequently, these species and their general habitats are protected under the ESA. Both species are also listed as Threatened on Schedule 1 of the federal SARA (Government of Canada 2024).

Bobolink and Eastern Meadowlark are both grassland bird species that have adapted to use of certain agricultural land cover types, such as hayfields and pastures. Bobolink and Eastern Meadowlark were recorded nearby to the NAT-20 natural features, while Eastern Meadowlark was recorded nearby to the NAT-18 natural features. Bobolink was also recorded adjacent to the eastern "arm" of the NAT-01 complex, west of 4th Line within an agricultural field on property NAT01-6. Neither of these species use habitats that are sensitive to hydrological or hydrogeological change; these species are therefore not expected to be indirectly impacted by the proposed undertaking. For this reason, the Bobolink and Eastern Meadowlark mapped near the NAT-20 and NAT-18 features that are >120m from the subject lands are not shown on Map 5. However, the agricultural field providing Bobolink habitat near the east end of NAT-01 does

extend to within 120m of the subject lands, and is therefore shown on Map 5. This field is considered confirmed breeding habitat for Bobolink, and therefore represents SAR habitat based on the agricultural field vegetation cover that existed at the time of the site investigations.

6.1.3.4 Other Species at Risk

Various SAR were screened as having potential to occur in the Study Area based on past records of occurrence in the vicinity, as summarized in Section 3.3. Aside from Bobolink and Eastern Meadowlark, none of the listed species were observed within the Study Area external lands. None of the listed SAR are considered hydrologically sensitive (TRCA 2017); however, it is anticipated that Louisiana Waterthrush would likely have some sensitivity to hydrological change to its habitat based on the presence of Northern Waterthrush within that list (medium sensitivity). As noted above, NEA field surveys were not targeted to document the presence of non-hydrologically sensitive wildlife species within the Study Area external lands.

6.1.4 Significant Wildlife Habitat

As listed in Section 3.2, several Candidate SWH functions were identified for the Study Area external lands; however, the majority of these are not sensitive to potential indirect hydrological or hydrogeological effects. Candidate SWH types that are considered potentially sensitive to these indirect impacts are discussed below.

Deer Yarding Areas and Deer Wintering Congregation Areas (Stratum 1 and Stratum 2, respectively) have been mapped by the OMNR, and are therefore considered Confirmed SWH, within the vicinity of the Study Area, mainly occurring to the east but incorporating a portion of NAT-16 (Map 1). Since these habitat features and functions are not sensitive to potential indirect effects caused by the quarry, they are not considered further in this report and are not shown on Map 5. Similarly, habitats for the SCC Eastern Wood-Pewee and most observed habitats for Grasshopper Sparrow were confirmed within certain locations of the Study Area external lands that were >120m of the subject lands during NRSI field surveys, but because these species and their habitats are not sensitive to the potential indirect quarry impacts, they are not discussed further in the context of the Study Area external lands or shown on Map 5. However, as discussed below, SWH for the SCC Grasshopper Sparrow that was identified within 120m of the subject lands were accounted for and shown on Map 5 to address potential impacts of pit/quarry operation on the 120m adjacent lands.

6.1.4.1 Confirmed Significant Wildlife Habitat

The following SWH types that are considered potentially sensitive to hydrological/hydrogeological change were confirmed within the Study Area external lands:

- Seeps and Springs
- Amphibian Breeding Habitat (woodland and wetland)
- Special Concern and Rare Wildlife (SCC) Habitats for the following species:
    - Snapping Turtle
    - Western Chorus Frog
    - Northern Ribbonsnake

<u>Seeps and Springs</u>

Groundwater seepage areas were observed in various locations within NAT-14 and NAT-15. At NAT-14, the seepage features occur as broad bands of saturated organic soil within the mixed and conifer-dominated swamp communities along the watercourse, both on the north and south side of Sideroad 15. Seepage was particularly evident on the south side of the road where water was emanating from a gentle slope and slowly trickling across the organic substrate to reach the watercourse. The visible seepage of water was less evident at NAT-15; however, saturated beds of organic soil which support groundwater-associated plant species were observed throughout the conifer swamp and marsh within the bottomland in the eastern "arm" of this feature. At both locations the seepage features act as a significant year-round water source for Wild Turkey (*Meleagris gallopavo*) and White-tailed Deer and potentially Ruffed Grouse as well. Within each feature, the seepages support a specialized assemblage of plant species and cover a substantial portion of the bottomland area.

<u>Amphibian Breeding Habitat</u>

Most amphibians require a source of water to reproduce and during the spring, many of these species concentrate in woodland ponds or swamps to mate and lay eggs. Adults of some amphibian species either live in the pond or at its edge, disperse away from the pond once they emerge to live in terrestrial habitats some distance from the pond, returning in spring to breed or in autumn to hibernate in bottom sediments while other amphibians only return to ponds to breed and hibernate below the frost line in terrestrial habitats (OMNR 2014). Breeding habitats may be within swamps, in floodplains, in groundwater seeps, or in vernal pools within upland

forests. Certain amphibian species prefer larger, semi-permanent to permanently wet breeding habitats that include shallow marshes and larger open water ponds. Several species utilize seasonally wet open habitat features; these may include meadow marshes or even terrestrial meadows and fields that seasonally collect standing water. Amphibian Breeding Habitat SWH (woodlands and wetlands) represents a form of Specialized Wildlife Habitat as defined by the OMNR (OMNR 2000, OMNR 2015a).

The majority of Amphibian Breeding SWH that was documented within the Study Area's external lands was located within the NAT-01 complex. However, this SWH type was widespread within the NAT-01 complex, being identified within six mapped vegetation communities or inclusions (Map 5-1). This SWH was identified in part due to the high relative abundances of calling male Spring Peepers and Wood Frogs within the wetland communities, such as the Birch-Poplar Organic Mixed Swamp (SWM6), the Coniferous Swamp/Mixed Swamp complex (SWC/SWM), and the Meadow Marsh/Thicket Swamp complex (MAM/SWT). Several communities were also identified as significant due to the presence of breeding Spotted Salamander populations within ponds. These include the Organic Thicket Swamp (SWT3) and the Forb Organic Meadow Marsh (MAM3-9) and Forb Organic Shallow Marsh (MAS3-10) inclusions of the Dry-Fresh Sugar Maple-Black Cherry Deciduous Forest (FOD5-7)/Fresh-Moist White Cedar-Hardwood Mixed Forest complex (Map 5-1). In particular, trap N1-8, within the SWT3 community, captured 27 and 19 Spotted Salamanders on two different survey dates.

The other location where this SWH was identified was at NAT-20, within the Reed Canary Grass Mineral Meadow Marsh (MAM2-2) with Mineral Shallow Marsh (MAS2) inclusion (Map 5-10). This community was designated due to the presence of Spotted Salamanders, where nine individuals were captured at trap N20-1 on one survey date.

To reflect the importance of the upland terrestrial habitats surrounding the aquatic/wetland breeding habitats, to which several amphibian species disperse for the terrestrial phase of their life cycle, and in accordance with OMNR guidelines (OMNR 2015a), the Amphibian Breeding SWH has been mapped to incorporate surrounding woodland communities within 230m of the wetland habitat where applicable (Map 5).

<u>Special Concern/Rare Wildlife Species Habitat – Snapping Turtle</u>

Snapping Turtles are listed as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); they are therefore considered a SCC in Ontario whose habitat may be

considered SWH (OMNR 2010, OMNR 2015a). Snapping Turtles are found in a variety of aquatic and wetland habitats that contain permanent or semi-permanent standing water, including marshes, swamps or bogs, and rivers or streams with soft muddy bottoms (OMNR 2014).

Snapping Turtles were observed at various locations within the Study Area's external lands. These include the SWT3 thicket swamp within the NAT-01 complex, an Open Aquatic (OA) pond within the NAT-03 complex, the Fowl Manna Grass Organic Meadow Marsh (MAM3-4) and the Coniferous Swamp/Mixed Swamp complex (SWC/SWM) at the NAT-15 complex, the large Shallow Aquatic (SA) pond at the NAT-16 complex, and the MAM2-2 with MAS2 inclusion at the NAT-20 complex (Map 5). A Snapping Turtle was also observed at a small OA pond at the NAT-01 complex (station TBO-01A), but since this pond is understood to be man-made, it is not considered a form of SWH.

In most cases, only a single Snapping Turtle was observed in each of the vegetation communities the species was observed in, although three individuals were recorded in the large SA pond at NAT-16. In most cases, based on the dates of observation, it could not be definitively determined that the observed Snapping Turtles were also using the habitats for overwintering, such as would be determined if the observations were made soon after spring emergence. However, in certain locations (e.g., SA at NAT-16) it can be inferred that the individuals are likely overwintering at the observation locations. The ELC communities in which the Snapping Turtles were observed have been identified as the SWH as shown on Map 5.

Special Concern/Rare Wildlife Species Habitat – Western Chorus Frog

Western Chorus Frogs that occur within the Study Area are a part of the Great Lakes/St. Lawrence-Canadian Shield population, which is designated as federally Threatened under Schedule 1 of the SARA (Government of Canada 2024). Although this species is considered Not at Risk in Ontario (MECP 2024), its SARA designation renders it a SCC in Ontario (OMNR 2010, OMNR 2015a). Western Chorus Frogs prefer shallow, temporary pools of standing water containing abundant vegetation. They are often found in woodlands but also breed within agricultural lands, meadows and other open fields where seasonal standing water is present (OMNR 2014).

Western Chorus Frog was infrequently recorded within the Study Area, and was only documented at three locations: the SWT3 thicket swamp within the NAT-01 complex, the

roadside Mineral Deciduous Swamp (SWD4) community within the NAT-03 complex, and within the Open Aquatic (OA) pond or the White Cedar Organic Coniferous Swamp (SWC3-1) at the north end of NAT-04 (Map 5). The simple presence of breeding individuals of this species renders the habitats as SWH. Where Western Chorus Frog was observed, it was recorded with low relative abundance (e.g., one calling male at SWT3). The ELC communities in which the Western Chorus Frogs were observed have been identified as SWH as shown on Map 5.

Special Concern/Rare Wildlife Species Habitat – Northern Ribbonsnake

Northern Ribbonsnake is listed as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); it is therefore considered a SCC in Ontario whose habitat may be considered a form of SWH (OMNR 2010, OMNR 2015a). Northern Ribbonsnake is typically found within sun-exposed, grassy areas with low, dense vegetation near bodies of shallow, permanent, quiet water, wet meadows, grassy marshes, or borders of ponds, lakes or streams (OMNR 2014).

This species was recorded at two locations within the Study Area. A single individual was recorded at the Mineral Shallow Marsh (MAS2) ecosite within the NAT-03 complex. This small (0.1ha) community, which is located within Property NAT03-5, represents an old borrow pit or topsoil scraping that extends below the water table and contains standing water of up to 1m depth. Although this feature is originally of anthropogenic origin, it has largely naturalized over past years. The MAS2 community in which the ribbonsnake was observed has been mapped as the SWH. A single individual Northern Ribbonsnake was also recorded within a Mineral Cultural Meadow (CUM1) community at the north end of the NAT-04 complex, as shown on Map 5.

Confirmed Significant Wildlife Habitat within 120m of Subject Lands – Grasshopper Sparrow

Grasshopper Sparrow is listed as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); it is therefore considered a SCC in Ontario whose habitat may be considered a form of SWH (OMNR 2010, 2015a). As described in Section 5.2.2, multiple Grasshopper Sparrows were recorded within the agricultural field on property NAT01-6, that extends to within 120m of the subject lands, during the course of breeding bird surveys. This agricultural field is therefore considered breeding habitat for the species, and represents confirmed SWH for the SCC Grasshopper Sparrow (Map 5) based on the agricultural field vegetation cover that existed at the time of the NRSI site investigations.

6.1.4.2 Candidate Significant Wildlife Habitat

Of the Candidate SWH types listed in Section 3.2, three can likely be considered absent in the Study Area based on the results of NRSI site investigations and refined Study Area characterization:

- Waterfowl Stopover and Staging Areas (Terrestrial)
    - Suitable cultural meadow or cultural thicket communities alongside watercourses that could seasonally flood do not occur in the Study Area.
- Shorebird Migratory Stopover Area
    - Suitable habitats that could be considered provincially significant are absent within the Study Area
- Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat
    - Osprey is not known to occur within or in the general vicinity of the Study Area (BSC et al. 2008, eBird 2024, iNaturalist 2024). Bald Eagle was not recorded within the Study Area during the 2nd Ontario Breeding Bird Atlas (BSC et al. 2008), and very few (<5) observations of this species have been made more recently within or near the Study Area (eBird 2024, iNaturalist 2024). The Study Area therefore does not represent important habitat for Bald Eagle.

Of the screened-in Candidate SWH types listed Section 3.2, which were not specifically assessed for the Study Area external lands (>120m from the subject lands), several are not considered to be sensitive to indirect hydrological/hydrogeological effects that could be caused by the quarry, and are therefore not considered further in this report with respect to the Study Area external lands:

- Raptor Wintering Area
- Bat Maternity Colonies
- Woodland Raptor Nesting Habitat
- Woodland Area-Sensitive Bird Breeding Habitat
- Open Country Bird Breeding Habitat
- Shrub/Early Successional Bird Breeding Habitat
- Special Concern/Rare Wildlife Habitat for the following SCC:

    - Upland Sandpiper
    - Canada Warbler
    - Eastern Wood-Pewee
    - Barn Swallow
    - Wood Thrush
    - Silver-haired Bat
    - Eastern Red Bat
    - Hoary Bat
    - Monarch
- Amphibian Movement Corridors
- Deer Movement Corridors

Several other Candidate SWH that were initially screened for the Study Area are considered potentially sensitive to indirect hydrological/hydrogeological impacts that could be caused by pit/quarry operations. These were maintained as Candidate SWH because they were a) not specifically assessed as part of the NEA fieldwork scope, b) there was insufficient evidence to rule out their presence, or c) in some cases were confirmed within certain portions of the Study Area but could also exist elsewhere within the Study Area that were not accessed by NRSI biologists. These include the following Candidate SWH types:

- Waterfowl Stopover and Staging Areas (Aquatic)
    - These would likely be limited to large ponds within the Study Area such as within NAT-16 and NAT-18.
- Turtle Wintering Areas
    - The seasonal timing of the NEA turtle basking surveys did not allow for definitive assessment of whether features provide overwintering habitat. However, it can be inferred that certain deeper-water features (e.g., the NAT-16 pond), where turtles were observed, likely provide an overwintering habitat function.
- Snake Hibernaculum

- Potential habitat could be anywhere within the Study Area and can be difficult to confirm, but potential habitats include areas containing rock fissures, mammal burrows or other accesses to subterranean frost-free zones that are sun-exposed, especially on south-facing slopes, and provide basking microhabitat features (e.g., logs, woody debris, rocks) immediately adjacent to the hibernaculum entrance. Hibernacula need to be located just above the winter-level groundwater table elevation to moderate the hibernaculum air temperature and to keep it above the freezing level, and to ensure the snakes do not desiccate.

- Colonially-nesting Bird Breeding Habitat (Trees/Shrubs)
  - Potential nesting habitat for this bird guild is associated with deciduous and mixed swamp communities, which are widespread throughout the Study Area.
- Waterfowl Nesting Area
  - This habitat could include all types of upland natural features, at least 120m wide, that are located adjacent to several forms of wetland ecosite, including shallow marshes, meadow marshes, and deciduous or thicket swamps. This potential habitat is therefore widespread throughout the Study Area. While the nesting habitat itself is not sensitive to potential indirect quarry effects, the adjacent wetland habitat that supports its viability may be susceptible to impact.
- Turtle Nesting Area
  - This habitat comprises suitably open, sun-exposed areas of mineral soil (sand and gravel) soils that are located within 100m of certain wetland types (e.g., shallow marsh). While the nesting habitat itself is not sensitive to potential indirect quarry effects, the adjacent wetland habitat that supports its viability may be susceptible to impact.
- Seeps and Springs
  - There is a high likelihood of occurrence among the non-accessed Study Area forest communities due to the prevalence of groundwater seepage that was observed in other features (e.g., watercourses).
- Amphibian Breeding Habitat (Woodland and Wetland)

    - These habitat types were confirmed within certain features of the Study Area, but may occur elsewhere within portions of the Study Area that were not surveyed due to the prevalence of suitable breeding habitats.

- Marsh Bird Breeding Habitat
    - The Study Area contains potentially suitable marsh habitats that were not surveyed as part of NEA field studies. Swamps may also be considered significant if they are occupied by one or more pairs of breeding Green Herons. A Green Heron was incidentally observed within the NAT-03 complex, while "possible" breeding evidence for Green Heron, based on observation in suitable habitat during one breeding bird survey (BSC et al. 2008) was documented for the large SA pond at NAT-16. These areas therefore represent potential habitat for Green Heron.

- Terrestrial Crayfish
    - The two terrestrial crayfish species associated with this SWH category are often located near wetlands, and require moist soil conditions for suitable habitat. Although no terrestrial crayfish chimneys were identified during NEA field studies, potential habitat is widespread throughout the study area.

- Special Concern and Rare Wildlife Habitats for the following SCC:
    - Blue-winged Teal
        - Although this species was not documented during breeding bird surveys or other site investigations, there is potential for it to occupy open water/marsh habitats within portions of the Study Area that were not accessed by NRSI biologists.
    - Snapping Turtle
        - This species was documented at various locations within the Study Area, and can be assumed to occupy various other portions of the Study Area where suitable permanent to semi-permanent pond and wetland habitats exist.
    - Northern Ribbonsnake

        - This species was documented at two locations within the Study Area, and can be assumed to occupy various other portions of the Study Area where suitable grassy fringing habitats around wetlands, watercourses and ponds exist.
    - Western Chorus Frog
        - This species was documented at two locations within the Study Area, and can be assumed to occupy various other portions of the Study Area where suitable wetland, vernal pool, and other seasonally flooded habitats exist.
    - Riffle Snaketail
        - Targeted surveys for odonates were not completed as part of the study's fieldwork scope. This species may therefore occur within areas of suitable habitat, such as clear, fast-flowing streams with fine gravel and sand sediments (MDFW 2015).
    - Floating Crystalwort
        - This species was not documented as part of vegetation inventories completed within the Study Area. However, it may occur within areas of suitable aquatic habitat in portions of the Study Area that weren't accessed by NRSI biologists. This species of liverwort inhabits permanent waterbodies including ponds and marshes.

6.2 Subject Lands

6.2.1 Significant Woodlands

The Dry-Fresh Sugar Maple Deciduous Forests (FOD5-1) that are located on the former Prince and Bonnefield properties were each identified as Significant Woodlands as part of the NEA/EIS that was completed for Strada Aggregates' pit-above-water table ARA and *Planning Act* application that was submitted for those properties (NRSI 2017). Woodlands on both the former Prince and Bonnefield properties, as well as the large NAT-19 swamp complex that extends into the eastern edge of the Melancthon Pit #2 site, are mapped as Significant Woodland in the Township Official Plan (Township of Melancthon 2017). Under County and Township policies, development is not permitted within or adjacent to Significant Woodland unless it can be

demonstrated through an EIS that no negative impacts to the natural features or their ecological functions will occur.

The Township Official Plan states that most significant woodlands in the Township are deemed as such due to their size being ≥20ha. The Official Plan also states that woodlands <20ha in size may be considered significant due to other important features such as a location near other woodlands, in a headwater area, or in a linkage feature between other natural heritage features and areas (Township of Melancthon 2017).

Four discrete woodland communities exist within the subject lands: the FOD5-1 deciduous forest and CUP3-2 pine plantation communities on the former Prince property (Map 3-12), the FOD5-1 deciduous forest community on the former Bonnefield property that extends northwards into the Melancthon Pit #1 site (Map 3-13), and the NAT-19 wooded complex that extends into the eastern edge of the Melancthon Pit #2 site. The portion that falls within the Melancthon Pit #2 site was characterized as a combination of Mineral Deciduous Swamp (SWD4) and Fresh-Moist White Cedar Coniferous Forest (FOC4-1) (Map 3-14). The FOD5-1 forest on the former Prince property extends onto adjacent properties north and east of the subject property. It is NRSI's understanding that the portion of the FOD5-1 forest community that occurs on the property to the immediate east falls within a licensed aggregate extraction area (St. Mary's Kasaks Pit) and is permitted to be removed for extraction (NRSI 2017). When excluding the area of FOD5-1 forest that will be removed, the on-site FOD5-1 and CUP3-2 communities are separated by a distance of approximately 20m based on air photo interpretation. A gap of 20m is considered the minimum spatial separation to consider two woodland areas as spatially separate and not contiguous (OMNR 2010).

Each of these four woodlands falls under the Township's size criterion for woodland significance (≥20ha). The following woodland area sizes include contiguous areas that extend off-property, but in the case of the former Prince property FOD5-1 community, excludes the portion of woodland to be removed on the adjacent property to the east:

Former Prince Property FOD5-1: 10.20ha

Former Prince Property CUP3-2: 3.04ha

Former Bonnefield Property FOD5-1: 8.27ha

NAT-19 wooded complex: 16.07ha

Although the size criterion is not met for these woodlands, other aspects of woodland condition and functional importance are to be considered in determining woodland significant under Township policies (Township of Melancthon 2017). For other aspects of woodland significance, the Township Official Plan refers to the OMNR's Natural Heritage Reference Manual (NHRM) (OMNR 2010), which describes various woodland significance criteria.

The FOD5-1 deciduous forest communities on the former Prince and Bonnefield properties, as well as the NAT-19 wooded complex, do meet several of the woodland significance criteria as laid out in the NHRM (OMNR 2010), and will be retained in their entirety as part of the proposed site plans, as further described below. For the purposes of this NEA, these forest communities are assumed to represent Significant Woodland as mapped in the Township Official Plan (Map 7.

As part of the NEA completed for the former Prince and Bonnefield properties (NRSI 2017), the CUP3-2 plantation community was assessed against the County's definition of "woodland" (County of Dufferin 2017) and the NHRM woodland significance criteria (OMNR 2010). Based on this analysis, it was determined that the CUP3-2 plantation does not meet provincial, County, or Township criteria to be considered a Significant Woodland. See the former Prince and Bonnefield Properties NEA for further details of this assessment. Based on the results of this assessment, the CUP3-2 plantation was proposed to be removed to accommodate the planned above-water table aggregate pit expansion into the former Prince property (NRSI 2017).

In accordance with the County OP (2017) policies (Section 5.3.4) and Township OP (2017) policies (Section 5.5.1), in which Significant Woodlands represent a form of "Environmental Conservation Area", development and site alteration within or adjacent to the woodlands is prohibited unless it can be demonstrated that there will be no negative impacts to the natural features or ecological functions.

6.2.2 Wetlands

The subject lands contain unevaluated wetlands as mapped by LIO (OMNR 2023), which fall within the Melancthon Pit #2 site and former Bonnefield property. LIO-mapped unevaluated wetland mapped within the former Prince property woodlot was confirmed to be absent (NRSI 2017). The majority of these wetlands are small, isolated features. The SWD4 swamp community along the eastern edge of the Melancthon Pit #2 site represents an outer band of the larger NAT-19 wooded complex that primarily occurs off-site. The subject lands wetlands are

illustrated on Map 7. A small wetland pocket on the former Prince property within what was the former barnyard, which is of anthropogenic origin and has recently naturalized from a previous use as a cattle watering hole, is not considered significant and is not included on Map 7.

The wetlands on the Melancthon Pit #2 site were previously assessed as part of the NEA completed for the above-water table Melancthon Pit #2 ARA license application (NRSI 2010). Based on that assessment, the wetlands and their recommended buffers were retained outside of the pit extraction limits. The boundaries of the Melancthon Pit #2 and former Bonnefield property wetlands were updated through use of the OWES methodology (OMNR 2022) and are shown on Map 7. The application of the OWES (OMNR 2022) requires that wetland units be 2.0ha in size or greater with potential exception made for notable wetland community types that may be smaller than 2.0ha. Revisions to the OWES no longer consider the complexing of multiple wetland units under a single evaluation and each wetland feature is evaluated as a standalone unit. Within the Melancthon Pit # 2 site and former Bonnefield property, the wetland units are less than 2.0ha in size and do not represent notable community types. If any units were to meet the minimum size requirement, the OWES scoring for these units would be well below the threshold for provincial significance. These wetlands would not meet criteria to be considered PSW under the current version of the OWES (OMNR 2022), if they were to be evaluated. Therefore, these wetlands are considered non-PSW wetlands for the purposes of this study.

In accordance with the County OP (2017) policies (Section 5.3.6) and Township OP (2017) policies (Section 5.5.1), in which unevaluated and locally/regionally significant wetlands represent a form of “Environmental Conservation Area”, development and site alteration within or adjacent to the wetlands is prohibited unless it can be demonstrated that there will be no negative impacts to the natural features or ecological functions.

6.2.3 Species at Risk

Two SAR were observed within the subject lands based on the completion of field surveys:

- Eastern Meadowlark
- Bank Swallow

Both of these species were recorded within the Melancthon Pit #2 site. A third SAR, Black Ash, is also identified for the subject lands within the Melancthon Pit #2 site where the predominantly off-site White Cedar-Hardwood Organic Mixed Swamp (SWM4-1) extends into the subject

lands. Although no Black Ash trees were specifically documented within the subject lands portion of the SWM4-1 community, the community as a whole is considered habitat. Potential habitat for SAR bats was also identified for the woodland features that fall within the subject lands as well as among trees that ring the Stonewort Submerged Shallow Aquatic (SAS1-3) ponds on the site.

6.2.3.1 Bank Swallow

Bank Swallow is designated as Threatened both provincially and federally (MECP 2024, Government of Canada 2024). Consequently, this species and its general habitat are protected under the ESA. During field surveys completed in 2022, a group of 12 Bank Swallows were observed entering and existing a cavity nest that had been established in a material stockpile within the operational area of the pit. This observation therefore represented evidence of confirmed nesting by the species.

Bank Swallows commonly nest in aggregate pits and quarries where suitable nesting habitat is provided, including vertical to near-vertical surfaces of sandy or gravelly materials. Bank Swallow habitat can be highly ephemeral from one year to the next, depending on where the nest is located within the pit and whether that area is being actively excavated. As such, a suitable nesting habitat site that exists one year may be eliminated or highly altered so as to not be suitable by the next breeding season. For this reason, the specific nesting habitat location as identified in 2022 is not shown on Map 5.

The general habitat of Bank Swallows includes the nesting colony as well as areas of suitable foraging habitat up to 500m from the nesting colony. Suitable foraging habitat includes open land habitats including meadows, wetlands, grasslands, and open water where flying insect prey occur (OMNR 2017). Impacts to Bank Swallows and their general habitat are prohibited under the ESA. However, Section 23.14 (pits and quarries provision) of Ontario Regulation 242/08 allows, under certain circumstances, for aggregate pit operators to undertake activities that would otherwise be prohibited under the ESA, provided that a mitigation plan is prepared and implemented such that the potential for adverse effects on the species and its habitat is reduced. As a means of avoiding injury or mortality to Bank Swallows, and to mitigate habitat loss effects, Best Management Practices have been prepared with a focus on Bank Swallows that occupy pits and quarries (OMNR 2017).

6.2.3.2 Eastern Meadowlark

Eastern Meadowlark was repeatedly observed during the course of field surveys at the Melancthon Pit #2 site during the 2021-2022 fieldwork period, but was never recorded during both breeding bird surveys within a single year at a particular habitat patch within the larger Mineral Cultural Meadow (CUM1) community. Specifically, these habitat patches comprise a southern portion of the CUM1 community to the south of the Mineral Deciduous Swamp (SWD4) community that extends off-property to the southeast of the subject lands, and a northern portion of the CUM1 community that is north of the Fresh-Moist White Cedar Coniferous Forest (FOC4-1) and surrounds the "South Pond "(SAS1-3) and a Reed Canary Grass Mineral Meadow Marsh (MAM2-2) (Map 5-14). Nonetheless, due to the repeated observations and based on a precautionary approach, it has been assumed that this species maintains breeding habitat within each of the two habitat patches it has been documented it. The entire CUM1 community is considered to represent habitat for the SAR Eastern Meadowlark.

Impacts to Eastern Meadowlark and its general habitat are prohibited under the ESA. However, provincial regulations have been enacted that would allow for pit/quarry operational activities that would otherwise be prohibited under the ESA. These regulations, which exempt certain activities from requiring a permit under the ESA, include Section 23.14 (pits and quarries provision) of O. Reg. 242/08 described above, and Part IV of O. Reg. 830/21 pertaining to Eastern Meadowlark. Each of these regulations require the creation and implementation of a mitigation plan for Eastern Meadowlark, with certain minor variations between their regulatory requirements. The application of these regulations within the subject lands may also depend on how the area of Eastern Meadowlark habitat is currently zoned for land use. For example, Eastern Meadowlark habitat that currently falls within the licensed pit area may be subject to O. Reg. 242/08 Section 23.14, while Eastern Meadowlark habitat that falls outside of the licensed area (e.g., the northern CUM1 zone, which coincides with Open Space-zoned wetland buffer lands established at the time of Melancthon Pit #2 licensing) may be subject to O. Reg. 830/21.

6.2.3.3 Black Ash

See Section 6.1.3.1 for a general description of Black Ash occurrence within Study Area external lands natural features. The SWM4-1 swamp community that comprises a majority of the NAT-19 complex was identified as habitat for Black Ash due to the observation of Black Ash trees within off-property portions of the community. No Black Ash trees were specifically identified within the small western portion of the SWM4-1 that extends into the eastern edge of

the Melancthon Pit #2 site (Map 5-14). However, since the entire community is considered to represent habitat for the species, confirmed Black Ash habitat is recognized to extend to within the southeastern extent of the subject lands.

6.2.3.4 Species at Risk Bats

Three bat SAR with potentially suitable on-site habitat, Northern Myotis, Little Brown Myotis and Tri-colored Bat, are known to occur within approximately 10km of the study area and/or have range distributions that include all of southern Ontario (Dobbyn 1994, ECCC 2018). Potential habitat for these species is considered present wherever live or dead trees with suitable roosting features (e.g., cavities, loose or sloughing bark) occur to provide maternity colony or roosting functions. Within the subject lands, this would primarily correspond to the deciduous forest communities that comprise the Significant Woodlands. The CUP3-2 plantation on the former Prince property is considered to be less suitable for bat habitat functions due to its dominance by coniferous trees that are less prone to providing the tree cavities and loose bark utilized by bats, relative to deciduous trees. The former Prince property CUP3-2 plantation is planned to be removed under the existing ARA license for extraction on that property parcel.

Detailed bat habitat assessments of the subject lands wooded features were not undertaken as part of the NEA fieldwork scope. However, assessments were previously completed for the woodlands on the former Prince and Bonnefield properties. Based on the identification of suitable bat roosting trees within these woodlands, each woodland was identified as potential SAR bat habitat (NRSI 2017). Although the portion of the NAT-19 wooded complex that extends into the Melancthon Pit #2 site was not investigated for potential bat habitat, it can be inferred that this wooded complex as a whole represents potential SAR bat habitat.

The majority of other subject lands trees that exist outside of the woodlands occur within hedgerows on the former Prince property. These hedgerow trees were also assessed for potential bat roosting at the time of the above-water table aggregate pit NEA. Based on consultation with the OMNR, it was determined that these trees do not provide significant bat habitat in relation to the other nearby woodlands (NRSI 2017). The hedgerows that previously existed on the former Bonnefield property have since been removed as aggregate extraction has expanded into that property.

Within the Melancthon Pit #2 site, tree growth is largely absent outside of the woodland/swamp complex with the exception of the trees that ring the SAS1-3 ponds. These trees have not yet

been assessed as to whether they provide potential bat roosting habitat. Like the hedgerows, their relative importance as potential habitat is likely less when compared to the adjacent woodland communities. However, relative to the hedgerow trees, their locations next to open water ponds that could provide a drinking water and insect prey foraging source for bats may render these trees of higher value. These trees are therefore considered potential bat SAR habitat pending supplementary investigation (Map 5-17).

6.2.3.5 Other Species at Risk

Various SAR were screened as having potential to occur in the subject lands based on past records of occurrence in the vicinity and potential presence of suitable habitat, as summarized in Section 3.3. Of these species, Eastern Meadowlark and Bank Swallow were observed within the subject lands, while potential habitat was identified for the SAR bats associated with the woodlands. The other screened-in SAR are considered absent within the subject lands. This includes Butternut, which has not been documented within the subject lands natural features across multiple studies (NRSI 2010, NRSI 2017) as well as for the current NEA, and the bird SAR Louisiana Waterthrush and Red-headed Woodpecker, which have not been documented during breeding bird surveys.

6.2.4 Significant Wildlife Habitat

Two forms of SWH were confirmed within the subject lands: Amphibian Breeding Habitat (Woodland) and Special Concern/Rare Wildlife Habitat for the SCC Eastern Wood-Pewee (Map 5).

6.2.4.1 Confirmed Significant Wildlife Habitat

<u>Amphibian Breeding Habitat (Woodlands)</u>

Significant amphibian breeding habitat was identified within the Melancthon Pit #2 site as well as within the wetlands on the former Bonnefield property. Within the Melancthon Pit #2 site, the Stonewort Submerged Shallow Aquatic (SAS1-3) “South Pond” met multiple significance criteria for Amphibian Breeding Habitat (Woodland) (OMNR 2015a):

- Spotted Salamander was captured within the pond, with up to 10 individuals captured within trap S2 specifically. The presence of a breeding population of Spotted Salamander automatically renders an ecosite as SWH.

- Forty (40) egg masses that were identified to Wood Frog were observed in the pond. Ecosites that contain 20 or more egg masses are considered SWH.
- Full choruses of the indicator species Spring Peeper and Gray Treefrog were recorded at the South Pond.

The Amphibian Breeding Habitat (Woodland) category also recognizes the importance of the adjacent upland terrestrial habitat to the life cycle processes of the amphibian species. In accordance with the criteria (OMNR 2015a), woodland that is within a 230m radius of the South Pond is also mapped as SWH.

The former Bonnefield property wetlands were previously identified as SWH due to the presence of full choruses of Spring Peeper, Wood Frog and Gray Treefrog (NRSI 2017). The status of these wetlands as SWH was re-affirmed through this NEA study, as full choruses of Spring Peeper and Wood Frog were again recorded during 2022 anuran surveys. Additionally, several Spotted Salamanders were captured within traps located with these wetlands; up to 23 individuals were captured in traps S3 and S6, while multiple individuals were recorded in the others. These wetlands, and the surrounding 230m radius area of woodland, have therefore been mapped as Amphibian Breeding (Woodland) SWH.

<u>Special Concern/Rare Wildlife Species Habitat – Eastern Wood-Pewee</u>

Eastern Wood-Pewees are listed as a species of Special Concern on the Species at Risk in Ontario list (MECP 2024); they are therefore considered a SCC in Ontario whose habitat may be considered SWH (OMNR 2010, OMNR 2015a). Eastern Wood-Pewees occupy woodlands of varying sizes, typically where lower-density canopy cover occurs and often near edge zones (Watt et al. 2020).

NRSI previously confirmed the presence of SWH for Eastern Wood-Pewee within the FOD5-1 forest communities on each of the former Prince and Bonnefield properties due to singing males being recorded in these communities during each of the two breeding bird surveys. This therefore represented evidence of probable breeding due to territoriality (NRSI 2017). During fields surveys completed for this NEA, breeding Eastern Wood-Pewee males were recorded within each of the FOD5-1 communities on the former Prince and Bonnefield properties, but only during a single breeding bird survey. While this in and of itself is indicative of “possible” breeding evidence (Birds Canada et al. 2021), when considering the previous NRSI assessment, it is again assumed that both of these forest communities represent likely breeding

habitat for Eastern Wood-Pewee. Both have therefore been mapped as SWH as shown on Map 5. For the former Bonnefield property woodland, this mapped habitat includes the small inclusions of White Pine Coniferous Plantation (CUP3-2) since Eastern Wood-Pewee may use these small woodland edge features. However, the SWH does not include the larger stand-alone CUP3-2 plantation feature on the former Prince property, which does not provide preferred habitat for the species.

6.2.4.2 Candidate Significant Wildlife Habitat

The following Candidate SWH types were also identified for the subject lands based on the results of background information review, SWH screening (see Section 3.2), and because they were not confirmed or ruled out through completion of the field surveys (see Maps 5-15 to 5-17).

- Amphibian Breeding Habitat (Wetland)
    - The SAS1-3 “North Pond” is located >120m from the nearest woodland community, and is therefore considered under the Amphibian Breeding Habitat (Wetland) category. The 2021-2022 anuran survey results for this pond (ANR-01) did not meet significance criteria (OMNR 2015a), with only Spring Peeper recorded at full chorus (NRSI 2022, 2023). NRSI monitoring results for this pond from 2023, collected as part of the annual Integrated Monitoring Program for Melancthon Pit #2, also did not yield results that would render the pond as SWH (no species recorded at full chorus) (NRSI 2024). However, salamander trapping was not completed at this pond. Since multiple Spotted Salamanders were captured at the nearby South Pond, and due to the relative proximity and similarity in ecological and hydrological characteristics between these ponds, it is feasible that Spotted Salamander would also breed within the North Pond. For this reason, the North Pond is considered Candidate SWH for Amphibian Breeding Habitat (Wetland).

- Bat Maternity Colonies and Special Concern/Rare Wildlife Habitat for SCC bats
    - Bat Maternity Colony SWH can be located within any forest community, or in deciduous, mixed or coniferous swamps (OMNR 2015a). Habitat for the SCC Silver-haired Bat, Hoary Bat or Eastern Red Bat may also be found within these features. Within the subject lands, these potential habitats would apply to the woodlands on the former Prince and Bonnefield properties as well as the fringing

western edge of the NAT-19 complex at Melancthon Pit #2. Since these wooded features were not investigated for the presence of suitable bat roosting habitat trees, nor were they surveyed through acoustic monitoring to determine which bats are using the features as habitat, these wooded features are considered Candidate SWH.

6.2.4.3 Significant Wildlife Habitats Considered Absent

Other forms of SWH that were initially identified during SWH screening for the subject lands as summarized in Section 3.2 were subsequently ruled out based on the results of targeted surveys. The following summarizes the assessment of these Candidate SWH types:

Table 58. Summary of Candidate Significant Wildlife Habitat Categories Identified During Preliminary Screening Considered Absent.

Significant Wildlife Habitat Type	Assessment Result
Snake Hibernaculum	Surface features that would be suggestive of significant snake hibernaculum locations (e.g., rock crevices, old stone wells, crumbling foundations, sun-exposed rocky slopes) were not observed within the subject lands. Large portions of the subject lands would likely be subject to significant disturbance to underground habitats through vibrations caused by pit operational activities.
Colonially-nesting Bird Breeding Habitat (Trees/Shrubs)	Heron nests were not observed in the subject lands during site investigations. No heron species were recorded during site investigations.
Turtle Nesting Area	Suitable nesting habitats were not observed within the subject lands.
Marsh Bird Breeding Habitat	Potential habitat suitability for this SWH category is specific to Green Heron. No Green Herons were documented during site investigations.
Terrestrial Crayfish	No terrestrial crayfish burrows were observed on the subject lands during site investigations.
Special Concern/Rare Wildlife Habitat – Canada Warbler	This species was not documented during breeding bird surveys or other site investigations.
Special Concern/Rare Wildlife Habitat – Barn Swallow	This species was not documented during breeding bird surveys or other site investigations.
Special Concern/Rare Wildlife Habitat – Wood Thrush	Wood Thrush was only documented during one breeding bird survey over a two-year period, within the SWD4 community on the Melancthon Pit #2 site. This suggests it was likely not maintaining a breeding territory within the subject lands.
Special Concern/Rare Wildlife Habitat – Snapping Turtle	Snapping Turtle was not observed within the subject lands wetland communities during NEA site investigations. This species has also not been observed within these wetland features during annual anuran surveys undertaken at these wetlands for the proponent by NRSI since 2013.
Special Concern/Rare Wildlife	Western Chorus Frog was not recorded within the subject lands during anuran call surveys completed for the NEA site investigations. This

Significant Wildlife Habitat Type	Assessment Result
Habitat – Western Chorus Frog	species has also not been recorded within the subject lands (Melancthon Pit #2) since 2009, as documented by NRSI, and based on subsequent annual anuran surveys undertaken at these wetlands for the proponent by NRSI since 2013.
Special Concern/Rare Wildlife Habitat – Monarch	While small areas of cultural meadow exist within the subject lands, it is too small to represent provincially significant habitat for Monarch.
Special Concern/Rare Wildlife Habitat – Floating Crystalwort	This species was not recorded within the subject lands ponds as part of vegetation inventory work undertaken for the NEA, nor was it inventoried as part of past natural heritage assessments of the site (NRSI 2010).

7.0 Impact Assessment

7.1 Description of the Proposed Undertaking

Strada Aggregates proposes to undertake below-water table bedrock extraction within a portion of their lands (i.e., the subject lands) in Melancthon Township that are currently licensed for above-water table aggregate extraction. From north to south, these lands specifically fall within ARA licenses #626199 (referred to as the "former Prince property"), #129167 ("Melancthon Pit #1"), #626199 ("former Bonnefield property"), and #625155 ("Melancthon Pit #2"). The three ARA licenses that comprise these four land parcels would be consolidated into a single ARA license to permit pit/quarry activities. Under this license, below-water table quarry extraction would be restricted to the northern two-thirds of the site, while the southern third would contain a wash plant with product stockpiles as well as water infiltration facilities (Map 8). The total area that falls within the quarry limit of extraction is 65.7ha.

The quarry is expected to be extracted in three lifts over the course of four sequential operational phases. Refer to the Site Plan (MHBC 2024) and Map 8, which identify the various phase and sub-phase extraction areas within the site. The quarry floor is expected to vary between 438-442m above-sea-level. All materials will be processed by portable plants near to the active extraction areas within the quarry/pit. A portion of the material will also be transported to the wash plant within the south end of the site. The new license will ship a maximum of 2 million tonnes of aggregate material per year. Vehicle access to 4th Line will be via the existing pit entrances/exits until Phase 3B is extracted, after which only the south entrance/exit will be used.

The water management plan for the site will include the backfilling of compacted Tavistock Till material along the quarry extraction limits (bedrock benches 1 and 3), including along the western face of the quarry, which will act as a barrier to reduce groundwater inflow (see Earthfx 2024a). Water that does enter the quarry will be collected within a quarry sump and then pumped to water filtration facilities. Three water infiltration facilities are proposed around the subject lands: at the northeast end (which comprises two adjacent infiltration trenches), at the southeast end (referred to herein as the central infiltration pond), and at the far south end (referred to as the southern infiltration pond) (Map 8). Injection wells will also be installed along the eastern property limits, south of the infiltration trenches, for supplementary water management purposes. Creation of the central infiltration pond, within the Melancthon Pit #2 site, will require the removal of certain existing wetland features as described below. To

compensate for the wetland removals, a new and larger wetland area will be created within the south end of the subject lands (see Section 7.3.4). In order to mitigate groundwater mounding effects to the west of the pit/quarry, due to the creation of the low-permeability barriers along the west quarry face, a buried tile drain will be installed along the western property boundary to collect groundwater. The buried tile drain will redirect the collected groundwater along the northern limits of the site and to the infiltration trenches and injection wells in the northeast end.

Following the cessation of extraction activities, quarry water management activities will cease and the quarry pit will be allowed to fill with groundwater inflow to form a large quarry pond. The other portions of the license area that were not excavated to below the water table will be rehabilitated to a combination of agricultural land use and restored natural land cover in accordance with a Rehabilitation Plan as described below.

7.2 Approach to Impact Assessment

Potential impacts arising from the proposed undertaking are determined by comparing the details of the proposed activity with the characteristics of the Study Area's existing natural features and their ecological functions. The impact assessment generally comprises two scales: 1) the subject lands on which the physical quarry pit will be created, plus the adjacent 120m lands and 2) the Study Area's external lands which may be subject to indirect hydrogeological effects caused by changes in the shallow groundwater regime. The following is a description of the types of impacts which will be discussed.

- Direct impacts to the natural features within the subject lands associated with disruption or displacement caused by the actual proposed "footprint" of the pit/quarry, including impacts caused by vegetation removal and aggregate extraction.

- Indirect impacts associated with changes in the hydrogeological regime of natural features, including wetlands and watercourses, both within the subject lands and among the Study Area's external lands. Indirect impacts may also include degradation of water quality caused by pit/quarry operations.

The potential for indirect ecological impacts caused by changes to the hydrogeological regime have been assessed based on modelling and analysis completed by Earthfx (2024a). The modelling results presented in this study compared projected conditions during pit/quarry operational stages, and a post-quarry rehabilitation stage, against a baseline condition in which the above-water table aggregate extraction that is currently licensed to Strada Aggregates has

been completed. The baseline condition therefore represents a projected modelled condition against which impacts will be assessed, and is distinct from the “existing condition”, during which aggregate extraction is still ongoing under the existing Strada licenses. This assessment assumes that the existing conditions among the natural features that were investigated for this study are representative of the baseline condition that would occur under the scenario of the Strada licenses being fully expended. Modelling has confirmed that there is relatively little difference between current conditions and baseline conditions (E. Wexler, Earthfx, pers. comm., August 2024).

7.3 Direct Impacts

7.3.1 Extraction Limit Setbacks

The existing ARA licenses for aggregate extraction on the subject lands incorporate extraction limit setbacks from the significant natural features on the subject lands. These extraction limits were determined based on the results of NEA studies completed to inform the applications (e.g., NRSI (2010) for Melancthon Pit #2; NRSI (2017) for the former Prince and Bonnefield properties). The previous NEA studies accounted for the significance and sensitivity of the on-site natural features (i.e., the Significant Woodlands including the on-site portion of NAT-19, and the isolated Stonewort Submerged Shallow Aquatic (SAS1-3) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2) wetlands) in recommending their complete retention outside of the extraction limits. The existing licensed pit extraction limits represent the outer limits of recommended buffers that were recommended for these features (NRSI 2010, 2017).

The Site Plan for the proposed pit/quarry recognizes the existing pit extraction limits as ecological constraint limits that have informed the delineation of proposed quarry extraction limits. In all areas, the proposed quarry limit of extraction is outside of the existing pit limit of extraction, and is therefore further set-back from the natural feature edges than the existing pit limit of extraction (Map 8). However, three areas of Site Plan encroachment beyond the existing pit limit of extraction are required to facilitate the proposed pit/quarry plan: 1) a portion of the central infiltration pond, 2) a portion of the proposed created wetland, and 3) a small northern extension of a proposed berm along the east side of the south infiltration pond. These areas of encroachment beyond the existing pit limit of extraction are discussed further below.

7.3.2 Vegetation Community and Species Removal

The majority of the proposed pit/quarry operation will be located within the footprint of the lands that are already licensed for above-water table aggregate extraction within the subject lands.

The proposed undertaking will require the removal of the two small SAS1-3 wetlands (i.e., the North and South Ponds) and the two MAM2-2 wetlands, located within the Melancthon Pit #2 site, in order to accommodate the central water infiltration facility. The central infiltration pond is critical to maintaining groundwater recharge, minimizing the impacts of quarry dewatering, and avoiding the need for off-site surface discharge. The proposed location of the central infiltration facility is the only feasible location for the facility to ensure that the proposed quarry's water management strategy can be achieved; specifically, the site needs to be located near the eastern boundary for optimal operation (E. Wexler, Earthfx, pers. comm., August 2024).

The wetlands to be removed are relatively common wetland feature types. They do not represent exceptional, rare or significant natural features from a vegetation community or floristic standpoint. The features to be removed do not contain any federally, provincially or regionally significant vegetation species. The removal of these features will eliminate a surface water storage function that they currently provide at the south end of the subject lands. See Section 7.3.4 for further discussion about the proposed wetland feature removals, and recommended mitigation and compensation measures.

Removal of the CUM1 cultural meadow, for the purposes of constructing the central infiltration facility, the new wetland creation, and the northern extension of the berm, does not represent a negative impact from a vegetation community or species standpoint. It is a very common community type, reflective of cultural disturbance, and does not contain any significant vegetation species. However, see Section 7.3.3 in regards to removal of wildlife habitat.

Under the baseline condition, all remaining areas of agricultural field with associated Mineral Cultural Meadows (CUM1) and hedgerows (currently limited to the former Prince Property) will have been removed for above-water table aggregate extraction within the licensed boundaries. No other vegetation community or vegetation species removal impacts are anticipated.

7.3.3 Impacts to Wildlife and their Habitats

7.3.3.1 Species at Risk

<u>Eastern Meadowlark</u>

The proposed undertaking will require the removal of CUM1 cultural meadow on the Melancthon Pit #2 site that provides breeding habitat for two Eastern Meadowlark pairs. The removal is required to accommodate the central infiltration pond, construction of the new wetland, and the northern extension of the berm along the east side of the southern infiltration pond. Breeding

habitat patches to be removed include the area of CUM1 north of Fresh-Moist White Cedar Coniferous Forest (FOC4-1) and adjacent to the SAS1-3 and MAM2-2 wetlands, and the area of CUM1 south of the FOC4-1 and the Mineral Deciduous Swamp (SWD4) (Map 8).

The proposed undertaking will entirely remove the northern breeding habitat, while it will remove a portion of the southern breeding habitat. It is anticipated that the majority of the southern breeding habitat is located off-property within adjacent meadow habitat. The CUM1 community within the Melancthon Pit #2 site as a whole is assumed to represent confirmed SAR habitat for Eastern Meadowlark; a total of 3.25ha of this habitat will require removal.

As described in Section 6.2.3, the anticipated removal of SAR Eastern Meadowlark habitat falls under the regulatory exemptions of Ontario Regulation 242/08 Section 23.14 (Pits and Quarries provision) since the areas of proposed habitat removal fall within Strada Aggregates' existing ARA license #625155. This exemption applies because, pursuant to O. Reg. 242/08 Section 23.14.3(a), in the case of species that were listed on the SARO list prior to January 24, 2013 (which includes Eastern Meadowlark, listed in 2012), Strada Aggregates' existing aggregate pit (Melancthon Pit #1) began operations prior to the date on which Eastern Meadowlark was listed as Threatened on the SARO list (January 13, 2012).

Updated surveys should be completed to re-assess the presence of Eastern Meadowlark individuals and suitable habitat within the CUM1 cultural meadow feature prior to removal of habitat within that feature. If Eastern Meadowlark is confirmed to still occupy the site prior to habitat removal, or if no additional surveys for Eastern Meadowlark are undertaken, then the habitat removal activity must be registered with the MECP via a Notice of Activity in accordance with O. Reg. 242/08. A Mitigation Plan, identifying a strategy to avoid or otherwise suitably mitigate impacts to Eastern Meadowlark, must also be prepared and implemented in accordance with O. Reg. 242/08.

<u>Bank Swallow</u>

Bank Swallow nesting habitat was identified within the operational area of Melancthon Pit #2 during the 2022 field survey season. As described in Section 6.2.3, Bank Swallow nesting habitat in pits and quarries can be ephemeral and variable from one year to another as slopes are modified and stockpile locations change, and the nesting habitat identified in 2022 may no longer exist. However, pit and quarry operators are responsible for avoiding, minimizing or mitigating impacts to the species and its habitat in accordance with the ESA.

Bank Swallow nesting habitat may occur at any location where suitable conditions exist (e.g., slopes of appropriate grade and substrate) within the pit extraction area; as such, specific habitat is not shown on Map 5. The removal of SAR Bank Swallow habitat falls under the regulatory exemptions of Ontario Regulation 242/08 Section 23.14 (Pits and Quarries provision) since the nesting habitat falls within Strada Aggregates' existing ARA license #625155. If Bank Swallows or their habitat are identified within the pit/quarry, Best Management Practices that have been established for Bank Swallows in pits and quarries (OMNR 2017) must be implemented in accordance with the requirements of O. Reg. 242/08.

Black Ash

No Black Ash trees were identified within the subject lands. However, following a precautionary approach, the entirety of the White Cedar-Hardwood Organic Mixed Swamp (SWM4-1), the majority of which exists off-property (NAT-19), was identified as Black Ash habitat due to the observation of individual trees within the off-property portion of the community. No direct impacts to Black Ash trees, or their SWM4-1 habitat, will occur as a result of the proposed site alteration. Construction of the central infiltration pond to the north, and the wash plant/stockpile area and created wetland to the west, will be set-back from the SWM4-1 edge as shown on Map 8-4.

Species at Risk Bats

The wooded natural features within the subject lands provide the greatest potential to provide SAR bat habitat. These natural features will be preserved in their entirety and buffered from the proposed adjacent pit/quarry operations as described above. No negative impacts to these potential SAR bat habitats will therefore occur.

Relatively few trees will require removal as part of the quarry creation. Under the baseline condition, all remaining agricultural hedgerows on the subject lands (e.g., within the former Prince property) will have been removed. Removal of the Melancthon Pit #2 wetlands will require removal of the trees ringing the North and South Ponds (SAS1-3). These trees have not been assessed for their potential to provide bat roosting habitat. However, given the relatively few tree removals required associated with these small wetland features, and that the adjacent large woodlands provide more abundant habitat opportunity, the removal of these trees is not anticipated to result in a negative impact to SAR bat habitat in the local landscape context.

As a means of avoiding impacts to individual bats, it is recommended that the SAS1-3 trees, and any other tree growth that requires removal within the subject lands, be removed outside of the April 1-September 30 bat active period.

Bobolink

Bobolink habitat is absent on the subject lands. However, Bobolink breeding habitat was identified within a field located on an adjacent property, on the west side of 4th Line, that extends to within 120m of the subject lands. As described in Section 6.1.3.2, multiple Bobolink individuals were observed to use this field for breeding purposes.

Since this habitat is located outside of the subject lands, no direct impacts to Bobolink or their breeding habitat will occur. See Section 7.4.2 in regards for discussion about the potential for indirect impacts to this species and its habitat.

7.3.3.2 Significant Wildlife Habitat

Amphibian Breeding Habitat (Woodland/Wetland)

Creation of the quarry will require removal of the SAS1-3 South Pond that was confirmed as Amphibian Breeding Habitat (Woodland) SWH due to the importance that it provides as anuran and salamander breeding habitat. The SAS North Pond will also require removal; this feature was identified as Candidate Amphibian Breeding Habitat (Wetland) due to its similar habitat characteristics and close proximity to the South Pond, and because salamander trapping was not completed within that feature. The proposed undertaking will therefore require direct impact to a form of SWH.

Habitat offsetting is proposed as a means of mitigating negative impact to this habitat function within the subject lands. Specifically, wetland habitat that is to be removed (including the collective areas of the SAS1-3 and MAM2-2 features) will be compensated for at a minimum 2:1 area-based ratio through creation of a wetland feature. The created wetland habitat has been designed with a topography that will allow for a variety of surface hydrological conditions, ranging from areas of permanent standing water to shallow depressional areas that will contain temporary standing water pools and moist soils. This design will incorporate the varied hydrological conditions of the SAS1-3 and MAM2-2 features, and by extension, the variations in amphibian breeding habitat that they provide.

See Section 7.3.4 for further discussion about the wetland offsetting plan as a means of habitat impact mitigation.

In order to avoid injury or mortality of amphibian species that occupy the wetland features, a wildlife salvage will be required to capture and relocate individuals immediately prior to the habitat removals. Wildlife exclusion fencing that is suitable to inhibit salamanders and anurans must first be installed around the habitat features. All captured wildlife species are to be relocated to a previously designated release area that is nearby and provides suitable habitat. Wildlife exclusion fencing must remain installed and functional until the habitat features are removed. The wetland habitat features must not be removed during the herpetofauna overwintering period (October 1-May 15) in order to avoid impacts to reptile or amphibian species that may overwinter within the features.

Special Concern/Rare Wildlife - Eastern Wood-Pewee Habitat

Confirmed SWH for the SCC Eastern Wood-Pewee was identified for the woodlands on the former Prince and Bonnefield properties. As described above, these woodlands will be preserved in their entirety and the adjacent proposed quarry operation will be set-back from these features. No direct impacts to Eastern Wood-Pewee habitat will therefore occur.

Bat Maternity Colonies and Special Concern/Rare Wildlife Habitat – Species of Conservation Concern Bats

Since the wooded natural features within the subject lands were not investigated for the presence of suitable bat roosting habitat trees, nor were they surveyed through acoustic monitoring to determine which bats are using the features as habitat, these wooded features were identified as Candidate SWH. However, as described above, these woodlands will be preserved in their entirety and the adjacent proposed quarry operation will be set-back from these features. No direct impacts to Candidate SWH for Bat Maternity Colonies or SCC bat habitat will therefore occur.

Special Concern/Rare Wildlife – Grasshopper Sparrow Habitat

Habitat for the SCC Grasshopper Sparrow is absent on the subject lands. However, Grasshopper Sparrow breeding habitat was identified within a field located on an adjacent property, on the west side of 4th Line, that extends to within 120m of the subject lands. As described in Section 6.1.4.1, multiple Grasshopper individuals were observed to use this field

for breeding purposes. This field therefore represents confirmed SWH for the SCC Grasshopper Sparrow.

Since this habitat is located outside of the subject lands, no direct impacts to this SWH type will occur. See Section 7.4.2 in regards for discussion about the potential for indirect impacts to this species and its habitat.

7.3.4 Wetland Removal and Offsetting

The proposed quarry operation will require the removal of the four small SAS1-3 and MAM2-2 wetland features on the Melancthon Pit #2 site to accommodate the central infiltration pond that will form part of the proposed quarry site plan (Map 8). As described above, these wetland community types do not represent unique or significant features on the landscape in and of themselves, nor do they contain significant vegetation species. However, the SAS1-3 South Pond has been confirmed to provide Amphibian Breeding Habitat (Woodland) SWH functions, while the SAS1-3 North Pond is considered Candidate SWH for amphibian breeding. In general, these four wetland features have been documented as relatively good quality anuran breeding habitat within the subject lands based on >10 years of monitoring in association with the Melancthon Pit #2 ARA license conditions (NRSI 2024).

It is recommended that a wetland offsetting plan be implemented to mitigate the negative impacts associated with the required removal of these wetlands. In the case of the proposed undertaking, it is NRSI's understanding that the proposed central infiltration pond is an integral and necessary component of the overall quarry's water management strategy, and that in conjunction with the proposed southern and northern infiltration facilities that are also required to achieve this strategy, there are no other suitable locations within the subject lands in which to construct the central infiltration pond. One of the primary mitigation strategies for the quarry operation as a whole is to adequately and effectively manage the incoming groundwater flows in a manner such that down-gradient groundwater-dependent natural features are not negatively impacted. Achieving a functional and self-contained water management strategy on the subject lands is therefore crucial to meeting these important, landscape-scale mitigation requirements. In this context, removal and compensation for the small, isolated SAS1-3 and MAM2-2 wetland features, despite the confirmed/assumed significance of the SAS1-3 ponds as amphibian breeding habitat, is considered warranted to ensure that the broader landscape-level impacts are appropriately mitigated.

7.3.4.1 Proposed Wetland Creation

As a means of offsetting the proposed wetland removals, a new wetland will be created on the subject lands. The new created wetland will be located immediately southwest of the existing SAS1-3 and MAM2-2 wetlands to be removed, and will be designed to functionally tie in with the existing Mineral Deciduous Swamp (SWD4) to its immediate east. The wetland will also be buffered from the adjacent operational areas through application of 15m buffers around the wetland limits. See Map 9 for the proposed location and design of the created wetland.

The overall size of the wetland will be 1.44ha (1.99ha including its 15m buffer). This 1.44ha size represents a greater than 2:1 area-based compensation ratio in relation to the 0.62ha total area of wetland that will be collectively removed among the four SAS1-3 and MAM2-2 wetland features. This strategy will provide a net gain in the area of wetland coverage on the subject lands.

The wetland has been designed to incorporate a variable topography that will support a range of hydrological surface water conditions. For example, this design includes two permanent pools, shallower depressions of various sizes that will contain seasonal standing water, and an outer zone (out to the wetland boundary) that will comprise seasonally wet or moist soils (Map 9). These varied topographic and hydrological conditions will therefore foster a diverse suite of habitat conditions that will optimize its use by multiple wildlife species. A key ecological function of this wetland will be to replace and enhance existing amphibian breeding habitat on the site. This will also be accomplished through the development and implementation of a detailed planting plan for the wetland, which will incorporate a diversity of native vegetation species that are suited to the various growing conditions (see Section 8.2). Through this approach, it is anticipated that all of the anuran species that have been documented within the SAS1-3 and MAM2-2 wetland across monitoring years (NRSI 2024) will have suitable habitat within the new created wetland. For example, tree and shrub plantings along the edges of the permanent and seasonal pools will encourage use by species such as Wood Frog, Spring Peeper and Gray Treefrog. Green Frogs will be attracted to the permanent pools, and these features will also provide suitable habitat for Spotted Salamander. Logs will be placed in the water to provide egg attachment sites and surrounding woody growth will naturally contribute woody debris and detritus. Seasonally wet meadow marsh areas will provide habitat for a variety of species, potentially including the SCC Western Chorus Frog, although this species has not been documented on the subject lands since 2009 (NRSI 2024).

As part of quarry site development, the area to contain the created wetland will first be raised in elevation through fill placement such that the created wetland will be at a similar elevation to the adjacent SWD4 swamp community. Lower-permeability till sourced from the pit will be utilized to create tighter underlying soils that will function to hold surface water and facilitate pooling. The overall grade of the wetland will be designed so that it passively drains into the adjacent SWD4 wetland, and ultimately into the broader adjacent NAT-19 wetland complex. A natural outlet will be created at the east end of the wetland to direct excess water into the SWD4 feature. The outlet is located at an existing topographic depression at the edge of the SWD4 feature which provides an established flow path to receive water from the created wetland. Surface flow outputs to the SWD4 community will only occur when water levels within the downstream permanent pool of the created wetland exceed a specified weir elevation.

The created wetland will be managed as part of the quarry's water management system during the operational phases. This will be required to ensure that the wetland maintains the suitable hydroperiod for its various ponded features (e.g., permanent pools and seasonally wet areas) and to provide suitable habitat for the targeted amphibian species in replacement of the existing wetlands. During the quarry operational period, water inputs to the wetland will primarily be derived from direct pumping of clean water from the quarry, with relatively lesser amounts of direct surface runoff within the small wetland catchment (out to its 15m buffer limit). Water inputs to the wetland will be continuously monitored and controlled such that the desired hydroperiods and standing water levels are achieved within the wetland. For example, the temporary pools within the wetland will be maintained with shallow standing water until at least June of each year to ensure complete amphibian metamorphosis and dispersal of juveniles. The permanent pools of the wetland will be designed to maintain at least 0.5m of water depth. Water that is pumped to the wetland will be drawn from the clean water pond, where the water will have first undergone detention to settle out sediments and other particulates.

The new wetland will be created within three years of issuance of the ARA license. As such, the new wetland will be functional to compensate for the removal of the existing wetland features and their habitat functions early during the pit/quarry operational period.

The created wetland has been designed to function as a self-sustaining system once the planted/seeded vegetation species establish and its hydrological regime equilibrates. This wetland will continue to function and integrate as part of the Rehabilitation Plan for the site. During the Rehabilitation Stage, the lands surrounding the wetland will be further raised and

graded such that a shallow surface catchment area is created for the wetland. Under this phase, the wetland will be entirely fed by surface water runoff and precipitation; no water will be actively pumped to the wetland following quarry closure. To achieve this, the graded surface catchment within the subject lands will include a thin layer of silty sand or silty loam so as to generate sufficient runoff and interflow to the wetland (Earthfx 2024a).

The wetland catchment grading has been designed to ensure that the desired water budget for the wetland is maintained. During the rehabilitation stage, the design of the created wetland will allow it to overflow, via its outlet to the NAT-19 wetland, at an elevation of 495masl. Based on modelled simulations of the rehabilitation stage, and given the proposed surrounding catchment grading for surface runoff, it has been determined that a permanent pool of standing surface water can be achieved within the wetland (Earthfx 2024a). Due to the natural seasonal fluctuations in wetland water level that can be expected, it is anticipated that rates of surface water outflow from the created wetland to adjacent areas of the NAT-19 wetland will range from 0.2-1.4 L/S (Earthfx 2024a).

The wetland creation plan meets key NVCA principles and guidelines (NVCA 2021b) for ecological offsetting including the following:

- The proponent, and not an outside organization, is taking all responsibility for planning, construction, maintenance and monitoring of the offsetting project;
- A net gain in wetland cover is achieved by exceeding the 2:1 area-based compensation ratio, with respect to the collective area of wetland removed;
- The created wetland is located immediately adjacent to the wetlands to be removed, facilitating the recolonization of the new wetland by wildlife species that inhabited the removed wetlands;
- The opportunity to raise surface elevations for the wetland location by introducing fill, to grade the surface to achieve hydrological objectives, and to design the wetland through incorporation of higher- and lower-permeability substrates, will allow for the creation of suitable conditions on which the wetland will establish;
- Core habitat functions of the existing wetlands, associated with amphibian breeding, will be emulated within the new wetland feature through introduction of a variety of hydrological conditions and habitat types that meet the needs of the targeted species;

- The created wetland will integrate with existing wetland located along the western fringe of the NAT-19 complex, and as such will enhance overall habitat diversity and functionality on local landscape.

See Section 9.0 for monitoring recommendations associated with the created wetland.

7.4 Indirect Impacts

7.4.1 Changes to Groundwater Regime

Creation and operation of the proposed below-water table quarry has the potential to alter the hydrogeological regime both within the subject lands and among the surrounding Study Area external lands if not appropriately mitigated. Changes in the shallow groundwater zone that provides hydrological inputs to surface natural features such as wetlands and watercourses could result in negative impacts to those natural features and their associated ecological functions. Impacts could arise due to decreases or increases in the shallow groundwater elevation (i.e., the water table level), and in particular on factors such as the relative magnitude, duration, frequency, spatial extent and seasonal timing of those groundwater level changes. Negative effects may also occur where the groundwater flow paths have been altered, such that more or less groundwater is directed toward down-gradient natural features. The degree of impact associated with these potential hydrogeological changes is also dependent on the relative sensitivity and significance of the ecological receptors, at the scales of both the vegetation communities as a whole to the individual constituent species. Habitat features and ecological functions associated with these community types and their resident species also have varying sensitivities to groundwater level change. Examples of groundwater-sensitive habitat functions include amphibian breeding habitat, Brook Trout spawning habitat, and turtle overwintering habitat. The hydrological sensitivities of the Study Area's natural features and inventoried species were described in Sections 5.0 and 6.0.

Earthfx, as a member of the Project Team, has undertaken complex and sophisticated hydrogeological modelling and analyses to predict with reasonable accuracy how the groundwater system will respond to various operational phases of the quarry operation, as well as to the rehabilitation stage, relative to baseline conditions. This modelling also predicts how the groundwater system will interact with surface features including wetlands and watercourses, such as through potential increases or decreases in baseflow inputs to watercourses and increases or decreases in "surface leakage" of groundwater to wetland soils and surfaces. Surface leakage refers to shallow groundwater that discharges to the surface layer and interacts

with features such as wetlands and watercourses (e.g., via runoff into the watercourse). Similarly, “stream leakage” refers to shallow groundwater that upwells directly into watercourse channels. In general, most of the groundwater inflow to streams occurs as groundwater discharge to seeps and the soil in the riparian areas adjacent to streams.

Earthfx simulated changes in groundwater levels, surface flow, and other aspects of groundwater-surface water interaction on a transient (time-varying) basis. This allowed for an assessment of how the groundwater and surface water features would behave on a seasonal and inter-annual basis (Earthfx 2024a). This is important to assess ecological effects on natural features and functions that require seasonal variability in hydrologic condition (e.g., summer dry-out of swamp features; wetter conditions in spring to maintain suitable hydroperiod to support amphibian breeding habitat). Model results were averaged over the 10-year simulation period to provide long-term averages that could be more readily compared and presented in report figures.

Quantitative evaluations of the hydrological and hydrogeological water budgets under baseline and future conditions were also undertaken (i.e., feature-based water budgets) to understand how these features, and their associated habitats, would respond to the predicted conditions. See the Impact Assessment Report (Earthfx 2024a) for additional detail on the modelling and analysis process that was undertaken in support of this study.

7.4.1.1. Overview of Predicted Groundwater Level Changes

Selected figures from the Earthfx Impact Assessment Report (Earthfx 2024a) have been appended to this report to inform the NEA impact assessment. For other figures and further discussion, please refer to the Earthfx report. All figures referenced in Appendix XII, unless otherwise stated, are derived from Earthfx (2024a).

See Appendix XII for the graphical representations of predicted groundwater level increases and decreases across the Study Area based on the results of the hydrogeological modelling. These results illustrate the simulated long-term average groundwater levels during Phase 4A of quarry operations, which is understood to represent the operational stage that presents the most potential to alter surrounding groundwater levels (Earthfx 2024a). Some variation in modeling results occurs between each Phase (1, 2C, 4A, and the Rehabilitation Phase) because of changes in the quarry excavation depth, the location of the open working face, and the placement of barriers. For example, a larger area to the northwest of the subject lands is

expected to experience groundwater drawdown in Phase 2C compared to Phase 4A. However, except where otherwise specified, the analysis presented below will focus on the Phase 4A and rehabilitation conditions. A brief discussion of Phase 1 and 2C is provided for context and general comparison. See below for further discussion about seasonal variation in predicted effects based on transient modelling results.

Groundwater level change contours are shown for the L1 (model layer 1 representing the shallow groundwater zone), and L6 (model layer 6 representing the Gasport aquifer) for context (Map 10). The L1 groundwater levels are of most direct relevance to surface feature effects on the south and west sides of the subject lands, including within the subject lands and at NAT-19, due to its close association and direct connections in many parts of the Study Area. The Gasport aquifer interacts with the surface near Horning's Mills and the edge of the escarpment (i.e., near NAT-14, NAT-15, NAT-16, and NAT-18). In these locations, the Gasport groundwater levels (L6) are of most direct relevance to surface feature effects. Positive groundwater contour values represent increases in groundwater elevation relative to baseline (i.e., "groundwater mounding"), while negative contour values represent decreases relative to baseline (i.e., "groundwater drawdown").

With reference to the above locations within the Study Area, Map 10 overlays the Phase 4A predicted groundwater level changes for either the shallow groundwater zone L1 or L6 Gasport zone against the Study Area wetland and watercourse features. The modelling results generally show that groundwater mounding is anticipated to the south, southeast and northeast of the subject lands, while groundwater drawdown is anticipated to the east, west, and southwest of the subject lands. These groundwater change effects are generally caused by the following factors:

- Construction of the buried tile drain along the west side of the pit/quarry boundary, to mitigate groundwater mounding effects that would otherwise be caused by the low permeability till barrier along the west side of the quarry, will cause some groundwater level drawdown to the west of the subject lands.
- Creation of the south, central and north infiltration facilities will cause locally higher groundwater levels due to water infiltration and recharge of the surrounding shallow groundwater zones.
- Excavation of the quarry will create a "shadow" effect, whereby some prevailing groundwater flows will flow around the quarry due to the lower permeability till barrier,

and groundwater levels will decrease immediately down-gradient (east) of the quarry, resulting in some drawdown effects and decrease in baseflow.

The groundwater drawdown effect downstream of the quarry will be mitigated through application of the water management strategy, whereby groundwater that does exfiltrate into the quarry, or collected within the west-property buried tile drain, will be captured and infiltrated on-site within the three infiltration facilities and, specific to drainage from the buried tile drain, the injection wells. Under this plan, captured water will be re-introduced back to the shallow groundwater zone soon after and spatially near its point of capture or exfiltration, such that prevailing easterly groundwater flows through the quarry site can be maintained. This on-site re-infiltration of groundwater, and maintenance of prevailing groundwater flow paths, is important in maintaining existing connectivity between groundwater flows and surface ecological receptors.

Despite this water management and mitigation strategy, some degree of groundwater drawdown is anticipated to the east and west of the subject lands as noted above and as shown on Map 10. Sections 7.4.1.2 to 7.4.1.7 below further discuss the potential for impacts to the terrestrial and aquatic systems as a result of this drawdown.

Groundwater mounding brings the shallow groundwater level closer to the soil zone and the ground surface, and can result in generally or seasonally wetter or moister soils. Where groundwater is at or near the ground surface under baseline conditions, relatively minor increases in groundwater level can result in “surface leakage”. Surface leakage is defined as when groundwater is discharged into the surficial soil zone, and potentially to the surface itself. This groundwater can then enter watercourses as either surface runoff or as interflow. Moister or wetter conditions may generally be considered less impactful to wetland and aquatic systems than groundwater drawdown effects. However, depending on the specifics of this effect, such as the frequency, duration or seasonal timing of the wetter conditions, including the effects of surface water pooling (e.g., extent and depth of inundation), groundwater mounding and surface leakage may cause detrimental effects on the health and survival of certain vegetation species that are not adapted to those conditions.

The potential for groundwater level change to influence an overlying natural feature depends on the degree of interconnectedness between the groundwater and surface hydrological regimes. The Study Area’s natural features are underlain by varying thicknesses of low permeability

Tavistock Till as shown in Appendix XII (Fig. 2.7; Earthfx 2024b). Areas of thicker underlying till layers represent areas where there is little connectivity between the shallow groundwater zone and the surface hydrological features. In these locations, wetlands may form as a result of surface runoff within topographic depressions that overly the low permeability till. An example of this are the small Mineral Shallow Marsh (MAS2) and Mineral Meadow Marsh (MAM2) wetlands that occur within the former Bonnefield property on the subject lands, where no evidence of groundwater influence was observed and where relatively thicker Tavistock Till has been mapped. Conversely, natural features that occur within areas of relatively little underlying Tavistock Till would be more directly influenced by fluctuations in the shallow groundwater levels. Examples of this are the NAT-01 and NAT-03 wetland complexes located west and southeast of the subject lands, respectively (Appendix XII).

Associated with the changes in groundwater elevations and increases in surface leakage are predicted increases and decreases in total streamflow among the Study Area watercourses relative to baseline conditions. Several of the Study Area watercourses are projected to experience an increase in total streamflow (m^3/s) (see Appendix XII, Fig. 4.38). This is related in part to the groundwater mounding that is expected for a portion of the Study Area. It is also related to increases in surface leakage that are anticipated for certain wetland complexes, such as NAT-02, NAT-03, and NAT-14 (Appendix XII, Fig.4.44). As shown in Appendix XII (Fig. 2.9), these complexes have relatively shallow water tables under baseline conditions. As a result of minor increases in groundwater elevation, they are predicted to experience increases in surface leakage as shown in Appendix XII. The increased surface leakage will create excess surface runoff and interflow that is expected to drain into the local watercourse channels associated with these complexes. This increased drainage to watercourses was accounted for in the model, contributing to the increased streamflows. The groundwater mounding and increased stream leakage also contribute to increases in direct groundwater inputs to the watercourses. The increased streamflow rates are a result of increased contributions of groundwater (via direct upwelling or through surface leakage inputs) and are not due to changes in surface catchment or increases in warm surface runoff to the watercourses.

Conversely, certain watercourse features to the east of the subject lands are projected to experience a decrease in streamflow as shown in Appendix XII (Fig. 4.39). This area of decreased streamflow corresponds to the area of groundwater drawdown (Map 7). A reduction in watercourse streamflow is also identified for the southwest end of NAT-01, which

corresponds to an area of predicted reduction in surface leakage, relative to baseline conditions, as shown in Appendix XII (Fig. 4.45).

The following subsections provide further assessment of potential indirect impacts to natural features and ecological functions as a result of the predicted hydrogeological regime during the Phase 4A operational period.

7.4.1.2 Predicted Effects West of Subject Lands

Natural Feature Water Balance

Natural features to the west of the subject lands that are addressed here include complexes NAT-01, NAT-20, and NAT-21. Groundwater levels to the west of the subject lands are below the surface, and do not interact with the upper soil surface or discharge directly to the surface (i.e., through seeps or springs).

NAT-01 is a large and complex system of natural features with a variety of wetland types. The south end is connected to several surface drainage features that flow south into and through NAT-04. Baseline groundwater elevations in NAT-01 are 1.3-3.5m below the ground surface (Appendix XII, Fig. 2.9). Surface leakage only occurs at the southwest extent of NAT-01 near the intersection of 2nd Line NE and County Road 17 (Appendix XII, Fig. 2.10). The average baseline volume of surface leakage at this location is approximately 3m^3/day, with an approximate seasonal maximum of 100-175m^3/day, peaking between March and April (Fig. 2.10, Earthfx 2024a). No surface leakage occurs at any other location in NAT-01. In general, lateral groundwater movement dominates the hydrology of NAT-01, and limited amounts of water reach the surface or pool within the feature. Surface leakage is also seasonal, and occurs from November to April. Surface leakage decreases as evapotranspiration processes dominate in the late spring and summer. Baseline streamflow was simulated for STR12, at the southern tip of NAT-01, ranging between 0m^3/second (no flow) to a peak of approximately 0.1 to 0.175m^3/second (Fig. 2.3, Earthfx 2024a).

During Phase 1, the groundwater table will be lowered within NAT-01 between 0m and 0.5m, with the greatest change occurring at the eastern tip of the feature, closest to the subject lands. Slight groundwater mounding (<0.15m) will occur in the southeast portion of NAT-01 near County Road 17, including the watercourses that drain this portion of NAT-01 (up to approximately 0.15m above baseline conditions) (Figure 3.6, Earthfx 2024a). The water budget modeling, prepared by Earthfx (Section 9.2; 2024a), shows imperceptible changes to lateral

groundwater flow (-0.02mm to -0.60mm, and 0.38mm in January) moving out of NAT-01 as a result of the groundwater drawdown and no changes resulting from mounding in the southeast corner. No negative impacts to the hydrology or hydroperiod of NAT-01 are anticipated during Phase 1

During Phase 2C, the groundwater table will be lowered within NAT-01 between 0m (at the southeast corner and the southwest corner) to 1.0m (at the northeast tip, closest to the subject lands) (Figure 3.23, Earthfx 2024a). A decrease in surface leakage is expected in the southwest corner where the groundwater table interacts with the surface under baseline conditions. The decrease in surface leakage is expected to be localized to the extreme southwest tip of the complex and will be approximately 0.01m^3/day (Fig. 3.33, Earthfx, 2024a). This results in a negligeable decrease to streamflow of less than 0.005m^3/second for the watercourse that drains this portion of NAT-01 (near STR 12) (Fig. 3.27, Earthfx 2024a). Given the existing groundwater elevation in NAT-01, the groundwater drawdown throughout NAT-01 is not expected to impact surface conditions. The slight decrease to surface leakage, and associated decrease in streamflow, in the southwest corner of NAT-01 during Phase 2 will slightly reduce downstream flow into the western edge of NAT-04 (<0.005m^3/second). A discussion of potential impacts of this change to wetland communities, terrestrial wildlife and habitats, and aquatic habitat and fish communities is provided below.. The reduction in surface leakage and streamflow at the southwest tip of NAT-01 during Phase 2C is not anticipated to result in negative impacts to the hydrology or hydroperiod of the complex.

During Phase 4A, groundwater levels are expected to decrease across NAT-01. Most of the NAT-01 complex will experience groundwater table reductions less than 0.5m; however, groundwater table elevations will decrease from 0.5m to 3.5m in the northeast corner of the complex. The easternmost tip of NAT-01 will see the largest elevation decrease, where the complex is closest to the subject lands (Map 10). These wetland communities (i.e., shallow marsh pond (MAS) and marsh thicket (MAM/SWT)) are fed by surface runoff catchments and are not directly influenced by the L1 groundwater table. These easternmost vegetation communities are therefore not expected to be impacted by the groundwater drawdown in this location. Surface water is directed towards the shallow marsh pond, which does not have a surface outlet. Field surveys conducted by NRSI suggest that this feature may recharge the shallow groundwater system, rather than the deeper groundwater table. No changes to surface leakage are expected in this location, which reinforces the presence of a localized separation between the surface and groundwater table (Fig. 3.49 and 3.50, Earthfx 2024a). The extent of

groundwater dewatering will gradually decrease through the complex towards the southwest; no effects will occur at the southwest tip of NAT-01 or at the southeast edge of the complex. The groundwater table will remain close to the surface between April and October, as evidenced in the expected groundwater evapotranspiration during these months. No change in soil evapotranspiration is expected, which reflects the continued presence of groundwater at the surface during Phase 4 (Table 19b, and d, Section 9.4, Earthfx 2024a). In the southwest corner of this complex, west of 5th Line and north of County Road 17, surface leakage is expected to decrease slightly, by approximately 0.01m^3/day. A slight decrease in surface leakage will occur throughout the year (between 0.18mm from June to September, up to 2.43mm in March) (Appendix XII, Fig. 3.50; Table 19d, Section 9.4, Earthfx 2024a). Given the baseline groundwater table elevation, the anticipated groundwater drawdown in NAT-01 is not expected to negatively impact the hydrology or hydroperiod of the feature.

During the Rehabilitation Phase, the northeast portion of NAT-01 will experience groundwater drawdown between 0.5m and 1.0m below the baseline groundwater table elevation. The effects of groundwater drawdown will decrease to the south and west, with no effects expected for the southeast edge of the complex. A slight decrease in surface leakage (0.01m^3/day) is expected for the southwest tip of the complex. This decrease does not impact streamflow for the watercourse draining this portion of NAT-01. Given the baseline depth to the groundwater table, as described above, no negative impacts to the wetland are anticipated.

NAT-20 is a much smaller feature containing mostly swamp communities. No surface water drainage features are connected to NAT-20, suggesting that it drains internally or that water evaporates/evapotranspires. This wetland complex is disconnected from the groundwater table and may be perched over soils with low permeability. A cross-section of the groundwater aquifers near the subject lands was prepared by Earthfx (Fig. 2.7, 2024a). This cross-section is located south of NAT-20, and shows a thick till layer that likely separates this complex from the upper groundwater layer. As such, a detailed water budget was not conducted for this complex.

During Phase 1, the groundwater table under NAT-20 will be drawn down slightly, less than 0.25m below the baseline elevation (Fig. 3.6, Earthfx 2024a). In Phase 2C, the groundwater table below NAT-20 will be lowered by approximately 0.75-1.5m relative to the baseline groundwater elevation is expected to occur (Fig. 3.23, Earthfx 2024a). Due to the thick till layer that separates the wetland from the groundwater table around NAT-20, no negative impacts are anticipated as a result of the groundwater table drawdown in Phases 1 and 2C.

During Phase 4A, groundwater drawdown (up to approximately 0.5m below the existing average groundwater table elevation) is expected to occur under NAT-20 (Map 10; Appendix XII, Fig 3.40), with decreasing effects towards the northwest where no dewatering impacts are expected at the northern most wetland. However, due to the perched nature of this complex and the existing depth to the water table (>5m below ground surface; Fig. 2.9, Earthfx 2024a), no negative impacts are expected from the anticipated groundwater mounding.

During the Rehabilitation Phase, drawdown will occur near the southeastern tip of NAT-20 and is expected to be less than 0.5m below the baseline groundwater elevation (Appendix XII, Fig 3.56). Given the baseline depth to the groundwater table and the thick till layer that separates the wetland from groundwater influences, no negative impacts are anticipated to NAT-20 during the Rehabilitation Phase.

NAT-21 is located northwest of NAT-20, west of 5th Line. During Phase 1, the groundwater drawdown and mounding effects are well removed from NAT-21 and are expected to be near 0m. No impacts to NAT-21 are anticipated during Phase 1. In Phase 2C, the groundwater table will be lowered by approximately 0.25m throughout the complex (Fig. 3.23, Earthfx 2024a). This will result in a negligeable decrease to streamflow (<0.0025m^3/day) and surface leakage along the watercourse (0.01m^3/day) at the southern extent of NAT-21 (Fig. 3.26 and 3.33, Earthfx 2024a). These changes are expected to occur where the average baseline groundwater table is at or near the surface. Given that the volume of the anticipated streamflow and surface leakage reductions are negligible, the hydrology and hydroperiod of NAT-21 are not anticipated to be impacted during Phase 2C.

Groundwater drawdown that occurs during Phase 4A is not expected to impact NAT-21 (Fig. 3.40, Earthfx 2024a) (Appendix XII). Under baseline conditions, the groundwater table is at the surface at the southern end of NAT-21 along the watercourse that flows through the complex, and surface leakage (up to 0.01m^3/day) occurs along the watercourse (Fig. 2.10, Earthfx 2024a). Simulated groundwater drawdown and mounding, illustrated in Figure 3.40 (Appendix XII), shows the 0m contour extending through NAT-21 and along the watercourse at the southern tip of the complex. No impacts to the groundwater table, surface leakage or streamflow is expected during Phase 4 and as such no impacts to the hydrology or hydroperiod of NAT021 are anticipated.

No groundwater effects will occur near NAT-21 during the Rehabilitation Phase (Fig. 3.56).

A discussion of the effects of groundwater mounding, increases in groundwater discharge, and increases in streamflow to the vegetation communities, hydrologically sensitive wildlife and plant species, and the fish community is provided below.

Effects on Vegetation Communities and Species

The hydrologically sensitive wetlands within NAT-01 include a large Birch-Poplar Organic Mixed Swamp Ecosite (SWM6) with smaller areas of White Birch – Poplar Organic Deciduous Swamp (SWD7-1), Organic Thicket Swamp (SWT3), Forb Organic Meadow Marsh (MAM3-9) and Forb Organic Shallow Marsh (MAS3-10). The marsh communities and some localized vernal pools within the swamp communities hold standing water into the summer months, transitioning to saturated substrate by late summer. These wetlands, as well as the wetlands within NAT-20 and NAT-21, do not contain vegetation that is indicative of groundwater influence. The roadside drainage ditches along 5th Line, whose base elevation is below the water table for the ditch section running through NAT-01, do exhibit evidence of groundwater with Yellow Sedge present in the bed of the ditch among saturated soil. For the majority of NAT-01, where the predicted decrease in the groundwater elevation will be up to 0.5m during Phase 2C, Phase 4A and the rehabilitation phase. This may result in a slight decrease in the size and distribution of seasonal standing water areas that are present during the spring months. These features hold shallow water among a loose matrix of peat and organic muck that supports species like Fowl Mannagrass, Spotted Jewelweed, Hemlock Water-parsnip and wetland sedges. Under existing conditions, the vernal pool features remain wet, either as standing water or saturated organics throughout the growing season and the conditions of seasonal standing water and saturated substrates will be maintained despite the 0.5m decrease in groundwater elevation. The wetlands within NAT-01 will not experience drying conditions that would affect the species composition and structure of these communities. The peat and muck, found in many of the wetland depressions affords some plasticity and tolerance to change in this regard.

Black Ash, a SAR, occurs at various locations in NAT-01, but has been heavily impacted by Emerald Ash Borer leaving only small diameter trees that are unlikely to reach reproductive maturity and are not protected under the ESA. The soil moisture in the substrate that supports the existing Black Ash trees will not change to the extent that the health of trees would decline or the spatial extent of suitable habitat would be reduced, as wetland and adjacent lowland forest communities will remain present.

The meadow marsh and shallow marsh communities at the far eastern extent of NAT-01, near 4th Line, are anticipated to experience groundwater drawdown in the range of 0.5 to 1.0m below the existing conditions during the rehabilitation phase. During the site surveys, these communities did not contain any indication of groundwater influence and based on topography and the observed eastward movement of surface water through NAT-01, these marsh communities in the far east are maintained through receipt of overland flow. As these marshes are situated at the low topographic elevation in the eastern part of the NAT-01 feature, and surface flow does not continue beyond these marshes, it is likely that water within the marshes infiltrates and evaporates, with some shallow pooling maintained through much of the year. The infiltration of surface water in the far northeast corner will continue through Phase 4A as it does under existing conditions.

Both NAT-20 and NAT-21 appear to be heavily dependent on surface water input to maintain the hydrology of the wetlands within these complexes. The till layer beneath NAT-20 and the depth to groundwater at this location will not result in any change to the wetland vegetation. At NAT-21, the slight lowering of groundwater elevation at the southern portion of the complex during Phase 4A is not anticipated to result in changes to the vegetation. The southern portion of NAT-21 is comprised largely of graminoid marsh, likely dominated by Reed Canary Grass or Broad-leaved Cattail, and these species would be unaffected by the groundwater elevation decrease. NAT-21 contains a network of drainage ditches that have altered the natural hydrology of the feature.

Effects on Terrestrial Wildlife and their Habitats

The NAT-01 wetland complex provides habitat for a relatively high number of hydrologically sensitive wildlife species, comprising seven high-sensitivity species (six herpetofauna and one mammal) and four medium-sensitivity species (two birds and two herpetofauna) as described in Section 5.2.2. The majority of these species are anurans that utilize the widespread availability of treed and thicket swamps and vernal pools throughout the complex. The majority of the NAT-01 complex has also been confirmed as Amphibian Breeding Habitat (Woodland) SWH due to the relative abundance and richness of anuran species using these features, while SWH for the SCC Western Chorus Frog has also been identified for a swamp thicket community within the complex. The complex also provides important vernal pool habitat for a large number of breeding Spotted Salamanders. The hydrological conditions that support these amphibian breeding habitats are not expected to change based on the results of hydrogeological

modelling. Anticipated groundwater drawdown during Phase 4A will be limited to within 0.5m of baseline levels for the majority of the complex. As described above, this drawdown is not expected to cause a drying effect within the complex wetlands, and the features will continue to sustain seasonal standing water and vernal pool conditions. The wet habitats that exist within this complex are predominantly fed by surface water (spring melt and precipitation over low permeability organic soils), with a relatively smaller influence of shallow groundwater. Changes to the shallow groundwater regime are expected to have relatively little influence on the surface hydrology given these conditions, and because the saturated organic soils have some resilience to drying effects that could be caused by the anticipated groundwater drawdown. Therefore, the projected changes to groundwater level are not anticipated to negatively affect the amphibian breeding habitat and SCC Western Chorus Frog SWH functions provided by the wetlands.

The anticipated reduction in surface leakage in the southwest end of the NAT-01 complex will be highly localized and is not expected to result in negative effects on the hydrology or hydroperiod within that portion of the complex, as described above. No negative effects to wildlife habitats, including Amphibian Breeding Habitat SWH, is therefore anticipated since hydrological conditions supporting these habitats are not expected to change.

No negative impacts to SWH for the SCC Snapping Turtle (thicket swamp habitat shown on Map 5-1) is anticipated as a result of the hydrogeological conditions. As with other wetland habitats within the complex, the Snapping Turtle habitat is predominantly sustained by surface water inputs, and is therefore not expected to be sensitive to predicted groundwater level changes. Similarly, negative impacts to the hydrologically sensitive species Northern Waterthrush, Wood Duck, and Muskrat are not expected. Negative effects to Candidate SWH types that were identified for the Study Area (see Section 6.1.4.2) are also not expected due to the expected maintenance of the existing surface hydrological regime within the wetlands.

The far east end of the NAT-01 complex, comprising the Shallow Marsh (MAS) ELC community and Meadow Marsh/Swamp Thicket (MAM/SWT) complex, fall within an area of shallow water drawdown as described above. However, since these wetland communities do not show a strong association with the shallow groundwater regime, the predicted groundwater level change is not expected to alter the wetland community characteristics in any way that would negatively affect its habitat functions.

The NAT-20 wetland complex provides habitat for seven species with high hydrologic sensitivity (all of which are herpetofauna) and one medium-sensitivity species (Wood Duck). The complex also contains SWH for Amphibian Breeding Habitat (Woodland) (due to the abundance of breeding Spotted Salamanders) and for the SCC Snapping Turtle. However, because these wetlands do not show a strong association with the shallow groundwater table, and likely exist as perched wetlands over low-permeability till, the groundwater level drawdown that is projected for that area is not expected to manifest in any notable changes within the wetlands. Therefore, no impacts to wildlife habitats are anticipated within the NAT-20 complex.

The NAT-21 wetland complex is not expected to experience groundwater drawdown effects during quarry operations. Furthermore, wetlands within this complex are predominantly influenced by surface water hydrology and do not exhibit strong groundwater influence. The surface hydrology of these wetlands will not change during quarry operation. Significant habitat functions or hydrologically sensitive species have not been confirmed for this complex, although three high-sensitivity anuran species were recorded within it (Section 5.1.12). No impacts to these species or their habitats are anticipated.

Effects on Aquatic Habitats and Fish Communities

One permanent watercourse occurs at the southwest corner of NAT-01, which provides year-round fish habitat. Summer water depths were measured up to approximately 0.13m and Watercress was observed throughout the reach. The watercourse was classified as a cool/coldwater feature at its crossing of County Road 17 and was confirmed to support a Brook Trout population, primarily comprised of adult individuals (100 – 148mm in length). This watercourse flows to NAT-04 east of 5th Line, which was confirmed as Brook Trout rearing habitat and a reach with a coldwater thermal regime. In general, the modeling shows that the watercourse may experience a slight decrease in streamflow through phases 1, 2C and 4A. This is due to slight decreases in surface leakage, with some variability across months. However, the decreases appear to be minor, and potential reductions in streamflow are expected to be negligible. Given the baseline groundwater table elevation, the anticipated groundwater drawdown in NAT-01 is not expected to negatively impact the hydrology or hydroperiod of the feature and is, therefore, not expected to negatively affect the available aquatic habitat, thermal regime, or the local fish community within the NAT-01 or NAT-04 watercourses.

7.4.1.3 Predicted Effects North of Subject Lands

Natural Feature Water Balance

The wetland complexes located north of the subject lands addressed here include NAT-14 and NAT-15. In these locations, which approach the Niagara Escarpment, the Gasport aquifer has an upward gradient and provides the source of groundwater to the surface layer. As such, changes to groundwater contributions in Phases 1, 2C, 4A (Map 10), and the rehabilitation phase and associated impacts to surface conditions consider the Gasport aquifer model results.

The groundwater table sits close to the surface and fluctuations in the water table elevation influence surface leakage. Average baseline conditions (Fig. 2.9, Earthfx 2024a) show that the groundwater table is at the surface within both NAT-14 and NAT-15. A watercourse flows through NAT-14, and consistent surface leakage occurs along its length, particularly north of Sideroad 15 and through the Coniferous Swamp/Mixed Swamp (SWC/SWM), Organic Meadow Marsh (MAM3), and the Shallow Aquatic (SA) vegetation communities. Groundwater leakage, noted as near 20m^3/day (Fig. 2.21, Earthfx 2024a), occurs in a concentrated area on the north side of NAT-14 immediately west of a private driveway that bisects the feature. Average baseline groundwater conditions in NAT-15 fluctuate and are less consistent than NAT-14 (Appendix XII, Fig. 2.9). Several leakages (10-20m^3/day) occur throughout the feature, along the watercourses flowing through NAT-15 and in the lands adjacent to the stream (Fig. 2.21, Earthfx 2024a). Average baseline streamflow into and through NAT-14 is approximately 0.03m^3/second to 0.1m^3/second. For NAT-15, average baseline streamflow through the complex is approximately 0.08m^3/second to 0.1m^3/second (Fig. 2.3, Earthfx 2024a).

The hydrology of NAT-14, under baseline conditions, is dominated by lateral groundwater inflow beneath the surface, which occurs throughout the year. Stream leakage provides a large portion of the water budget for this feature during the growing season (May to September), and surface leakage (i.e., groundwater discharge) represents a large portion of the water budget from October to April (Section 9.1, pp. 185, Earthfx 2024a). The groundwater table is at or near the surface throughout the year, indicating that the hydrology of NAT-14 is driven by groundwater processes.

During Phase 1, NAT-14 will experience slight groundwater drawdown of approximately 0.15m or less, compared to baseline conditions. The western tip of the complex is expected to have no groundwater drawdown effects (Fig. 3.8, Earthfx 2024a). Imperceptible changes to surface

leakage are expected. Surface leakage will decrease between 0.02-0.12mm below baseline conditions. A negligible decrease in stream leakage is expected to occur between December and April, while a negligible increase, or no change, is expected between May and November. In addition, lateral groundwater flow into NAT-14 will decrease slightly (an average of 0.26mm/month in Phase 1) (Section 9.2, Table 11d, Earthfx 2024a). The changes to water inputs to NAT-14 are not anticipated to impact the hydrology or hydroperiod of the complex. Streamflow in the watercourse that flows through NAT-14 (between STR2 and STR3) is expected to increase due to the effects of mounding occurring in the L1 layer from the northern infiltration trenches. This increase is expected to be approximately 0.003m^3/second in Phase 1 (Fig. 3.9, Earthfx 2024a). The increase in streamflow is not expected to impact the hydrology of NAT-14 during Phase 1, as this watercourse flows through the wetland, and the anticipated volumes are unlikely to impact hydrological process of the watercourse.

During Phase 2C, the groundwater table will be lowered by as much as 0.25m below baseline conditions. Surface leakage will decrease throughout the year (0.09mm in July to 0.44mm in January, below baseline conditions). Stream leakage will be variable throughout the year, with decreases occurring from February to August and again in October (as much as 0.38mm below baseline conditions), and increases occurring in September and November to January (as much as 1.27mm above baseline conditions) Lateral groundwater flow into NAT-14 will increase (0.46mm in April to 0.80mm in September, over baseline conditions) Section 9.3, Table 17d, Earthfx 2024a). The changes to water inputs to NAT-14 are not anticipated to impact the hydrology or hydroperiod of the complex. Streamflow in the watercourse that flows through NAT-14 (between STR2 and STR3), is expected to decrease due to the effects of groundwater drawdown occurring in the L1 layer. This decrease is expected to be less than 0.005m^3/second (Fig. 3.27, Earthfx 2024a). The decrease in streamflow is not expected to impact the hydrology of NAT-14 during Phase 2C, as this watercourse flows through the wetland, and the anticipated volumes are unlikely to impact hydrological process of the watercourse.

Limited groundwater mounding will occur at the easternmost edge of NAT-14 during Phase 4A (Map 10). Average elevations are modeled to be near 0m to approximately 0.15m or less. Limited groundwater drawdown will occur through the remainder of the complex, and the elevation is expected to be <0.15m relative to the baseline condition (Appendix XII, Fig. 3.42). Lateral groundwater inflow will decrease between October to March (0.04mm in October and March to 0.19mm in December), and will increase between April and September (0.02mm in April to 0.17mm in June); however, these changes and fluctuations are imperceptibly small.

During the growing season (April to October), the groundwater table will be at or near the surface as indicated by an increase in groundwater evaporation, and stream leakage will continue to contribute to the hydrology of NAT-14 from May through November (Section 9.4, pp.221, Earthfx 2024a). Surface leakage is expected to increase by approximately 0.01m^3day within the central portion of NAT-14 along the watercourse that flows through the complex. Surface leakage is also expected to increase (0.01 m^3/day to 0.2m^3/day) along the watercourses to the west of NAT-14, which flows through the complex. The increase in surface leakage will result in an increase to streamflow of approximately 0.001m^3/second through NAT-14 (Fig. 3.49 and 3.43, Earthfx 2024a). Given that surface leakage is concentrated along the watercourse that flows through NAT-14, the increased volume of surface discharge is expected to runoff towards the watercourse and is not expected to cause pooling or inundation within the complex. Potential impacts to the vegetation communities and aquatic habitat are discussed further below. Given that the NAT-14 complex is a flow-through system, the anticipated increases to surface leakage and streamflow during Phase 4A are not expected to negatively impact the hydrology or hydroperiod of the complex.

During the Rehabilitation Phase, minor groundwater drawdown will occur at NAT-14; however, elevations will be near 0m near the east side of the complex, up to an approximately 0.25m reduction on the west side (Appendix XII, Fig. 3.58). A slight decrease in surface leakage is anticipated during this phase (Appendix XII, Fig. 3.66). No negative impacts to NAT-14 are anticipated during the Rehabilitation Phase.

The hydrology of NAT-15, in the baseline condition, is dominated by stream and surface leakage, which reflects the high groundwater conditions in the area (Section 9.1, pp. 187, Earthfx 2024a). Water depths from stream leakage are consistent throughout the year, while higher surface leakage occurs during the October to April period. Lateral groundwater inflow is also consistent throughout the year, and represents the third most important contributor to the hydrology of NAT-15.

No changes to the groundwater table at NAT-15 will occur during Phase 1 and 2C (Fig. 3.8, and 3.25, Earthfx, 2024a). During both phases, negligible changes to surface, stream and lake leakage are expected and will be variable across the year; however, the change is on average <1.7mm/month. Lateral groundwater flow into NAT-15 will decrease less than 1mm per month in Phase 1 and between 0.69-1.73mm per month in Phase 2C (Section 9.2, Table 12d, and Section 9.3, Table 18d, Earthfx 2024a). In Phase 1, a negligeable decrease in streamflow (less

than 0.005m^3/second) is expected for both the east and west watercourses that flow through NAT-15. During Phase 2C, streamflow into NAT-15 is expected to decrease (<0.005m^3/second) in the western watercourse, flowing through the complex and between STR1 and STR4 (Fig. 3.27, Earthfx 2024a). Along the eastern watercourse that flows through the east side of the complex, streamflow is expected to increase (approximately 0.003m^3/second) (Fig. 3.26, Earthfx 2024a). Surface leakage along both the east and west watercourses in NAT-15 is expected to increase slightly to approximately 0.01m^3/day (Fig. 3.32, Earthfx 2024a). These changes will be imperceptible and are not anticipated to impact the hydrology or hydroperiod of NAT-15 during Phase 1 and Phase 2C.

During Phase 4A, the water balance for NAT-15 will remain essentially unchanged from baseline conditions (Map 10). The monthly water balance analysis shows imperceptible changes to recharge (up to 0.04mm decrease), surface leakage (0.3 to 1.71mm decrease), stream leakage (0.29mm decrease to 2.22mm increase) and lake leakage (0.025 to 0.91mm increase) across each month (Section 9.4, pp. 223, Earthfx 2024a). These minor shifts from the baseline condition leave NAT-15 essentially unaffected by the Phase 4A operations, and no impact to the hydroperiod or hydrology of the feature is anticipated as a result.

During the Rehabilitation Phase, NAT-15 will be unaffected by the drawdown conditions modeled by Earthfx (Appendix XII, Fig.3.58). Conditions within the complex will remain consistent with the baseline conditions.

Effects on Vegetation Communities and Species

The Poplar-Conifer Organic Mixed Swamp (SWM6-2) within NAT-14 has a high sensitivity to hydrological change. A total of 17 plant species with medium sensitivity to hydrological change were observed, including some of the 11 groundwater indicator species that are present. The bottomland of NAT-15 is largely comprised of White Cedar-Conifer Organic Coniferous Swamp (SWC3-2), which also has a high sensitivity to hydrological change. The groundwater seepage within NAT-14 and NAT-15 is similar and occurs as beds of saturated organic soil flanking the watercourse which can range in width from 1m to approximately 25m in some areas.

These features have a gently sloping aspect toward the watercourse. While shallow pockets of surface water are present during the spring and following large precipitation events, the wetland vegetation is never inundated within these features and there are no defined flow paths that direct water to the watercourse. The organic soil is stabilized by the existing vegetation,

including tree cover and moderate herbaceous cover and the soil facilitates slow percolation of groundwater and surface water towards the watercourse. Groundwater-dependent plant species are more heavily concentrated along the watercourse and become progressively less common at higher elevation away from the watercourse. The prevalence of White Cedar on the organic bottomland reflects the high pH condition and although surficial expression of groundwater may not be evident away from the seepage beds that line the watercourse, the root zone of these trees is likely to be in direct contact with groundwater. The predicted increase in surface leakage is likely to be absorbed by the organic substrate which will direct excess water to the watercourse.

Whereas NAT-14 has a relatively simple slope toward the watercourse providing positive drainage, the broad bottomland area of NAT-15 contains microtopography and low sloughs that could result in localized holding of seepage water and small increases in inundation as a result of groundwater mounding. Pooled water will infiltrate the adjacent organic soil, but this may be limited when that soil is fully saturated. Given the small rate of increased groundwater mounding in the L1 layer at NAT-14 during Phase 2A and no predicted groundwater elevation change at NAT-15, it is unlikely that the groundcover or trees would be stressed or reduced in numbers due to prolonged inundation. The drawdown of the groundwater elevation at NAT-14 of 0.15m or less during the rehabilitation phase will not affect tree cover or the vegetation composition within the seepage beds. Groundwater currently makes a substantial contribution to the water balance within these features and as a result, changes in soil pH are unlikely to occur.

Black Ash, a SAR, occurs in various swamp habitats to the north of the subject lands, but has been heavily impacted by Emerald Ash Borer leaving only small diameter trees that are unlikely to reach reproductive maturity and are not protected under the ESA. The soil moisture in the substrate that supports the existing Black Ash trees will not change to the extent that the health of trees would decline or the spatial extent of suitable habitat would be reduced as wetland and adjacent lowland forest communities will remain present.

Effects on Terrestrial Wildlife and their Habitats

The NAT-14 complex provides habitat for four species with high hydrological sensitivity and four with medium-sensitivity, while the NAT-15 complex provides habitat for four high-sensitivity species and three medium-sensitivity species. The majority of these sensitive species are anurans, although neither of these complexes contained wetland habitats that met provincial

criteria to be considered significant amphibian breeding habitat (OMNR 2015a). NAT-15 contains SWH for the high-sensitivity species Snapping Turtle, while both complexes also contain Seeps and Springs SWH.

Based on the assessment of modelled effects for these complexes, no notable changes to the wetland habitat conditions that support the hydrologically sensitive species are anticipated. As described above, predicted hydrogeological effects within these areas will result in only very minor to imperceptible effects among the surface terrestrial features. No significant changes to hydroperiod or water levels are anticipated during or following operation of the quarry that would negative impact amphibian or turtle habitats. Reductions in groundwater seepage volumes, or the sizes or locations of the seepage features, are not expected to occur. No negative impacts to terrestrial wildlife habitats, including confirmed SWH, as well as associated Candidate SWH types, are therefore not anticipated.

Effects on Aquatic Habitats and Fish Communities

As noted, one permanent watercourse flows generally east through the coniferous swamp and marsh ecotypes associated with NAT-14. The watercourse provides direct fish habitat and was open and flowing during both winter and summer surveys between 2020 and 2022. Summer water temperature measurements characterize the feature as both cool to coldwater, which was dependent on the location assessed (Map 6-5). Under existing conditions, the groundwater table is noted to be at or near the surface for most of the year with stream and surface leakage to the watercourse providing consistent flow and coldwater temperatures that support Brook Trout. In particular, this includes a concentrated area of groundwater upwelling along the north side of NAT-14. Adult, juvenile and yoy Brook Trout were captured within the NAT-14 watercourse, indicating that the feature provides suitable spawning, rearing and foraging habitats.

The groundwater table associated with NAT-14 is expected to be slightly lower during Phase 1 (≤0.15m), which will result in slight, but imperceptible reductions in surface (0.02 to 0.12mm) and some seasonal increases and decreases in stream leakage. However, the overall streamflow through the watercourse is expected to increase by approximately 0.003m^3/second due to the effects of mounding occurring in the L1 layer from the northern infiltration trenches. The groundwater table is also expected to be slightly lower (up to 0.25m) during Phase 2C. Similar to Phase 1, this will result in slight decreases in surface leakage throughout the year (0.09mm in July to 0.44mm in January) and seasonal increases and decreases in stream

leakage. Generally, lateral groundwater flow into NAT-14 will increase, with a maximum projection of approximately 0.8mm in September, and although the NAT-14 will experience a slight decrease in streamflow (0.005m^3/second), the overall impact on the feature's hydrology and hydroperiod will be negligible. Similarly, the hydrology and hydroperiod is unlikely to be impacted during Phase 4A since the groundwater table is expected to remain at or near the surface. Some minor increases and decreases in the groundwater budget are expected under the Phase 4A condition, but due to an increase in surface leakage of approximately 0.01-0.2m^3/day, the overall fluctuations will result in an increase to streamflow of approximately 0.001m^3/second through NAT-14. The increased streamflow may result in more frequent flooding events (over bankfull) during periods of high flow (e.g., spring freshet and high precipitation events). However, this would not affect the aquatic habitat or existing fish community. Overall, the aquatic habitat conditions within the NAT-14 watercourse are not anticipated to be negatively affected by the proposed undertaking and conditions are expected to continue to support Brook Trout across all life stages.

NAT-15 is comprised of two permanent watercourses that flow south and connect to form one permanent watercourse downstream of the existing mill pond dam at Mill Lane. Both the east and the west watercourse arms are characterized by coldwater thermal regimes and support self-sustaining Brook Trout populations (Map 6). Adult, juvenile, and yoy Brook Trout were confirmed to occur throughout NAT-15, including at Sideroad 15 and below the dam at Mill Lane. The average baseline groundwater conditions are known to fluctuate, but to a lesser extent than at NAT-14. However, water depths from stream leakage are relatively consistent throughout the year. Modelling indicates that although surface leakage may increase slightly during Phase 1 and 2C, the streamflow into NAT-15 is expected to decrease slightly (<0.005m^3/second) in the western watercourse during but increase slightly (0.002m^3/second) in the eastern watercourse. However, these changes will be imperceptible and are not anticipated to impact the hydrology or hydroperiod of NAT-015 during Phase 1 and Phase 2C. During Phase 4A, the water balance for NAT-15 will remain essentially unchanged from baseline conditions. Therefore, the proposed undertaking is not expected to affect the aquatic habitats associated with the NAT-15 watercourses or their ability to support the Brook Trout populations within them.

7.4.1.4 Predicted Effects South of Subject Lands

Natural Feature Water Balance

Natural features to the south of the subject lands that are addressed here include complexes NAT-02, NAT-03, and NAT-04. NAT-02 and NAT-03 are connected via watercourses that initiate within or flow through NAT-02, eastwards into NAT-03. NAT-04 is located to the southwest of the subject lands and is connected to NAT-01 via a watercourse that flows southwards. All of these features are large wetland systems with a variety of vegetation communities consisting mainly of swamps and marshes.

NAT-02 has an average baseline groundwater elevation that is at or near the surface (0-2m) (Fig. 2.9, Earthfx 2024a). NAT-02 is a headwater wetland complex that receives water from the groundwater table and discharges a small portion into streams, and to NAT-03. Lateral groundwater inflow and surface leakage dominate the hydrology of NAT-02 (Section 9.1, pp. 179, Earthfx 2024a). Groundwater and soil evaporation represent a large proportion of the water loss for this feature, particularly from April to October, indicating that the soil is saturated and the groundwater table is at or near the surface during this period. Average baseline surface leakage occurs in localized areas throughout the feature, with the largest area of leakage occurring on the west side of 3rd Line, near NAT-03 (Fig. 2.23; Earthfx 2024a). NAT-02 has the highest seasonal variability of total groundwater discharge to the surface of all the wetlands modeled within the Study Area. Surface leakage peaks in the early spring (approximately 1,200-1,500m^3/day) when groundwater elevations are high and the spatial extent of surface leakage expands to include most of the wetland surface area. Surface leakage drops substantially to a seasonal low around August and September (0-100 m^3/day) (Fig. 2.26, Earthfx 2024a). Baseline streamflow for NAT-02 was simulated at STR13, at the downstream end of the complex. Streamflow at this location ranges from 0m^3/second (no flow) to approximately 0.18m^3/second (Fig. 2.18, Earthfx 2024a).

During Phase 1, groundwater mounding will occur at the northwestern tip of NAT-02 between 0.5-1.0m above baseline elevations. The remainder of NAT-02 will see between 0-0.5m of mounding, with mounding effects diminishing further to the south and east, away from the southern infiltration facility (Fig 3.6, Earthfx 2024a). An increase to streamflow is expected for the watercourses at the northwest corner of NAT-02 (approximately 0.0008m^3/second), flowing into the complex, and at the southern extent of the complex (approximately 0.00003m^3/second) (Fig. 3.9, Earthfx 2024a). Mounding will also result in an increase to lateral groundwater flow

into NAT-02 (7-14mm per month above baseline conditions) and an increase in surface leakage into the feature (2.25-6.65mm per month above baseline conditions). Stream and lake leakage (referring to the small OA ponds within the complex) will also increase by approximately 1-3mm per month (Section 9.2, pp. 191, Earthfx, 2024a). These changes are not anticipated to impact the hydroperiod of NAT-02, since lateral groundwater flow and surface leakage are the dominant sources of water for this feature. The anticipated water depth increases for groundwater inflow and surface leakage are not expected to impact the hydroperiod of NAT-02, as excess water is expected to be conveyed to the internal drainage features and flow through the complex. No impacts to the hydrology or hydroperiod of NAT-02 are expected during Phase 1.

Modeling of the groundwater mounding effects during Phase 2C are nearly identical to Phase 1 (Fig. 3.23, Earthfx 2024a). As a result, an increase to streamflow (approximately 0.0008m^3/second) is expected for the watercourses at the northwest corner of NAT-02, flowing into the complex (Fig. 3.26, Earthfx 2024a). Groundwater mounding will result, in a slight increase in runoff to streams within the complex (0.04-0.33mm/month) (Section 9.3, Table 14b, Earthfx 2024a). Lateral groundwater flows are expected to increase by 6.93-8.37mm per month over baseline conditions . Surface, stream, and lake leakage will increase and will also have similar effects as Phase 1 (Section 9.2, Table 14d, Earthfx 2024a). No negative impacts to the hydroperiod or hydrology of NAT-02 will occur as a result of Phase 2C.

During Phase 4A, a minor amount of groundwater mounding will occur in NAT-02, representing an average increase of 0.25m. This expected mounding will extend to 1.0m above baseline levels at the northwest tip of the complex adjacent to County Road 7 (Map 10). The magnitude of groundwater mounding will decrease rapidly with distance away from the south and central infiltration galleries, such that the distance between the modelled 1.0m and 0.5m mounding contours is approximately 125m, within NAT-02 (Fig. 3.40, Earthfx 2024a). The mounding will result in an increase in lateral groundwater flow into NAT-02, and an increase in evaporation of groundwater throughout the feature. A minor increase to surface leakage will also occur, approximately 1-3.5mm each month (Table 20d, Section 9.4, Earthfx 2024a). However, while a negligible change to the amount of surface leakage occurs, this is not anticipated to have a negative impact on the hydrology of NAT-02. No change to the hydroperiod of the feature is expected and the pattern and distribution of water inflow and outflow will remain the same as baseline conditions.

Model simulation of the Rehabilitation Phase shows that conditions will be nearly identical to baseline conditions for NAT-02 (Appendix XII, Fig. 3.56). Imperceptible changes to surface and stream leakage, groundwater inflow, and evaporation of groundwater will all be well below 1mm per month (Section 9.5, pp. 227, Earthfx 2024a) decreases to surface leakage. No negative impacts to the hydrology or hydroperiod of NAT-02 are anticipated during the Rehabilitation Phase.

Under baseline conditions, NAT-03 has an average groundwater elevation that is at or near the surface (0-1m) (Fig. 2.9, Earthfx 2024a). Surface leakage is focused along the watercourses that flow through the feature. Average baseline conditions for surface leakage in NAT-03 are between 0.01-5m^3/day, with the highest volumes of leakage occurring from January to April (Fig. 2.10 and 2.26, Earthfx 2024a). During the seasonal high, the spatial extent of surface leakage is substantial and occurs throughout the NAT-03 complex (Fig. 2.24, Earthfx 2024a). As groundwater elevations drop, a rapid drop in the volume of surface leakage occurs, and no surface leakage occurs between June and September (Fig. 2.25 and 2.26, Earthfx 2024a). The hydrology of NAT-03 is dominated by surface water runoff from November to April. From May to October, groundwater discharge to the surface, via surface and stream leakage, represents a large component of the total inflow to NAT-03 (Section 9.1, pp. 181, Earthfx 2024a). Baseline streamflow was simulated at the downstream end of NAT-03 at STR14, and ranges from 0m^3/second (no flow) to approximately 0.10m^3/second (Fig. 2.18, Earthfx 2024a).

NAT-03 will experience a minor amount of groundwater mounding during Phases 1 and 2C, between 0-0.25m above baseline elevations, with southern half of the complex experiencing no, or imperceptible, mounding effects (Fig. 3.6 and 3.23, Earthfx 2024a). A minor increase in stream leakage to NAT-03 will occur, with the highest water depths (i.e., amount of groundwater seeping into NAT-03 from the watercourses) occurring between May and November for both phases (Section 9.2 and 9.3, pp. 193 and 205, Earthfx 2024a). The pattern and hydroperiod of water inflow and outflow for NAT-03 will remain nearly identical to baseline conditions. Due to mounding effects within NAT-03 during Phases 1 and 2C, an increase to streamflow along the watercourses within the complex is expected. In Phase 1, streamflow within the watercourse that connects NAT-02 to NAT-03 (flowing southwest to northeast through STR13) is expected to increase by approximately 0.0001m^3/second above baseline conditions. No changes above baseline conditions are expected for this watercourse during Phase 2C. Streamflow within the central watercourse (flowing northwest to southeast through NAT-03) is expected to increase up to approximately 0.001m^3/second above baseline conditions for both Phases 1 and 2C. During

both Phases 1 and 2C, surface leakage is expected to increase slightly at the upstream extent of the watercourses flowing into NAT-03 from the west. An increase of approximately 0.01m^3/day is expected in Phases 1 and 2C. The increased streamflow and surface leakage along the watercourses is not expected to impact the hydrology or hydroperiod of NAT-03 during Phases 1 and 2C, since the increased volumes are small and the excess water is expected to flow through and out of the complex.

During Phase 4A, minor groundwater mounding is expected to occur in NAT-03, <0.25m relative to baseline levels (Map 10; Appendix XII, Fig. 3.40). Mounding effects will reach 0m at the downstream end of the Shallow Aquatic (SA) vegetation communities. The mounding will result in an imperceptible increase to surface leakage (groundwater seepage) along the upstream extent of the central watercourse (Fig. 3.49, Earthfx 2024a). Streamflow is also expected to increase along the central watercourse that flows northwest to southeast (approximately 0.001m^3/second) (Fig. 3.49, Earthfx 2024a). The central portion of NAT-03 will experience a slight groundwater drawdown effect (<0.15m) and no impact will occur towards the southern extent of the complex. A small area south of the SA vegetation communities will experience a negligible decrease in surface leakage (approximately 0.01m^3/day). The simulated volume changes to surface and stream leakage are negligible, and given that the baseline volumes of discharge to the surface are high, are not anticipated to have negative impacts to the hydrology or hydroperiod of NAT-03.

Model simulation of the Rehabilitation Phase shows that conditions will be nearly identical to baseline conditions for NAT-03. Lateral groundwater flow into NAT-03 will increase slightly (<0.2mm per month) and surface leakage will increase slightly (0.01-0.18mm per month). Imperceptible changes to recharge and stream leakage were also modeled by Earthfx (Section 9.5, pp. 229, 2024a). The Rehabilitation Phase is expected to cause no negative impact on the hydrology or hydroperiod of NAT-03.

NAT-04 is connected to NAT-01 via two watercourses that flow north to south. Average baseline groundwater elevations in NAT-04 are at or near (0-2m) the surface, with the highest elevations (i.e., the groundwater table is at the surface) in an area surrounding the watercourses on either side (Appendix XII, Fig. 2.9). As a result of the high groundwater table, groundwater discharge to the surface dominates the hydrology of this feature, including surface and stream leakage (Section 9.1, pp. 183, Earthfx 2024a). Groundwater elevations and processes influence the hydroperiod of NAT-04. Figure 2.10 of Earthfx (2024a) shows that most of NAT-

04 has no surface leakage, with the exception of the southwest corner along the watercourse near 5th Line, and within the marsh vegetation community. Surface leakage in this location fluctuates with the elevation of the groundwater table and regularly occurs during the period of October to April, dropping to near zero with the seasonal groundwater low (May to September) (Fig. 2.26, Earthfx 2024a). Evaporation from soil water occurs throughout the wetland and during each month of the year, indicating that soils in NAT-04 are continuously wet or saturated. Evaporation from groundwater occurs from April to October, which indicates the groundwater table is near the surface during this time. The groundwater and soil evaporation represent a substantial portion of outflow from NAT-04, indicating that the groundwater table is near the surface, and soils are saturated throughout the year. Runoff to the watercourses within NAT-04 represents another large portion of water outflow from this feature (Section 9.1, pp. 182, Earthfx 2024a). Baseline streamflow was simulated upstream of NAT-04 at STR15. Streamflow at this location ranges from 0m^3/second (no flow) to approximately 0.05m^3/second (Fig. 2.18, Earthfx 2024a).

During Phases 1 and 2C, groundwater mounding from the southern infiltration gallery is expected to increase groundwater elevations between 0.15m (Phase 1) and up to 0.25m (Phase 2C) (see Appendix XII, Fig. 3.6 and 3.23). Streamflow is expected to decrease (<0.015m^3/second) in the western watercourse and increase (0.00001m^3/second) in the eastern watercourse during Phase 1. No changes to streamflow within NAT-04 are expected to occur during Phase 2C; however, a slight decrease to streamflow is expected along the watercourse that connects NAT-01 and NAT-04 at the western extent (near STR12 and STR15) of <0.0025m3/second. No changes to surface leakage during Phase 1 are expected. A slight increase to surface leakage is expected at the southwest extent of NAT-04 along the watercourse during Phase 2C. The increase is expected to be approximately 0.01m^3/day. Given that the anticipated streamflow and surface leakage changes are negligible, and that the hydrology and hydroperiod of NAT-04 is dominated by groundwater discharge and watercourse runoff, the modelled changes in Phase 1 and 2C are not anticipated to impact the hydrological function of the complex.

During Phase 4A, the 0m contour (no change from baseline conditions) between groundwater mounding and dewatering impacts is located through the middle of NAT-04. The east side of NAT-04 is expected to have negligeable groundwater mounding effects, while the west side is expected to have negligible drawdown effects. (see Map 10; Appendix XII, Fig. 3.40). Despite the groundwater drawdown effects on the west side of NAT-04, streamflow within the western

watercourse is expected to increase by approximately 0.001m^3/second. Surface leakage on the west side of the watercourse is also expected to decrease slightly by 0.01m^3/day, during Phase 4A. No changes to streamflow or surface leakage are expected on the east side of NAT-04. The dominant hydrological processes occurring within NAT-04 include groundwater discharge and runoff to watercourses internal to the complex. The anticipated decreases to streamflow and surface leakage are negligible (<0.02mm per month in surface leakage and 0.01-0.12mm for stream leakage) and are not expected to impact the hydrology or hydroperiod of NAT-04 (Section 9.4, pp. 219, Earthfx 2024a).

During the Rehabilitation Phase, a slight drawdown effect will occur in NAT-04, which is similar to most of NAT-01 (Fig. 3.56, Appendix XII). A slight reduction in lateral groundwater flow to NAT-04 will occur (0.15-0.3mm per month) (Section 9.5, pp. 231, Earthfx 2024a). This change, and the other imperceptible changes occurring to surface and stream leakage, are not expected to negatively impact the hydroperiod or hydrology of NAT-04 for the rehabilitation phase.

Effects on Vegetation Communities and Species

All three of these complexes, NAT-02, NAT-03 and NAT-04, are predicted to experience groundwater mounding during Phase 4A. NAT-04 will experience a period of slight drawdown during Phase 2C, after which mounding will occur during Phase 4A and the rehabilitation phase. Since all of the wetlands within these complexes are palustrine and contain permanent or intermittent drainage features, increased groundwater input will not result in the formation of pools which could result in prolonged inundation and subsequent impacts to the vegetation communities.

No hydrologically sensitive ELC communities were identified in NAT-02 based on roadside and desktop assessment and assignment of ELC community codes. In consideration of the site topography, shallow water table depth and the dominance of White Cedar in the northwest of NAT-02, it is likely that this area contains groundwater seepage beds within the bottomland swamp or toe-of-slope areas of forest. For existing groundwater seepages, periods of increased surface leakage that are expected during Phase 2C are likely to have two effects on these features: potential increases in water volume discharging and potential lateral expansion of the seepage feature beyond its current extent. The increase in volume will not be abrupt or flashy, and the saturated organic substrate and vegetation that comprise the existing seepages will not become inundated or prone to erosion. The potential expansion of a seepage feature would be incremental and relatively small as the upgradient side of a seepage experiences

higher groundwater and wetting of substrates. Gradually, the vegetation within the existing seepage will colonize any newly suitable wetted area through seed dispersal and rhizomatous or stoloniferous growth of species such as Eastern Rough Sedge or Water Speedwell.

NAT-03 contains two ELC communities that are considered to be sensitive to hydrological change: Cattail Organic Shallow Marsh (MAS3-1) and two areas of Willow Organic Thicket Swamp (SWT3-2). These features contain groundwater indicator species such as Boneset and Spotted Jewelweed that are rather tolerant of change and occupy a wide range of habitats as well as Water Speedwell, which is more strongly dependent on groundwater. A large beaver dam separates the southern “arm” of NAT-03 wetlands from the core area of wetlands in the north. The dam has a regulating effect on the depth of standing water in NAT-03; deeper water conditions exist to the north with shallower standing water conditions below the dam to the south. The predicted groundwater mounding will not overtop or compromise this dam and hydrologic input to the wetlands south of the dam is likely to strongly reflect the current condition as groundwater seepages in NAT-03 are located above the dam.

NAT-04 contains several wetlands that have a medium sensitivity to hydrological change including White Cedar Organic Coniferous Swamp (SWC3-1), Poplar-Conifer Mineral Mixed Swamp (SWM3-2), Poplar-Conifer Organic Mixed Swamp (SWM6-2), Speckled Alder Mineral Deciduous Thicket Swamp (SWT2-1) and Red-osier Organic Deciduous Thicket Swamp (SWT3-5). The Phase 4A elevation will not change at this location and as a result these communities will not be impacted. This feature does receive surface water input from NAT-01 to the north, which will experience a minor drawdown but will continue to direct water to NAT-04. Drainage within this feature is directed southward via two parallel low-lying portions of the wetland; a permanent watercourse on the west side of the feature that is maintained as a drainage ditch and a series of marsh and thicket wetlands along the east side of the feature that allow for gradual conveyance of water from north to south. Increase in groundwater or surface water input will largely be received by the eastern portion of the feature. The northeast portion of NAT-04 includes a large area of Red-osier Dogwood swamp thicket that was observed to contain standing water during site visits through the spring and summer months. This community is approximately 7ha in size and in addition to the Red-osier Dogwood contains an assemblage of herbaceous species tolerant of prolonged inundation and shallow water marsh conditions. This community is contiguous with additional areas of marsh and swamp with shallow pooled water and saturated substrates. An increase in water input to NAT-04 will be dispersed across a broad area of wetland that outlets as a defined watercourse at the southern

extent of the complex. Impacts such as vegetation die-off due to inundation or erosion due to increased flow are not anticipated as the water is not impeded and the dense vegetation cover across a nearly flat gradient limits the potential for erosion of substrates or the formation of flow paths.

In general, the water pH that supports some of the more conservative groundwater seepage plant species such as American Water Pennywort, American Golden-saxifrage, Water Speedwell, Marsh Marigold, Yellow Sedge, Inland Sedge and Porcupine Sedge will not change as a result of the modelled hydrogeological conditions and these species will persist in their current locations.

Black Ash, a SAR, occurs in various swamp habitats to the south of the subject lands, but has been heavily impacted by Emerald Ash Borer leaving only small diameter trees that are unlikely to reach reproductive maturity and are not protected under the ESA. The soil moisture in the substrate that supports the existing Black Ash trees will not change to the extent that the health of trees would decline or the spatial extent of suitable habitat would be reduced as wetland and adjacent lowland forest communities will remain present.

Effects on Terrestrial Wildlife and their Habitats

The three large wetland complexes located south of the subject lands (NAT-02, -03, and -04) provide habitat for a relatively wide diversity of groundwater-sensitive wildlife species and habitats within the Study Area. NAT-02 provides habitat for four high sensitivity species (all of which are herpetofauna) and four medium sensitivity species (two birds and two herpetofauna). NAT-03 provides habitat for seven high sensitivity species (one bird and six herpetofauna) and four medium sensitivity species (two birds and two herpetofauna). NAT-04 provides habitat for five high sensitivity species (all herpetofauna) and two medium sensitivity species (both anurans). The number of groundwater-sensitive features is reflective of the large influence that the groundwater regime plays in the hydrology of these wetland complexes, given the relatively shallow water table.

Anuran species presence is well-represented among these features, which are sensitive to hydrologic change. This includes the presence of the SCC Western Chorus Frog (high sensitivity), which was recorded within the NAT-04 and NAT-03 complexes and whose habitat has been identified as SWH. However, general anuran species relative abundance did not meet provincial thresholds for the identification of Amphibian Breeding Habitat SWH among

these complexes. The inventoried herpetofauna also include the high-sensitivity species Midland Painted Turtle (multiple locations in NAT-03 and -04) and the SCC Snapping Turtle (NAT-03, whose habitat is identified as SWH). SWH for the SCC Northern Ribbonsnake was also identified in NAT-03 and -04; however, Northern Ribbonsnake is not considered sensitive to hydrological change (TRCA 2017). One high-sensitivity bird species, Hooded Merganser, was observed within the NAT-03 complex.

As described above, NAT-02, -03, and -04 are not expected to undergo any change to their hydrological surface conditions or hydroperiods as a result of the quarry operation or during the rehabilitation stage. Furthermore, no changes to the wetland vegetation communities or their associated seasonal water levels are expected. Consequently, no negative impacts to the amphibian breeding habitats, turtle habitats, or habitats for hydrologically-sensitive bird species within these complexes are anticipated. Groundwater seepages, which contribute to the hydrology and hydroperiod of these habitats, are not expected to be negatively affected through reduced seepage areas or flow volumes.

Effects on Aquatic Habitats and Fish Communities

Two permanent watercourses are associated with NAT-02 and NAT-03 where they cross into NAT-03 at 3rd Line. The first occurs at the northeast corner of NAT-02 (northwest corner of NAT-03), while the second watercourse flows from the southern section of NAT-02 into NAT-03. Both watercourses provide direct fish habitat that support relatively diverse and abundant fish communities (10 species at each location) comprised primarily of coolwater fish species dominated by Creek Chub, Brook Stickleback and Central Mudminnow. At both locations, the features exhibit coolwater thermal regimes, which also correlate with the capture of coolwater fish species, but then transition towards warmwater thermal regimes within NAT-03. A single watercourse conveys flows from the central portion of NAT-03 to the southeast, eventually crossing County Road 124 at the Shelburne Golf and Country Club. This feature was also classified as warmwater and provides direct fish habitat for a variety of cool- and warmwater fish species, albeit less diverse compared to the communities at 3rd Line. Brook Trout were not captured within any of the watercourses associated with NAT-02 or NAT-03, indicating that the features don't receive the amounts of groundwater that would be required to maintain cold temperatures that would support Brook Trout populations. This is further shown by the apparent transition from coolwater within NAT-02 to warmwater within NAT-03.

As described above, NAT-02 and -03 are not expected to undergo any change to their hydrological surface conditions as a result of the quarry operation or during the rehabilitation stage, and it is expected that the pattern and hydroperiod of water inflow and outflow for NAT-03 will remain relatively consistent with baseline conditions. However, the groundwater mounding that is predicted during Phase 1, 2C, and 4A may result in slight increases in surface, stream, and lake leakage within both NAT-02 and -03, which could provide some supplemental discharge to the inflowing and outflowing watercourses when the groundwater elevation is at the surface. It could also extend the amount of time during the year that the groundwater elevations are at the surface, which would provide additional baseflow for watercourses during those months. Overall, the watercourses associated with NAT-02 and -03 will continue to provide suitable habitat for the existing fish communities in both quality and quantity, with the potential for enhancements to water temperatures (i.e., cooler temperatures) and baseflow conditions that would benefit the local fish community.

The primary watercourse within NAT-04 flows south as a permanent feature through a straightened channel along the western edge of the complex. This watercourse is characterized by a coldwater thermal regime and appears to provide ideal nursery and rearing habitat for Brook Trout. The presence of yoy and juvenile Brook Trout at this location also suggests that spawning is occurring within the watercourse. A secondary permanent watercourse appears to originate within the southeast section of NAT-04 and was classified as coldwater at its crossing of Sideroad 5. This watercourse flows into a larger watercourse southeast of Sideroad 5 and 4th Line, which is known to support Brook Trout and it is likely that the feature also supports Brook Trout throughout its lower reach.

Average baseline groundwater elevations in NAT-04 are at or near (0-2m) the surface, with the highest elevations in an area surrounding the watercourses on either side. As a result, groundwater discharge dominates the hydrology for the features, which is expressed through coldwater thermal regimes within the watercourses. NAT-04 will experience a period of slight drawdown during Phase 2C, after which mounding will occur during Phase 4A and the rehabilitation phase. Overall, the anticipated streamflow and surface leakage changes are negligible during all phases of the project. Given that the hydrology and hydroperiod of NAT-04 is dominated by groundwater discharge and watercourse runoff, the modelled changes are not anticipated to impact the hydrological function of the complex. As a result, the proposed undertaking is not expected to negatively affect the aquatic habitat or Brook Trout populations associated with NAT-04.

7.4.1.5 Predicted Effects Within NAT-19 Complex

Natural Feature Water Balance

NAT-19 is located closest to the subject lands, to the immediate southeast, and will be influenced by the central and southern infiltration facilities within the quarry site. The hydrology of this feature is dominated by precipitation and snowmelt, and lateral groundwater flow out of the wetland. Between May and August, water received and stored within the feature (e.g. soil and surface ponding) dominates (Fig. 2.31, Earthfx 2024a). Under average baseline conditions, the depth to the groundwater table varies from approximately 1m below the surface at the western extent where the complex straddles the subject lands property line, to within 5m of the surface in the eastern extent (Fig. 2.9). Water pools on the surface when soils are saturated and/or the groundwater table is near the surface. NAT-19 loses water to groundwater recharge, evaporation, and through lateral flow out of the feature to surrounding areas. When conditions are particularly saturated, minor amounts of overland flow occur, discharging excess water to downstream drainage features (Fig. 2.30 and 2.31). An intermittent drainage feature is present at the southwest corner of the complex. It extends south through an online pond then southwest through a small wetland pocket (SWD/SWT). It drains under County Road 17 towards the northern tip of NAT-02 (Map 3-14). No stream or surface leakage occurs in the baseline condition for NAT-19. No baseline streamflow modeling was completed for watercourses connected to or near NAT-19.

During Phase 1 and 2C, NAT-19 will be affected by localized groundwater mounding that occurs around the central and southern infiltration ponds. The central infiltration pond will be located immediately adjacent to the northwest corner of NAT-19. The south infiltration pond will be located adjacent to the southwest corner of the wetland complex. Groundwater elevations are expected to rise 0.5-2.5m above the baseline groundwater table elevation (Fig. 3.6 and 3.23). This mounding is expected to result in surface leakage occurring at the northwest corner of NAT-19 of approximately 1m^3/day (Fig. 3.15 and 3.32, Earthfx 2024a). Slight increases to runoff into NAT-19 are expected to occur, of approximately 0.03-0.11 mm/month in Phase 1 and <0.3mm/month in Phase 2C (Section 3.5.5.2 and 3.6.5.2; Table 3.8 and 3.16, Earthfx 2024a). No changes are expected to surface water flows to streams or out of the complex during Phase 1, which means that the increased volume of water received through surface leakage and runoff into the complex is contained within NAT-19. Surface pooling is likely to occur; however, the topography of NAT-19 is fairly flat (Fig. 2.23, Earthfx 2024a) and surface water will spread out from the source of discharge, contributing to soil water contents and lateral flows, and may drain

towards the southern intermittent stream. During Phase 2C, a decrease in the amount of surface flows to streams will occur each month, ranging from 0.02mm in June to 0.11mm in February compared to baseline conditions. Surface flows out of the complex will increase each month, with increases above baseline conditions ranging from 0.07mm in June to 0.22mm in February. Some surface pooling is likely during Phase 2C; however, the increase in runoff out of the complex indicates that excess water drains out, likely towards the southern intermittent stream. Groundwater mounding during Phases 1 and 2C will alter the hydrology of NAT-19 slightly. The surface of the wetland is expected to be wetter, particularly within localized depressional areas present in the microtopography of the wetland. However, this is not expected to change the overall hydroperiod of NAT-19 since the southern drainage feature outlet will provide an overflow relief allowing excess water to drain away and out of NAT-19. As such, no negative impacts to the hydroperiod of NAT-19 are anticipated as a result of groundwater mounding in Phases 1 and 2C (Fig. 3.17, 3.18, 3.34, and 3.35; Tables 3.8, 3.10, 3.16, and 3.18 Earthfx 2024a).

Modelling for Phase 4A, prepared by Earthfx (2024a), shows that NAT-19 will experience groundwater mounding due to the influence of the adjacent infiltration galleries (Map 10i; Appendix XII, Fig. 3.40). The predicated groundwater mounding, as shown on Map 10i, is expected to range from near 0.5m to 1.5m above baseline levels. This increase in groundwater elevation will be highest in the western portion of the wetland, decreasing towards the east. Surface leakage will occur, as a result, throughout the year, with the highest amounts expected during March and April when groundwater elevations are at their peak. Surface leakage from June to November is expected to be negligible (<1mm/month). The groundwater table will remain elevated throughout the year and may result in continuously saturated soils. Figure 3.50 and 3.51 of the Impact Assessment Report (Earthfx 2024a) shows that a loss of water through evaporation from soil water and groundwater will occur throughout the year. Soil evaporation is expected during each month, whereas groundwater evaporation will occur from April to November. This indicates that the groundwater table will be close enough to the surface to allow for evaporation and confirms that soils will be continuously saturated (Fig. 3.50 and 3.51, Earthfx 2024a). The hydrology of NAT-19 will change in the Phase 4A condition, from a losing feature to a continuously saturated feature with higher amounts of groundwater received by the wetland. The southern intermittent watercourse is expected to provide an overflow relief that will prevent the wetland from holding excess water. As such, no negative impacts to the hydroperiod of NAT-19 are anticipated for Phase 4A.

Model simulation of the Rehabilitation Phase shows a projected decrease in the groundwater table elevation at NAT-19 between near 0m and 1.0m compared to baseline levels (Appendix XII, Fig. 3.56). This will result in a slight reduction of water loss through groundwater evaporation, as the water table will be lower, and a slight increase in the feature's use of water stored in the soil (i.e., net water from storage). The pattern of water input and the source of water to the system will not change between the baseline and the rehabilitation condition (Fig. 4.64 and 4.65, Earthfx 2024a). As such no negative impact to NAT-19 during the Rehabilitation phase is expected.

Effects on Vegetation Communities and Species

The increase in water input to NAT-19 may result in continuously saturated soils which could include localized pooling in areas that would typically hold water in the spring. Under current conditions, the White Cedar-Hardwood Organic Mixed Swamp (SWM4-1) has a patchy canopy and a diverse groundcover of wetland forbs and graminoids that occupy the hummocks and depressions throughout the feature. The canopy gaps appear to be the result of a combination of naturally wet areas that function somewhat like marsh within the core area of the swamp and where tree establishment is restricted by seasonal standing water. Other factors such as tree blow-downs and tree die-off of species such as Green Ash and American Elm also contribute to the semi-open canopy structure.

While an increase in groundwater elevation of up to 1.5m has potential to increase the depth of water and the hydroperiod within the feature, the southern "arm" of NAT-19 directs surface water from the swamp, in a southward direction, toward NAT-02. This main outlet is regulated by a berm-culvert feature on an adjacent property between the feature and County Road 17. Aerial imagery also suggests that a secondary route of overland drainage occurs from the southeastern portion of NAT-19, directing water south through a pasture and to the east by way of a low-lying area that contains intermittent channels that run parallel to County Road 17 on the north side of the road. During site investigations of NAT-19, no plant species indicative of bog habitat were identified; this suggests that under existing conditions, water entering the NAT-19 swamp ultimately exits the feature, unimpeded, and this inflow-outflow process will continue during and following quarry operation.

The potential for impacts relating to vegetation will occur in the localized depressions throughout the swamp. Currently, those areas of the swamp where marsh openings exist among the treed swamp will be the locations where inundation will alter the vegetation communities slightly. The

topographic low within the NAT-19 swamp is located in the southwest corner and although nearly level, there is some north-to-south movement of water through the swamp toward the southwest area. The existing patches of low-lying marsh in the southwest may expand to the north as a result of increased water input. There may be localized decline or mortality of some tree species along the fringes of the marsh pockets including White Cedar, but in general, trees will continue to provide a semi-open canopy across the greater area of swamp. Increases in the depth and duration of water within the microtopographic depressions of the feature are likely to favour those species that are more tolerant of inundation (and which are already present in the feature) such as Broad-leaved Cattail, Soft Rush, Northern Beaked Sedge and Hemlock Water-parsnip.

Black Ash, a SAR, occurs in small numbers within the NAT-19 complex, but has been heavily impacted by Emerald Ash Borer leaving only small diameter trees that are unlikely to reach reproductive maturity and are not protected under the ESA. The soil moisture in the substrate that supports the existing Black Ash trees will not change to the extent that the health of trees would decline or the spatial extent of suitable habitat would be reduced as wetland and adjacent lowland forest communities will remain present.

Effects on Terrestrial Wildlife and their Habitats

Relatively few hydrologically-sensitive wildlife species were recorded within NAT-19, comprising one bird species (Northern Waterthrush; medium-sensitivity) and two anuran species (Spring Peeper and Gray Treefrog; both high-sensitivity). Furthermore, the feature contained relatively low amphibian species richness and abundance, with the latter exception of Spring Peeper where the species was recorded at full chorus at one survey station. Most of the western half of the complex has been mapped as Amphibian Breeding Habitat (Woodland) SWH, but this represents adjacent wooded dispersal habitat for significant amphibian breeding activity recorded in the adjacent Melancthon Pit #2 South Pond (Stonewort Submerged Shallow Aquatic; SAS1-3), and is not indicative of significant aquatic amphibian breeding habitat within the NAT-19 feature itself. The high-sensitivity species Wood Frog may also inhabit the NAT-19 wetland communities, but was not detected during NEA site investigations due to survey timing.

As described above, quarry operation, and the effects of the adjacent central and southern infiltration ponds, will result in a groundwater mounding effect that will manifest as generally wetter conditions (increased water depth and increased hydroperiod) within the NAT-19 complex. However, these effects will largely be contained to the localized depressions of the

swamp microtopography. The NAT-19 complex as a whole, and the smaller depressional pockets in particular, will still continue to function as amphibian breeding habitat, and no impairment to this function is anticipated. The localized areas of increased surface wetness may provide an overall enhancement of the amphibian breeding habitat within the complex, resulting in a greater diversity of hydrological conditions across its microtopography and potentially attracting a wider array of anuran species that prefer the standing water conditions. No fish-bearing watercourses exist within the complex that could introduce predatory fish under higher water conditions. The increased hydroperiod may also benefit amphibian breeding by lessening the potential for premature dry-out of breeding pools within the feature. No negative impact to the amphibian breeding SWH, or to the habitats of individual sensitive anuran species, are anticipated.

Northern Waterthrush is not expected to be negatively impacted by the anticipated conditions within NAT-19. The occurrence of this species is more closely associated with the area and contiguity of wooded breeding habitats (forests and swamps) (Whitaker and Eaton 2020), and information is not known to suggest that increased occurrence of scattered wet pockets within the swamp would be detrimental. Conversely, Northern Waterthrush may benefit from the anticipated operational-stage conditions.

Various Candidate SWH types were identified for the Study Area natural features as discussed in Section 6.1.4.2. However, the majority of these Candidate SWH types are likely absent within the NAT-19 complex specifically, either due to an absence of suitable habitat conditions or because NRSI surveys within the feature can be considered sufficient to rule them out.

Effects on Aquatic Habitats and Fish Communities

No watercourses are associated with NAT-19 that provide aquatic habitat, or that support a fish community. Therefore, any potential changes to the NAT-19 water balance are not expected to negatively affect the local aquatic habitat or fish community.

7.4.1.6 Predicted Effects East of Subject Lands

Natural Feature Water Balance

Natural features to the east of the subject lands that are addressed here include complexes NAT-16 and NAT-18. NAT-18 is situated on the western edge of Horning's Mills, while NAT-16 is to the immediate east of the village, and downstream of NAT-14 and NAT-18; both NAT-18 and NAT-16 are located in proximity to or along the Niagara Escarpment. In this location, the

Gasport aquifer has an upward gradient and provides the source of groundwater to the surface layer (Fig. 2.17, Earthfx 2024a). As such, changes to groundwater contributions in Phases 1, 2C, and 4A, and the rehabilitation phase and associated impacts to surface conditions consider the Gasport aquifer model results.

The primary feature within the NAT-18 complex is a dammed pond (Shallow Aquatic (SA) (Map 10h). Smaller wetland communities are situated on either side of Main Street to the south/southeast, consisting of shallow and open aquatic wetland systems, and a marsh that connects the areas of standing water. Baseline groundwater elevations surrounding the dammed pond and the watercourses that flow into the pond are at the surface. The depth to the groundwater table along the watercourse that flows through the smaller wetland communities on either side of Main Street are approximately 2.5-4.0m below the ground surface (Appendix XII, Fig. 2.9). Modelling undertaken by Earthfx for NAT-18 focused on the large SA pond, since the effects from groundwater drawdown were most prevalent for this portion of the complex. This modelling (Earthfx 2024a) shows that the Gasport groundwater layer is at the surface within NAT-18 (Fig. 2.9 and 2.17, Earthfx 2024a). While groundwater table elevations vary throughout the course of a year, discharge from the groundwater table to the NAT-18 pond is fairly consistent and only fluctuates with the seasonal groundwater elevation highs and lows (Fig. 2.21 and 2.26, Earthfx 2024a). Baseline streamflow conditions were modeled by Earthfx for the watercourses that flow into and out of the NAT-18 wetlands and the dammed pond. Figure 2.19 of the Impact Assessment Report (Earthfx 2024a) illustrates the average baseline streamflow conditions. The watercourse that flows into the small wetlands on either side of Main Street has an average baseline streamflow of approximately 0.002-0.004m^3/second. Average flow, under baseline conditions, for the watercourses on the south and west side of the NAT-18 dammed pond are 0.005-0.02m^3/second, while the watercourses on the north side of the pond have an average baseline streamflow of 0.0001-0.0004m^3/second (Fig. 2.20, Earthfx 2024a).

The large dammed SA pond within NAT-18 receives all of its water from precipitation, snowmelt and lateral groundwater flow. The feature discharges water throughout the year to the downstream connected watercourse that flows to the east through Horning's Mills, with the largest amounts occurring between November and April. Lateral groundwater inflow dominates the below-surface hydrological processes (Fig. 2.28 and 2.29, Earthfx 2024a). Consistent lake leakage, stream leakage and surface leakage occur within this pond, along the connected watercourses, and along the pond edges (Appendix XII, Fig. 2.10). Surface leakage in the NAT-18 pond is consistent throughout the year and has some of the highest daily volumes of all the

Study Area wetlands (ranging from a low of approximately 700m^3/day from June to August, to a high of approximately 1,050m^3/day from March to April (Fig. 2.26, Earthfx 2024a)). Overall, the NAT-18 dammed pond is a gaining system that gathers substantial water from the Gasport groundwater system and discharges it to the downstream watercourse and into the northern portion of NAT-16. No surface leakage is noted for the smaller wetland communities on either side of Main Street, during baseline conditions.

During Phase 1, NAT-18 will experience groundwater drawdown of 0.1-0.25m below baseline conditions (Fig. 3.8). Surface leakage around the dammed pond is expected to decrease on average 0.01-2m^3/day, with the greatest decrease occurring on the south and southwest sides of the pond. Stream leakage and lake leakage are also expected to decrease (Fig. 3.16 and Table 3.6, Earthfx 2024a). Earthfx provides a detailed description of drawdown effects to NAT-18 in the Impact Assessment Report (2024a). The report states that a reduction in lateral groundwater flow into NAT-18 is expected during Phase 1, ranging from 3.21mm (February) to 42mm (in July and August), which is approximately 3.7% per month less than baseline conditions. This results in a similar scale decrease in the magnitude of surface leakage and stream leakage. Stream inflow is also expected to decrease by 11.3-19.8L/s. The impact of the decrease in water input to NAT-18 is expected to cause a decrease in water levels in the pond of 0.05-0.08m relative to the baseline water level (Section 3.5.5.1, Earthfx 2024a). The decrease in water level in the pond will be minor and will not impact the hydrology or hydroperiod of NAT-18. The smaller wetland communities on either side of Main Street are expected to experience a decrease in the elevation of the groundwater table of approximately 0.25m (Fig. 3.8, Earthfx 2024a). No changes are expected to surface leakage; however, a decrease to streamflow for the watercourse that flows into these wetlands of <0.01m^3/second is expected (Fig. 3.10, 3.15, and 3.16, Earthfx 2024a). No negative impact to the small wetland communities is expected as a result of groundwater dewatering in Phase 1.

Phase 2C groundwater drawdowns extend further east towards NAT-18, and result in a 0.5-1m decrease in the elevation of the Gasport groundwater table (Fig. 4.21, Earthfx 2024a). As a result of the groundwater drawdown, surface leakage along the watercourse flowing into the west side of the NAT-18 dammed pond will decrease (0.01-2m^3/day), as well as surface leakage on the west and south edges of the pond (1-5m^3/day) (Fig. 3.33, Earthfx 2024a). The decrease in surface leakage along the watercourse and pond edges will result in decreases to streamflow for the watercourses flowing into the NAT-18 dammed pond, between 0.0108m^3/second to 0.0184m^3/second (Fig. 3.27, Earthfx 2024a). Lateral groundwater flow into the pond is also

expected to decrease by 76.4-98.8mm/month (Table 3.14, Earthfx 2024a). A similar scale decrease in the magnitude of surface leakage and stream leakage also occurs. Due to the decreases to inflow to the NAT-18 dammed pond, the water level is expected to decrease slightly by 0.07-0.09m relative to baseline conditions (Section 3.6.5.1, Earthfx 2024a). The anticipated changes are not expected to have a negative impact on the hydrology or hydroperiod of the NAT-18 dammed pond. The smaller wetland communities on either side of Main Street are expected to experience a decrease in the elevation of the groundwater table by 0.50m (Fig. 3.25, Earthfx 2024a). No changes are expected to surface leakage; however, a decrease to streamflow for the watercourse that flows into these wetlands of <0.005m^3/second is expected (Fig. 3.27, 3.32, and 3.33, Earthfx 2024a). No negative impact to the small wetland communities is expected as a result of groundwater dewatering in Phase 2C.

During Phase 4A, the groundwater table will be lowered (i.e., drawdown) to the east of the quarry (Map 10; Appendix XII, Fig. 3.42). The Gasport groundwater system, which represents the shallowest groundwater layer near NAT-18, will be lowered 0.25-0.5m below the baseline condition (Fig. 3.42, Earthfx 2024a). This will result in a decrease in lateral groundwater flow (65-81mm per month) and decreased leakage into the pond (Fig. 3.50, Earthfx 2024a). The Impact Assessment (Earthfx 2024a) notes that the expected groundwater flow decrease is 10% relative to baseline conditions. No changes to the annual pattern of groundwater contributions to NAT-18, nor to the relative distribution of surface water inputs, will occur during Phase 4A. Streamflow into the NAT-18 dammed pond is expected to decrease by 0.0075m^3/second to 0.0175m^3/second. As a result of the groundwater drawdown effects, the water level within the NAT-18 dammed pond is expected to be 0.04-0.08m lower than the baseline condition (Section 4.7.5.1, Earthfx 2024a). The lower water level in the pond and the decreases to surface leakage, lateral groundwater flow, and stream inflow are minor and are not anticipated to have a negative impact on the NAT-18 hydrology or hydroperiod. The smaller wetland communities on either side of Main Street are expected to experience a decrease in the elevation of the groundwater table by 0.5m (Fig. 3.42, Earthfx 2024a). No changes are expected to surface leakage; however, a decrease to streamflow for the watercourse that flows into these wetlands is expected and will be <0.01m^3/second (Fig. 3.44, 3.46, 3.47, Earthfx 2024a). No negative impact to the small wetland communities is expected as a result of groundwater drawdown conditions in Phase 4A.

Model simulation for the Rehabilitation Phase shows a slight decrease in the elevation of the Gasport groundwater table of a few centimeters below the baseline condition. This slight

drawdown results in a decrease to surface leakage occurring on the west and south side of the dammed pond of approximately 0.01- 1.0m^3/day (Fig.3.66, Earthfx 2024a). Streamflow into the dammed pond will be slightly lower than baseline conditions, and will have a slightly lower peak flow and baseflow condition (Fig. 3.60, Earthfx 2024a). The decrease will equate to 2.6-6.0 L/second below baseline flows. The anticipated water level within the NAT-18 dammed pond will be 0.02m (2cm) lower than baseline conditions (Section 4.8.1.1, Earthfx 2024a). The NAT-18 dammed pond will recover well during the Rehabilitation Phase and no negative impacts to the hydrology or hydroperiod of this feature are anticipated.

No changes to surface leakage occur for the smaller wetland communities south of the pond and on either side of Main Street during the Rehabilitation Phase (Appendix XII, Fig. 3.65, Fig. 3.66). A decrease to streamflow for the watercourse that flows into these wetlands is expected and will be <0.01m^3/second relative to baseline conditions (Fig. 3.60, Earthfx 2024a). No negative impact to the small wetland communities is expected as a result of groundwater dewatering during the Rehabilitation Phase, and the hydrological condition of these features is expected to recover well during this phase.

NAT-16 predominantly consists of open water shallow aquatic wetlands, located south of River Road. North of the road a swamp (SWD4) is present where two watercourses intersect that connect NAT-16 to NAT-18 and NAT-14. The watercourses converge and flow under River Road and through the larger shallow aquatic (SA) pond. Under baseline conditions, the groundwater table is at the surface on the north side of River Road through the swamp and along the watercourses that flow into this pond. Localized areas of surface leakage occur at the northern and western edges of the swamp, with additional leakage occurring along the edges and floodplain of the southwestern watercourse (flowing from NAT-18 towards NAT-16). High daily volumes of groundwater discharge were modeled by Earthfx in these locations, between 5m^3/day to near 20m^3/day (Fig. 2.21, Earthfx 2024a). The groundwater contributions to NAT-16 are not anticipated to change as a result of the various quarry phases. As such, detailed water balance modelling was not prepared for this complex. No negative impacts to the groundwater system are anticipated. The surface water hydrology of NAT-16 is controlled by the weir at the downstream end of the NAT-18 dammed pond. Under average baseline conditions, streamflow into NAT-16 is between 0.03m^3/second and 0.1m^3/second. A discussion of potential impacts to the surface flows to NAT-16 is provided below.

NAT-16 will not be directly affected by groundwater drawdown occurring during Phase 1 or Phase 2C (Fig. 3.8 and 3.25, Earthfx 2024a). Figures 3.10 and 3.27 (Phase 1 and 2C, respectively) of the Impact Assessment Report show a projected decrease in streamflow in the watercourse between NAT-18 and the west side of NAT-16 of 0.01-0.03m^3/second for Phase 1, and of 0.015m^3/second for Phase 2C. An increase in streamflow is expected in both Phase 1 and Phase 2C within the watercourse to the north (flowing south out of NAT-14) of between 0.0002 and 0.001m^3/second (Phase 2C and Phase 1, respectively) (Fig. 3.9 and 3.26, Earthfx 2024a). The increased flow from the north, and the decreased flow from the west are expected to offset each other such that any reduction in volume flowing into the SA pond feature south of River Road will be imperceptible. The indirect effects of groundwater drawdown during Phase 1 and 2C in the Gasport aquifer, and mounding effects in the L1 layer (affecting streamflow) are minor and are not anticipated to have a negative impact on the NAT-16 complex.

During Phase 4A (Map 10; Appendix XII, Fig. 3.42), drawdown of the Gasport aquifer will not affect NAT-16. The groundwater table is expected to be consistent with baseline conditions for NAT-16 and the northern watercourse that drains into the complex. An increase to streamflow into the northern portion of NAT-16 is expected due to the slight groundwater mounding effects along the watercourse upstream of NAT-14 (approximately 0.004m^3/second) (Appendix XII, Fig. 3.43). An increase in surface leakage is expected during Phase 4A within the swamp community north of River Road and along the watercourse that connects NAT-14 and NAT-16 ranging from 0.01-1.0m^3/day (Appendix XII, Fig. 3.49). Concurrently, a slight decrease to surface leakage (0.01m^3/day) is expected for the western edge of that same SWM4 swamp community, closer to Main Street (Appendix XII, Fig. 3.50). A decrease in streamflow downstream of the NAT-18 dammed pond (approximately 0.03m^3/second, Appendix XII, Fig.3.44) is expected. Streamflow monitoring location STR8, downstream of the NAT-18 pond (Appendix XII, Fig. 3.43 and Fig. 3.44), shows a 15% reduction during all seasons. This watercourse flows into the southwest corner of the NAT-16 swamp on the north side of River Road. The projected streamflow at STR7 (at the road between the SWM4 swamp and the SA pond communities) shows a slight decrease in flow of about 5% (Section 3.6.10, Earthfx 2024a). The combination of increases and decreases to surface leakage and stream flows through and within NAT-16 are expected to result in similar conditions to the baseline condition. An approximately 0.025m^3/second reduction in streamflow is expected downstream of NAT-16 (Appendix XII, Fig. 3.44). The increase to surface and groundwater inflows to the northern portion of NAT-16 appears to balance out the decreases occurring on the west side. The water

flowing into the SA pond feature is likely to replenish the water levels and maintain the hydrology and hydroperiod of this feature. This may result in less water flowing out of the NAT-16 pond. No negative impacts to the hydrology of hydroperiod of NAT-16 is anticipated during Phase 4A.

During the Rehabilitation Phase, NAT-16 will not experience any direct groundwater drawdown or mounding effects. A slight decrease in streamflow is expected into NAT-16 from the watercourse to the west that connects the complex to the NAT-18 dammed pond (4-6% during the spring, and 5-17% during the summer) (Section 4.8.3, Fig. 3.60, Earthfx 2024a). A negligible decrease to streamflow is expected in the northern watercourse that connects NAT-14 to NAT-16 (Appendix XII, Fig. 3.60). Streamflows at the STR8 stream assessment point at River Road show a 7% reduction during the spring and a 10-14% reduction during the summer (Section 4.8.3, Fig. 3.60, Earthfx 2024a). As a result, an imperceptible decrease in streamflows discharging from NAT-16 is expected (Appendix XII, Fig. 4.55). A slight increase to surface leakage is expected during the Rehabilitation Phase within the SWM4 swamp community north of River Road (approximately 0.01m^3/day). The hydrology and hydroperiod of the NAT-16 features are expected to recover well during the Rehabilitation Phase and no negative impacts are anticipated.

<u>Effects on Vegetation Communities and Species</u>

In the vicinity of NAT-18, a predicted groundwater elevation decrease of 0.25-0.5m during Phase 4A is likely to result in a drying effect for groundwater seepage features that may be present on all sides of the large SA pond feature. The complex includes four separate incised valleys on the north, west and south side of the large pond, and the control structure outlet at the northeastern extent. Topographic data indicates that the slopes are approximately 20m high and moderately steep and it is likely that each of the four valley features contains an elongated seepage bed where the valley intersects the groundwater table. A decrease in groundwater elevation is likely to result in drying of the upper portion of a given seepage bed and potentially drier conditions within the valley bottom or wetland below the seepage bed. The reduction in groundwater wetting of the substrates may allow for increased evapotranspiration, and the suitability of the seepage for supporting groundwater-associated vegetation will be diminished. Given the steep slopes, it is likely that the seepage beds are triangular with a constricted point where groundwater reaches the surface extending to a broader fan-shaped area of seepage at lower surface elevation which then transitions to swamp communities along the perimeter of the

open pond feature. The decrease in groundwater elevation would likely compromise the narrow upper portion of a given seepage bed with reduced hydrologic input afforded to the lower portion of the seepage.

The probable impact of this decrease in groundwater would be mortality of the conservative vegetation in the upper reach of a seepage bed and possible reduction or reduced vigour of seepage vegetation at the lower extent of each feature. Capillary action within the porous organic soil of each seepage bed may maintain soil moisture through wicking of groundwater from saturated areas to areas where the seepage is enduring a drying trend. This “re-wetting” of soil is likely to be insufficient to maintain seepage vegetation, but would likely sustain the wetland vegetation along the fringe area of the open water. A decrease in water level elevation in the pond of 0.04-0.08m relative to baseline during Phase 4A would result in a shifting of vegetation in that some plant species along the shore may die-off, but recruitment of plants would sustain the overall composition at a slightly lower elevation around the periphery of the pond. A water level change of 4-8cm would likely have no impact to the diversity and distribution of the riparian wetland vegetation that surrounds the pond, while shallow emergent vegetation (if present), may shift location slightly in response to changes in water depth. Impacts to the existing tree species composition and structure are unlikely as the root zones of the existing trees will be resilient to the relatively small change in groundwater depth.

Review of aerial imagery, topography and water table elevation data suggests that a groundwater seepage is present approximately 500m to the west of NAT-18; however, examination of the channel bed and culvert crossing to the west of County Road 124 did not document sustained watercourse flow and it appears that this seepage infiltrates before reaching County Road 124.

The small shallow aquatic and marsh features associated with the NAT-18 complex are anticipated to experience a drawdown in surface water elevation. The drawdown may result in slightly drier conditions for the peripheral vegetation around the features; however, the minimal predicted change in elevation will maintain the riparian wetland vegetation while in-water aquatic vegetation will largely remain unchanged. The alteration in water depth is not substantial enough that aquatic vegetation would decrease or shift location within the shallow marshes. The Organic Meadow Marsh (MAM3) community may be subject to a higher rate of evaporation and a reduced period of inundation in the spring months, but will still be comprised

of hydric soil supporting wetland vegetation. No negative impacts to the form and ecological functions of these natural features are therefore anticipated.

NAT-16 is not anticipated to see notable changes in groundwater elevation and volume of seepage contributing to the watercourse within the NAT-16 boundary. Potential impacts to NAT-16 largely reflect a decreased baseflow condition from NAT-18 to the west. It is not anticipated that the vegetation communities or plant species would change substantially. A decrease in baseflow could result in slightly lower water levels that expose substrate along the watercourse-bank transition area or within the centre of portion of the watercourse. Due to the abundant cover of White Cedar, groundcover species are naturally quite limited and newly exposed substrate would likely see some recruitment of riparian vegetation tolerant of damp soils. These potential areas of herbaceous vegetation along the banks or on spits within the watercourse would be subject to scouring and reconfiguration that results annually during spring freshet period, and the dynamic nature of the in-stream vegetation or bank vegetation is a natural and expected process. No negative impacts to the form and ecological functions of these natural features are therefore anticipated.

Effects on Terrestrial Wildlife and their Habitats

The NAT-18 complex provides habitat for four species with high-sensitivity to hydrological change (one bird and three anuran species) and three species with medium sensitivity (one bird and two anurans). Amphibian breeding activity was relatively limited among features within this complex, and no turtles were observed within the open water areas that could be viewed. No SWH was identified for NAT-18 complex features.

All of the significant habitat, and habitat associated with hydrologically sensitive species, within the NAT-16 complex was associated with the large Shallow Aquatic (SA) pond feature. The pond was identified as SWH for the SCC Snapping Turtle, which is a high-sensitivity species. It also provides habitat for four other high-sensitivity species (one bird, two anurans and one mammal) and to five medium-sensitivity species (three birds and two anurans). Despite a diversity of anuran species present within the pond, recorded calling activity of breeding males was relatively limited within the NAT-16 pond and adjacent wetland communities.

NRSI biologists did not have access to the large NAT-18 SA pond to characterize the terrestrial wildlife species and habitats within that feature. However, despite the predicted reduction in watercourse surface flow inputs to the pond and associated groundwater drawdown during

operational Phase 4A, the wildlife habitat functions of the pond are not anticipated to change. For example, the feature will continue to provide suitable open water habitat for use by aquatic birds (e.g., Hooded Merganser). Marsh fringe vegetation that may occur along the pond edges will likely be resilient to minor water level reduction that may occur during this phase, and will continue to provide habitat for breeding amphibians and wetland-associated birds. No negative impacts to the terrestrial wildlife habitats provided by the large SA pond are anticipated.

Drying effects may be experienced in the smaller SA, Open Aquatic (OA) pond, Organic Meadow Marsh (MAM3) and Stonewort Submerged Shallow Aquatic (SAS1-3) wetland features that comprise part of the NAT-18 complex, due to the combined effects of reduced stream inflow and shallow groundwater drawdown during Phase 4A. The species with high sensitivity to hydrological change that were recorded at this complex (i.e., Hooded Merganser, Gray Treefrog, Spring Peeper, and Wood Frog) (TRCA 2017) may be the most susceptible to negative habitat effects caused by the anticipated change in conditions. However, as described above, these smaller features will experience only minor reductions in water level, and minor shifts in fringing vegetation based on these anticipated hydrological effects. These features will continue to maintain a suitable hydroperiod for amphibian breeding, and no changes to their current habitat functions (e.g., as amphibian breeding habitat or as habitat for the observed bird species) are anticipated.

As described above, no negative effects on the hydrological regime of the NAT-16 natural features are anticipated during or following quarry operation. Provided the existing vegetation communities remain relatively unchanged from baseline conditions, as is anticipated, and since the large open water pond habitat (SA) will continue to exist, no negative effects to terrestrial wildlife or their habitats are anticipated within NAT-16.

Effects on Aquatic Habitats and Fish Communities

The aquatic habitats present throughout NAT-18 include several online ponds and a single permanent watercourse, which connects the ponds and crosses Main Street at several locations as it meanders in a northerly direction. The ponds provide habitat for the local fish community as well as portions of the connecting watercourse where water depths and aquatic vegetation establishment allow. Where it crosses Main Street between Oldfield Court and Fieldway Court the watercourse exhibits a coldwater thermal regime. Where the watercourse crosses Main Street, at its intersection with Mill Street, the thermal regime was characterized as coolwater, suggesting that the large online SA pond associated with NAT-18 is acting to increase the water

temperature to some degree within the feature under baseline conditions. The watercourse associated with NAT-18 flows east into a larger watercourse within NAT-16, north of River Road. This larger watercourse flows south from NAT-14 and its headwaters to the north of Sideroad 15. The thermal regime of NAT-14 was cool/coldwater and at that location the watercourse supports Brook Trout (see Section 7.4.1.3). Brook Trout were also confirmed within the watercourse associated with NAT-16 at its crossing of River Road, where both adults and juveniles were captured, in addition to several other coolwater fish species including Blacknose Dace, Creek Chub, and Northern Redbelly Dace. At this location the watercourse exhibited a coolwater thermal regime and provides more available habitat (i.e. wider wetted width and deeper pools) compared to the NAT-14 watercourse.

Under Phase 1, 2C, and 4A conditions, it is predicted that the surface leakage and streamflow to the ponds and associated watercourses occurring within NAT-18 will experience varying amounts of decrease. The watercourses and smaller ponds along Main Street between Oldfield Court and Fieldway Court, which flow to the south side of the large pond, are not expected to experience much of a decrease in surface leakage/discharge but may experience a slight reduction in streamflow. However, the online ponds should act to alleviate potential reductions in flow and, given the small expected decrease, it is not anticipated that there would be any notable change in the quality or quantity of available aquatic habitat, or in the thermal regime when compared to baseline conditions. In comparison, the watercourse features in the vicinity of County Road 124, and that connect to the west side of the large NAT-18 pond, are predicted to experience higher decreases in surface leakage, which would cause decreases in streamflow to the pond. These decreases will be higher during Phase 4A compared to Phases 1 and 2C. However, the aquatic habitat associated with these features is limited. In particular, the watercourse at its crossing of County Road 124 does not provide suitable fish habitat at or upstream of that location since the road and its associated culvert acts as a barrier. Fish may utilize the relatively short lower reach of the watercourse where it connects to the pond, but this couldn't be assessed during field investigations due to site access limitations. Further, if a direct connection to the large SA pond exists, fish are expected to utilize areas within the pond throughout the year, as required. Potential reductions in surface leakage and streamflow within these reaches may slightly reduce the amount of water flowing to the large pond, including the amount of groundwater, but the aquatic habitat or local fish community is not expected to be affected. The pond level is dictated by a weir at the northeast edge, which should act to maintain water levels within the pond to a certain extent and only a minor drop in the pond water

level is expected across the various phases based on model results; between 0.04 and 0.09m relative to the baseline water level.

A single channel collects water from NAT-18 at its northeast outlet from the large SA pond and directs it across Main Street towards NAT-16 where it flows into the watercourse flowing south from NAT-14, a distance of approximately 450m. Modelling predicts that this reach, flowing from the NAT-18 pond, will experience relatively small decreases in surface discharge and streamflow across the various phases. However, it is also predicted that there would be an increase in surface discharge to the SWM4 swamp north of River Road, which would help to offset some of the potential effects from the reduction in surface discharge to the watercourse reach upstream. A greater decrease in streamflow within this reach is predicted to occur during Phase 4A due to the reductions in surface leakage and streamflow that are anticipated in the vicinity of the large NAT-18 pond and the inflowing watercourses, which feed into and influence this reach. Under baseline conditions, this reach exhibits a coolwater thermal regime and provides direct fish habitat, evidenced by observations of fish within the channel at the crossing of Main Street. Further, it is expected that the fish community that occupies this affected reach would have access to the watercourse within the NAT-16 SWM4 swamp north of River Road, which flows southwards from NAT-14, which the affected reach confluences with. Given that Brook Trout were confirmed within the NAT-16 watercourse at River Road, it is anticipated that the NAT-18 would also contain Brook Trout. However, due to site access limitations, this could not be confirmed. The decrease in the surface leakage and streamflow, as modeled for the watercourse reach outflowing from the NAT-18 pond, may result in a slight reduction in the amount of available fish habitat, and less coldwater input to the watercourse. However, it is expected that this reach will still provide adequate water depths and suitable water temperatures to continue to support the existing cool and coldwater species within it. Under summer baseflow conditions, the channel just east of the River Road crossing was measured with a wetted width of approximately 2.5m with a water depth of approximately 0.3m, which is predicted to be near the minimum water depth for that location under baseflow conditions. Seasonal fluctuations will occur at this location and it is expected that water depths will be higher for much of the year and in particular throughout the spring and during precipitation events. For watercourses that exhibit a stream width of ≤5.0m, a water depth of 0.3m falls within the optimal range for Brook Trout (Raleigh 1982) when considering the average thalweg depth during the late growing season low water period. While suitability generally decreases for water depths below 0.25m, water depths above approximately 0.1m can still be considered

suitable, albeit less than optimal. The proposed quarry operation is expected to result in a temporary reduction in streamflow up to approximately 15% during all seasons that may see water depths drop below the optimal depth for Brook Trout during the low flow period. However, given that suitable water depths occur down to approximately 0.1m, it is expected that this reach of watercourse will still provide adequate water depths for Brook Trout. Additionally, given its connection to the larger watercourse flowing southwards from NAT-14 through NAT-16, which provides a relatively deeper channel and pools over 0.6m deep, the opportunity exists for fish to utilize the aquatic habitats within both watercourses, as needed, throughout the year.

The decrease in surface leakage and streamflow that is predicted for the watercourse connecting NAT-18 and NAT-16 is not expected to negatively affect the capacity of the feature to support the local fish community, nor within the downstream watercourse to which it flows. As noted in section 7.4.1.3, it is predicted that NAT-14 will experience an overall increase in surface leakage within the complex under Phase 1, 2C, and 4A conditions, which will provide additional groundwater to the associated watercourse and will result in an increase in streamflow and a potential cooling effect. Since this watercourse flows from NAT-14 and then through NAT-16, this increase in streamflow and the potential cooling effect associated with it will also be realized within NAT-16 at River Road and downstream. Overall, it is expected that the NAT-16 watercourses will continue to provide suitable habitat for the existing fish community, including Brook Trout.

7.4.1.7 Predicted Effects Within the Subject Lands

Natural Feature Water Balance

The Impact Assessment Report (Earthfx 2024a) provides a west to east cross-section of the various surficial materials and bedrock conditions, along with baseline groundwater levels. The cross-section is located north of the former Bonnefield property, approximately through the centre of the Melancthon Pit #1 property (Fig. 2.6, Earthfx 2024a). A layer of Tavistock Till is present beneath the surface sand and gravel layer (Earthfx 2024b). On the east side of the former Bonnefield property, within the Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1) the Tavistock till limits groundwater interaction with the surface. The baseline depth to the groundwater table near the former Bonnefield property wetlands is approximately 2.5-4.5m below the ground surface (Appendix XII, Fig. 2.9). In the area immediately surrounding the MAM2 and MAS2 wetlands, the depth to the groundwater table is greater than 5m (Fig. 2.9; Earthfx 2024a). These conditions result in perched wetlands on the former Bonnefield property.

As such, the effects of groundwater dewatering and mounding during Phases 1, 2C, 4A and the rehabilitation phase will not impact the MAM2 and MAS2 wetlands. No negative impacts are expected to these wetlands during pit operations.

A portion of the NAT-19 complex extends onto the Melancthon Pit #2 property, including SWD4 and SWM4-1 vegetation communities (Map 3-14). A detailed description of the effects of groundwater mounding resulting from the central and southern infiltration ponds for the NAT-19 complex is provided in Section 7.4.1.5. The following is a brief summary of groundwater mounding effects for the western portion of NAT-19 that extends onto the subject lands. The reader is referred to Section 7.4.1.5 for more details, including a discussion of baseline conditions.

The west side of the NAT-19 complex will experience changes to the groundwater table, relative to baseline condition, during all phases as listed below:

- Phase 1 – 1.5-2.0m of groundwater mounding
- Phase 2C – 1.5-2.0m of groundwater mounding
- Phase 4A – 1.0-1.5m of groundwater mounding
- Rehabilitation Phase – 0.01-0.25m of groundwater drawdown

Since the groundwater table is approximately 1.5m below the surface under average baseline conditions (Appendix XII, Fig. 2.9), the mounding effects in Phases 1, 2C, and 4A are expected to result in groundwater discharge to the wetland surface. This will change the hydrology of the wetland from a perched system to a discharge system. The extra water within the soil layer and at the surface of the wetland is not anticipated to cause negative impacts to the western portion of NAT-19 within the subject lands. This is due to the existing topography and the presence of a surface water outlet at the southwest corner of NAT-19, outside of the subject lands. Excess water within the soil and at the wetland surface is expected to move laterally to the east and spread out, feeding the rest of the wetland. Should conditions become overly saturated, the southwest surface water outlet will prevent the wetland from becoming inundated with water for long periods. The result is that the hydroperiod of the wetland is not expected to be negatively impacted.

During the Rehabilitation Phase, the portion of NAT-19 within the subject lands is at the edge of groundwater drawdown effects. A slightly lower groundwater table is expected, relative to

average baseline conditions. The lower groundwater table will return the hydrology of the complex to a perched system. During the Rehabilitation Phase, the western portion of NAT-19 within the subject lands is expected to recover well, and no negative impacts to the hydrology or hydroperiod of the wetlands are expected.

Effects on Vegetation Communities and Species

The small pockets of Mineral Meadow Marsh (MAM2) and Mineral Shallow Marsh (MAS2) within the Bonnefield property are unlikely to be impacted by alteration to groundwater. Neither feature contained conservative groundwater seepage indicator species and both are situated within bowl-like depressions within the forest that create a localized surface water catchment. Although a groundwater elevation drawdown of 1.5-2.5m at each feature is expected during Phase 4A of operations (Map 10m), it appears that the form and function of these wetlands is maintained independent of groundwater influence as features that are perched above the groundwater table.

The expected decrease in groundwater table elevation on the former Bonnefield property (Map 10m) is unlikely to have a negative impact on the Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1), which is situated on well-drained soil with tree root zones well above the groundwater elevation under baseline conditions. On the Prince property, although groundwater mounding will occur beneath the FOD5-1 forest on that property due to the adjacent north infiltration trenches, the substrates within the tree root zone comprise well-drained sands, gravel and cobble, and surficial and near-surface soil moisture is not anticipated to change to a degree that would affect the health of the current forest stand or the groundcover.

The treed communities at the western extent of NAT-19 which include an area of Fresh-Moist White Cedar Coniferous Forest (FOC4-1) as well as edge portions of mineral swamp and organic swamp communities, will experience groundwater mounding. All of these communities have moderate to gentle slopes to the east and any surface water is directed east and ultimately south through the larger NAT-19 feature. The vegetation within these features is tolerant of a range of soil moisture conditions and much of this area currently exhibits mesic soil or soil that is seasonally wet during spring melt and large precipitation events, and increased soil moisture would be within the tolerance of the vegetation in this vicinity.

Effects on Terrestrial Wildlife and their Habitats

Within the subject lands, the majority of terrestrial wildlife species with sensitivity to hydrological change (TRCA 2017) were associated with the small isolated wetlands of the former Bonnefield property and the Melancthon Pit #2 site. However, since the small wetlands of the Melancthon Pit #2 site (i.e., the Stonewort Submerged Shallow Aquatic (SAS1-3) and Reed Canary Grass Mineral Meadow Marsh (MAM2-2)) will require removal, as described above, they are not considered further here. No hydrologically sensitive species were documented on the former Prince property.

The Mineral Meadow Marsh (MAM2) and Shallow Marsh (MAS2) wetlands of the former Bonnefield property provide habitat for five species with high sensitivity to hydrological change (all amphibians), while they provide habitat for two medium-sensitivity species (one bird and one anuran). These wetlands also represent Amphibian Breeding Habitat (Woodland) SWH due to species composition and relative abundance of breeding anurans that use these features, as well as due to the presence of breeding Spotted Salamanders. However, despite the relative hydrological sensitivity of these wetland habitats, their form and ecological functions are not expected to be negatively impacted by the predicted Phase 4A or Rehabilitation Phase groundwater drawdown effects due to these wetlands being disconnected from the influences of shallow groundwater fluctuation. Furthermore, terrestrial wildlife habitats associated with the surrounding FOD5-1 woodland will not be impacted since the vegetation community itself, and its constituent vegetation species, are not expected to be negatively influenced by the reduction in groundwater level (see above). The groundwater mounding that it expected under the FOD5-1 woodland on the former Prince property will also have no effect on the terrestrial wildlife habitats that it provides. As described above, no change in hydrological condition is expected within the fringing western edge of the NAT-19 complex that extends into the Melancthon Pit #2 site. Some increase in seasonal pooling of water may occur within the SWD4 deciduous swamp feature, which may benefit amphibian species breeding. Therefore, no indirect negative effects on terrestrial wildlife or their habitats that are associated with operational or rehabilitation-stage changes to the hydrogeological regime are anticipated within the subject lands.

Effects on Aquatic Habitats and Fish Communities

No watercourses are associated with the subject lands that provide aquatic habitat, or that support a fish community. Therefore, any potential changes to the water balance within the subject lands are not expected to negatively affect the local aquatic habitat or fish community.

7.4.2 Quarry Operational Disturbance to Adjacent Natural Features

In general, quarry operational activities have the potential to inadvertently destroy, damage and degrade the edges of existing vegetation communities outside of the defined extraction limits unless the boundaries of those limits are clearly marked. However, the existing pit extraction limits are already approved under the existing ARA licenses, and the proposed quarry extraction limit will be further removed from the adjacent natural features than the existing extraction limit. Therefore, degradation or disturbance of the adjacent natural features are not anticipated.

Three areas of encroachment into the existing pit extraction limits will be required to accommodate the operation: creation of the central infiltration pond, creation of the new wetland, and creation of the berm that will extend along the east side of the south infiltration pond. The configuration and location of the central infiltration facility has been designed such that it is maintained >10m from the outer dripline edges of the FOC4-1 woodland community that forms the north edge of the on-site portion of the NAT-19 complex. Construction of the northern terminus of the berm for the south infiltration pond will also be maintained outside of the NAT-19 natural feature on-site. A small portion of the western edge of the SWD4 community (i.e., the western on-site extent of the NAT-19 complex) may require modification to incorporate the outflow channel for the created wetland (Map 8). However, this minor encroachment will not represent a negative impact.

To limit ecological impacts during construction of the above pit/quarry features, it is recommended that geotextile silt fencing be installed along the defined limits of construction to ensure that inadvertent construction damage or disturbance to the adjacent natural features is avoided. This fencing must be installed prior to the initiation of construction of the above features.

Since pit/quarry operations will be maintained within the existing licensed pit areas on the subject lands, no negative impacts associated with the locations of truck haul routes, areas of equipment storage/staging, or materials stockpiling are expected.

Dust control measures will be implemented in accordance with Site Plan requirements for pit/quarry operation. Implementation of these measures will effectively mitigate impacts to adjacent natural features associated with the dispersal and deposition of dust. See the Site Plan (MHBC 2024) air quality technical recommendations for additional details.

Time-of-day operational restrictions to daylight hours only will ensure that no impacts to adjacent roosting habitats will occur. All artificial lighting will be shielded or directed away from the adjacent natural features. Refer to the Site Plan (MHBC 2024) for the detailed operational requirements.

Based on the existing and proposed pit/quarry extraction limit setbacks, and based on the technical recommendations to mitigate the effects of noise and vibrations (Explotech 2024, Aerocoustics 2024), negative sensory impacts associated with noise and vibrations on adjacent wildlife habitats are not anticipated such as based on the following:

- The blasting effects (noise and vibration) will be periodic and of very short duration. This may startle certain wildlife in proximity, but the effect will be temporary and wildlife are expected to continue utilizing the features.
- As noted above, the blasting will not occur at night, thereby avoiding disturbance of various sensitive nighttime life processes and habitat functions.
- Blasting that is centred below-grade within the quarry, relative to the higher elevation of the adjacent natural features, will likely attenuate the noise and vibration effects on the adjacent lands to a certain extent.
- The adjacent natural features that will be retained are already located in close proximity to the existing aggregate extraction activities within the subject lands, or will be (i.e., extraction within the former Prince property) by the time of baseline conditions. Wildlife species that occupy these features would already have some degree of exposure to noise and vibration disturbances.

It is expected that at least the majority of species observed occupying the adjacent natural features will be tolerant of some degree of disturbance and will continue to use the features.

7.4.3 Sedimentation and Erosion

During soil stripping and earth-moving activities within portions of the quarry site that are adjacent to the natural features (e.g., construction of the infiltration facilities), areas of bare soil

will be exposed which have the potential to erode and impact adjacent natural features. In the event of a heavy rain, sediment laden runoff can enter adjacent natural areas by way of overland flow. Increased stormwater surface flow and erosion processes may cause the deposition of sediments onto down-slope vegetation, ultimately causing vegetation die-back or impaired health.

In order to protect adjacent natural features from potential impacts due to sediment, it is recommended that silt fencing be installed, regularly inspected and maintained when construction or pit/quarry operational work adjacent to a natural feature has the potential for sediment release into the adjacent natural feature. See the Site Plan (MHBC 2024) for additional details about erosion and sediment control requirements on the site.

7.4.4 Water Quality

Surface runoff and groundwater inflow that is captured within the quarry pit will be directed through a water quality treatment process prior to the water being re-infiltrated on-site, or directed into the created wetland. Water inputs to the quarry will first be captured within a sump on the quarry floor. Water from the sump will then be pumped into settling ponds to settle out sediments and other debris from the water column before it is released into a clean water pond. Water from the clean water pond will be directed toward the infiltration facilities or the created wetland. However, if it is determined that water collected in the sump is sufficiently clean (i.e., satisfies the water quality conditions stipulated in the quarry's ECA), the sump water may be pumped directly into the infiltration facilities. The water quality treatment requirements will be determined in consultation with the MECP through the ECA application process. Effluent limits are typically set for total suspended solids, oil and grease. Sampling and monitoring of the discharge water to the infiltration facilities will be required as a condition of the ECA.

This water treatment approach will mitigate the potential for sediments to clog up the infiltration features and optimize their functionality. This process also ensures that captured water is appropriately treated before being reintroduced to the groundwater layer, and that water pumped into the created wetland is of sufficient quality.

In addition, a Spill Response Plan (SRP) should be developed and implemented as required under the ARA.

Refer to the Level 1 and 2 Hydrogeological Assessment report (Earthfx and Tatham Engineering 2024) for further details on the water quality treatment process and other water quality impact mitigation measures within the proposed quarry.

8.0 Ecological Restoration and Enhancement

8.1 Restoration of Extraction Setback Zones

It is recommended that the lands between the licensed extraction limits and the natural feature limits be restored through a combination of passive regeneration and targeted native vegetation plantings. The extraction setback zones will readily re-establish through passive regeneration from natural recolonization from the adjacent features. However, due to the disturbed nature of these edges resulting from the existing adjacent aggregate extraction operations, passive regeneration alone may result in the establishment and proliferation of non-native species growth such as buckthorn. It is therefore recommended that passive regeneration be supplemented through the establishment of native tree and shrub plantings as well as a native seed mix application.

See Section 10.1 for additional details of site restoration and enhancement measures.

8.2 Wetland Creation

Creation of the new wetland within the quarry site will incorporate a phased approach to establishing native vegetation cover within the feature. This establishment will occur over an approximately two-year period, after which it is anticipated that the vegetation within the created wetland will proceed to a free-to-grow stage and will be largely self-sufficient. Periodic monitoring (see Section 9.0), and associated management and tending of the vegetation and habitat features, will be completed to ensure that the wetland is properly establishing and is functioning as intended.

See Section 10.1 for the detailed recommendations to implement vegetative restoration of the created wetland, split between Year 1 and Year 2 of wetland creation.

8.3 Rehabilitation Plan

A Rehabilitation Plan has been prepared as part of the Site Plan to guide the restoration of portions of the licensed quarry lands to agricultural and natural environment land cover following the quarry's closure (MHBC 2024). As shown on the Rehabilitation Plan, the majority of the quarry footprint will be allowed to fill with groundwater and will become a large quarry lake. The southern portion of the subject lands, which will not be quarried to below water table and will not fill with water, will primarily be restored to an agricultural land use. The rehabilitation phase will allow for ecological restoration and enhancement opportunities within other portions of the subject lands as discussed below.

Two key objectives of the natural environment restoration aspects of the Rehabilitation Plan are to 1) increase ecological connectivity among the fragmented natural features, and 2) bulk up and enhance the natural feature edges while further buffering their interiors from adjacent land uses (e.g., agriculture) and reducing ecological edge effects. At a more localized scale, within the southern end of the site, another objective of the plan will be to re-establish and enhance (e.g., through enlargement of habitat area over baseline conditions) habitat for the SAR Eastern Meadowlark, which has been documented within that portion of the subject lands (Section 6.2.3.2).

Connectivity will be enhanced by establishing a woodland community within the area of the former central infiltration pond, which will connect the northwestern end of the NAT-19 complex to the former Bonnefield property woodland (MHBC 2024; see Sheet 4 of 5). This created woodland will also be designed to incorporate vernal pools or small wetland features that will collect and hold water, at least seasonally. This may be achieved by excavating depressional areas (to below the shallow water table if feasible) and by introducing tighter clay/silt-heavy soils within these areas to improve their water-holding capacity. As an alternative to isolated pockets, these wetter features could also be consolidated into a more narrow, sinuous configuration through the created woodland, to facilitate north-south amphibian movements. The creation of small wetland features within this area will, in part, restore the previous wetland functions that will have previously existed in that location. They will also serve as additional habitat and contribute to movement paths for amphibians that may then travel between the NAT-19 wetland and created wetland in the south, and the former Bonnefield property wetlands to the north.

The Rehabilitation Plan will allow for enhancement of existing natural feature edges. This will include a substantial (approximately 100m-wide) addition of natural feature cover to the western edge of the NAT-19 complex on the subject lands, which will span the area of the created wetland in the north southwards to the south subject property boundary (MHBC 2024; see Sheet 4 of 5). This area will be restored as a native meadow, in part to compensate for and enhance habitat for the SAR Eastern Meadowlark that maintains breeding habitat in that area. This meadow habitat zone will tie in to and complement the created wetland, which in turn will have connectivity to the created woodland in the former central infiltration area. A row of native planted trees will be established along the western edge of the meadow zone, to demarcate the adjacent restored agricultural land from the meadow habitat while providing perching habitat for Eastern Meadowlark.

Quarry side slopes that will be graded to a 2:1 slope following quarry closure will also provide an opportunity for ecological enhancement on the site. Specifically, the side slopes along the east side of the subject lands, facing the former Prince property and former Bonnefield property woodlands, will tie into their restored extraction setback zones (see above) and create a naturalized transition zone out from their woodland edges. It is recommended that these side slopes be seeded with a native meadow seed mix and planted with scattered nodes of native trees (e.g., Eastern White Pine) and shrubs (e.g., Gray Dogwood, Staghorn Sumac) that will be tolerant of the harsh slope growing conditions.

The edges of the quarry pond will be graded at a 2:1 slope for several metres where at the land-water interface to provide suitable conditions for fringing shallow wetland habitat. This zone is referred to as the quarry lake littoral zone (MHBC 2024; see Sheet 4 of 5) and will provide habitat for a variety of wildlife species while providing additional vegetative diversity to the site.

As described in the Rehabilitation Plan, fill will be introduced to raise the surface elevations of the rehabilitated lands to the south of the quarry lake. The lands will be graded to create a surface catchment for the created wetland such that its hydrology can be naturally sustained through passive inflows of surface runoff and precipitation.

As summarized above, ecological restoration and enhancement of the subject lands during the Rehabilitation Phase will be undertaken within four distinct restoration zones: Zone A: Native meadow; Zone B: Woodland; Zone C: Restored Side Slopes; Zone D: Quarry Lake Littoral Zone. See Section 10.1 for the detailed recommendations to implement the vegetation planting and seeding plan for each of these restoration zones during the Rehabilitation Phase.

9.0 Monitoring

A comprehensive and long-term Ecological Monitoring Program will be implemented to track the occurrence of any negative effects on terrestrial and aquatic ecosystems that results from operation of the proposed quarry. The Monitoring Program would be inclusive of lands both within the subject lands, and outside of the subject lands within the Study Area where access permits. Monitoring completed outside of the subject lands is expected to be undertaken at selected locations within municipal road rights-of-way (Map 11). The Monitoring Program may include selected natural features on the properties of participating landowners. Landowners participating in the Monitoring Program will not necessarily correspond to the owners of Participating Properties that were accessed in support of the NEA (Map 2).

This monitoring plan will be designed to integrate with the surface water monitoring as outlined within the Water Resources notes of the Site Plan (MHBC 2024; see Sheet 3 of 5). Collectively, these will result in a robust and comprehensive monitoring framework for the subject lands and surrounding Study Area to ensure that negative impacts associated with quarry operations are not occurring, and if any negative effects or trends are discerned that can be attributed to the quarry, to take prompt and appropriate mitigation actions as required.

See Section 10.1 for the detailed recommendations of the Ecological Monitoring Program that are to be implemented within the subject lands and the surrounding Study Area external lands where shown on Map 11.

10.0 Summary

NRSI was retained by Strada Aggregates to complete an NEA associated with the planned creation of a below-groundwater table quarry within the footprint of their existing Class A above-water table aggregate pit in Melancthon Township, Ontario. The NEA has been prepared in support of a license application under the provincial ARA, and also serves the purposes of an EIS in support of a Township Official Plan Amendment and Zoning Bylaw Amendment. The subject lands are located within the upper subwatershed reaches of the Pine River and Boyne River, and several wetlands and watercourses associated with the headwaters of these aquatic systems occur across the surrounding lands. The majority of the area's wetlands are unevaluated by the OMNR, while two PSW complexes, the Melancthon PSW complex and Terra Nova PSW complex, are located to the west and east of the subject lands, respectively. The subject lands contain woodland features that are considered Significant Woodlands based on municipal criteria. The subject lands also contain small wetland features, specifically within the former Bonnefield property and the Melancthon Pit #2 site.

In completion of the NEA, a broad Study Area was utilized within which several large natural feature complexes (NAT complexes) were characterized and mapped in order to determine their ecological significance and sensitivity to potential hydrological/hydrogeological changes that could be caused by quarry operations. Natural features within the subject lands were also characterized, updating previous information collected by NRSI for these features as part of previous ARA license application studies for the proponent. Through completion of background information review and a multi-year comprehensive fieldwork program that incorporated access to several private properties, NRSI biologists identified a wide range of hydrological sensitivities among the many investigated wetland communities, watercourse features, and their associated terrestrial and fish habitat functions. Detailed baseline information was collected for these features, including their vegetation species compositions and habitat functions, to help inform an assessment of their potential response (sensitivity vs resiliency) to potential changes in the groundwater regime that supports and influences many of these features. SWH, and habitat for Threatened and Endangered species (i.e., SAR habitat) was also identified for various locations around the Study Area and within the subject lands themselves. The majority of the investigated watercourses were identified as coldwater or coolwater features, reflecting the importance of groundwater-surface water interactions on the landscape. Coolwater and coldwater fish species, including Brook Trout, occur widely across these features and were frequently encountered during surveys.

Quarry operational activities will proceed across four iterative phases, followed by a Rehabilitation Phase once the quarry operations cease. Based on the results of hydrogeological modelling undertaken by Earthfx, varying extents and magnitudes of groundwater level change (increases and decreases relative to baseline conditions) are expected across the different phases. In general, the lands to the south, southeast, and the northeast of the pit/quarry will experience either groundwater level mounding, or relatively little change, while lands to the east, west and southwest will experience some level of groundwater drawdown, relative to baseline conditions. These modelled scenarios represent conditions in which hydrogeological effects of quarry operation have been mitigated through a quarry water management system that will function to re-infiltrate captured and quality-treated water back into the ground within the quarry site. In doing so, prevailing groundwater flows will generally be maintained, thereby minimizing negative effects on down-gradient ecological groundwater receptors.

Implementation of this quarry water management system will require the creation of three water infiltration facilities within the subject lands (a northern trench system, and central and southern infiltration ponds) as well as injection wells along the east property boundary. A buried tile drain along the west boundary of the site will collect and redirect water to the injection wells, and in doing so, will mitigate groundwater mounding to the west of the site that could otherwise occur due to creation of the low-permeability barriers along the west face of the quarry.

Creation of the central infiltration pond will require the removal of four small, isolated wetland features on the Melancthon Pit #2 site. One of these features was identified as confirmed SWH for Amphibian Breeding Habitat, while Candidate SWH for Amphibian Breeding Habitat was identified for another. In order to compensate for the removal of these wetlands, it is proposed that a new wetland feature be created within the quarry site to the immediate west of the existing swamp community that extends into the southern end of the subject lands. This created wetland will offset the combined area of the removed wetlands at a >2:1 area-based ratio, and will be designed to incorporate a range of surface hydrological conditions (permanent pools to seasonal and more ephemerally wet areas) in order to attract a diversity of wildlife species use and to re-establish significant amphibian breeding habitat on the site. This wetland will require direct pumping of clean water during the quarry operational period to maintain its water budget. However, during the Rehabilitation Phase, the surrounding lands will be graded to create a surface catchment such that this wetland will function through passive surface water inflows and will be self-sustaining in perpetuity.

Groundwater mounding in parts of the study area will result from the localized effects of water leakage from the on-site infiltration facilities. These mounding effects will result in increased groundwater seepage within certain Study Area wetlands, and increased groundwater baseflow inputs to multiple watercourses. These effects are not anticipated to cause negative ecological impacts to vegetation communities or species, terrestrial wildlife habitats, or to fish habitats. In large part, these effects will not result in significant change to surface conditions among these Study Area features.

The NAT-19 wetland complex, located immediately southeast of the subject lands, will receive shallow groundwater leakage from the adjacent central and southern infiltration ponds. It will also receive some periodic outflows of surface water from the created wetland when water levels reach a specific elevation during seasonally wetter periods. This wetland will experience the greatest degree of shallow groundwater level mounding among Study Area features, and will experience wetter surface conditions in topographically lower areas of its microtopography due to perpetually saturated soils. However, because this wetland feature contains natural outlets to the south, potential increases in standing water are expected to be mitigated through flow toward these drainage routes. Despite the increased prevalence of localized wetter conditions within the NAT-19 feature, significant change to the characteristics and function of the existing wetland community are not expected. It is expected to return to baseline conditions during the Rehabilitation Phase.

Minor groundwater drawdown of <0.5m during Phase 4 will occur across the majority of the NAT-01 complex to the west of the pit/quarry. However, with the exception of roadside drainage ditches along 5th Line, these wetlands are not strongly influenced by the local groundwater regime, and their surface hydrological conditions and hydroperiods are not expected to change in a manner that would negatively impact the existing wetland quality or functions including wildlife habitats. A greater magnitude of drawdown is expected under the far eastern extent of the NAT-01 complex. However, the wetland communities at the far east end are surface water-fed and will not be impacted by the hydrogeological conditions.

The effects of groundwater drawdown to the east of the quarry site were primarily identified for the large pond of the NAT-18 complex and its associated inflowing and outflowing watercourses. The pond will only experience a minor reduction to its water level during quarry operations, due to reductions in surface leakage around the lake perimeter and reductions in inflowing streamflow. However, no negative impacts to the hydrological functioning or

hydroperiod of the pond, nor to its fringing vegetation communities, wildlife habitat functions, or fish habitat use are anticipated. The watercourse outflowing from the NAT-18 pond, through the centre of Horning's Mills and to the NAT-16 complex to the east, is expected to experience streamflow reduction relative to baseline conditions. This watercourse reach was characterized as a coolwater feature that provides habitat for Brook Trout. However, despite the modelled reduction in baseflow to this feature, it will continue to exist as a permanently flowing watercourse that is expected to continue supporting coolwater and coldwater species with suitable depths and water temperatures. Furthermore, the Brook Trout using this reach will have access to an adjacent, larger, watercourse of the NAT-16 complex that inflows from the NAT-14 complex to the north. This NAT-16 watercourse will experience an increase in cold groundwater baseflow through increased upstream inputs as well as increased groundwater surface leakage within the NAT-16 wetland complex, providing ideal conditions for Brook Trout.

Based on the results of the NEA impact assessment, with reference to the hydrogeological modelling results prepared by Earthfx, the quarry operations are not anticipated to cause indirect negative effects on the Study Area natural features or their ecological functions as a result of groundwater level changes. Furthermore, no negative indirect effects are anticipated following quarry closure during the Rehabilitation Phase.

The quarry Site Plan has been designed to allow for the complete retention of the subject lands Significant Woodland features, as well as the western edge of the NAT-19 wooded complex that extends into the site. Existing and approved pit extraction limits adjacent to these features will be maintained, while the quarry extraction limits will be further set-back from these features. These setback zones will provide opportunity for ecological restoration of the lands adjacent to these feature edges. No direct impacts to these significant natural features, including the SWH functions they provide, will therefore occur. Creation of the quarry will require removal of SAR habitat for Eastern Meadowlark. If Eastern Meadowlark is confirmed to still occur on-site, based on updated surveys to be completed prior to site alteration, the activity that would remove this habitat must be registered with the MECP, and a Mitigation Plan prepared, prior to habitat removal in accordance with Ontario Regulation 242/08. The SAR Bank Swallow has also been documented within the active pit operational areas. If Bank Swallow is observed during site operations, actions must be taken in accordance with O. Reg. 242/08, including the implementation of Best Management Practices established for Bank Swallows in pits and quarries.

Various recommendations have been provided to avoid, or otherwise minimize or mitigate potential negative impacts associated with pit/quarry operation on the adjacent on-site natural features and ecological functions. Provided these measures are implemented, negative impacts to the on-site and adjacent natural features and their ecological functions are not anticipated.

Recommendations have been provided to inform the ecological restoration and enhancement of lands within the pit/quarry site. This includes the woodland and wetland extraction limit setback zones, the created wetland, and the Rehabilitation Plan natural feature zones. Specifically, the Rehabilitation Plan will include new woodland creation that will increase ecological connectivity on the lands, new native meadow creation to compensate for SAR Eastern Meadowlark habitat removal and for the benefit of other open habitat species, restoration of quarry side slopes to build off of adjacent retained woodland features on the property, and the creation of fringing wetland habitat along the edges of the large quarry lake.

A long-term, comprehensive Ecological Monitoring Program will be implemented and designed to integrate with other proposed surface water monitoring measures pre-, during, and post-quarry operation to track conditions and ensure that negative effects are not occurring within the site or on the surrounding landscape. The Ecological Monitoring Program will incorporate anuran breeding surveys, fish community characterization and water temperature monitoring to ensure that these significant habitat functions continue to persist unaffected by pit/quarry operations. Mitigative actions will be taken if negative effects or trends are observed that can be attributed to pit/quarry operations. This monitoring plan will also track the vegetative establishment, hydrological conditions and habitat within the created wetland to ensure that its functional objectives are being met.

10.1 Summary of Recommendations

The following is a list of the technical recommendations presented in this report that are to be included in the ARA Site Plan to ensure no negative impact to significant natural heritage features and ecological functions occurs, and to ensure compliance with the ESA, *Fisheries Act*, and *Migratory Birds Convention Act*.

Operational Recommendations

- The pit limit of extraction was previously approved on Aggregate Resource Act Licences 626199, 129167 and 625155 and shall be maintained for this licence. The quarry limit of

extraction shall be a minimum of 15m from wetlands and 10m from Significant Woodlands that are located outside of the pit limit of extraction.

- There shall be no site disturbance between the pit extraction limit and the protected wetlands and significant woodlands with the exception of the following that are located in the southeast corner of the licence boundary: the proposed acoustic berm, the proposed central infiltration pond and the created wetland.
- The areas located between the pit limit of extraction and the edges of the protected wetlands and significant woodlands, with the exception of the three areas identified above, shall be allowed to passively re-naturalize and will be supplemented with targeted native species plantings and seeding. The native tree species will include: White Pine (*Pinus strobus*), Red Maple (*Acer rubrum*) and Trembling Aspen (*Populus tremuloides*) with smaller numbers of Sugar Maple (*Acer saccharum*), Black Cherry (*Prunus serotina*), Hop Hornbeam (*Ostrya virginiana*), and American Basswood (*Tilia americana).* The native shrub species will include: Gray Dogwood (*Cornus racemosa*), Staghorn Sumac (*Rhus typhina*), Sandbar Willow (*Salix interior*), and Nannyberry. The native meadow species (Ontario Seed Company Mixture "CVC7") will include: Black-eyed Susan (*Rudbeckia hirta*), Blue Wood Aster (*Symphyotrichum cordifolium*), Canada Anemone (*Anemone canadensis*), Canada Goldenrod (*Solidago canadensis*), Common Milkweed (*Asclepias syriaca*), Evening Primrose (*Oenothera biennis*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Meadow Sedge (*Carex granularis*), New England Aster (*Symphyotrichum novae-angliae*), Riverbank Wild Rye (*Elymus riparius*), Virgin's Bower (*Clematis virginiana*) and Wild Bergamot (*Monarda fistulosa*).
- Observations of the SAR Bank Swallow (*Riparia riparia*) or their habitats within the pit/quarry operational area shall be addressed through implementation of Best Management Practices identified for the species and in accordance with the requirements of Ontario Regulation 242/08.
- Prior to site alteration for creation of the wash plant/stockpile area, and the southern and central infiltration ponds in the south end of the site, an updated habitat assessment and surveys for the SAR Eastern Meadowlark (*Sturnella magna*) shall be completed. If it is determined that this species still occupies habitat within these areas, habitat removal activities shall be registered with the MECP through a Notice of Activity, and creation and implementation of a Mitigation Plan in accordance with Ontario Regulation 242/08.

- All tree removals shall be completed outside of the period April 1 to September 30 unless otherwise approved by a qualified biologist through completion of a bird nest search and through confirmation that the tree does not provide suitable bat habitat. Nest searches shall only be completed within 48 hours of the tree removals required between April 1 to September 30.
- All non-tree vegetation removals shall be completed outside of the period April 1 to August 31 unless otherwise approved by a qualified biologist through completion of a bird nest search of the vegetation. Nest searches shall only be completed within 48 hours of the vegetation removals required between April 1 to August 31.
- Water shall be managed on site in accordance with the water resources technical recommendations presented in the Site Plan (MHBC 2024).
- Dust impacts shall be mitigated in accordance with the air quality technical recommendations presented in the Site Plan (MHBC 2024).
- Artificial lighting shall be shielded or directed away from the protected wetlands and significant woodlands as described in the Site Plan (MHBC 2024).
- When operations and rehabilitation work is occurring adjacent to the protected wetlands and Significant Woodlands and has the potential for sedimentation and erosion into the features, silt fencing shall be installed, regularly inspected and maintained until the area is adequately vegetated.
- A Spill Response Plan shall be developed and implemented to ensure no release of hazardous materials from the site or into the protected wetlands and significant woodlands as presented in the Site Plan (MHBC 2024).

<u>Wetland Creation and Removals</u>

Wetland Creation

- A new wetland shall be created in the area as shown on Drawing 2 of 5 of the Site Plan (MHBC 2024) within three years of issuance of the ARA license for the pit/quarry. The following steps shall be followed for the creation of the new wetland.

Year 1

- The grading limit for the new wetland shall be staked to demarcate the extent of the feature.

- The removal of vegetation within the envelope of the new wetland shall occur outside of April 1 to August 31.
- The new wetland shall be graded and include a low-permeability lens of till across the bed of the new wetland to facilitate water retention and conditions that will support hydrophytic vegetation. The wetland creation area shall be overlain with a minimum of 20cm of topsoil. Site photographs shall be taken to document the work.
- A nurse crop of proso millet (*Panicum miliaceum*), annual rye (*Lolium multiflorum*) or oats (*Avena sativa*), or any combination of these species, shall be applied at a rate of 25kg/ha.

Year 2

- In the early spring of Year 2 (late March or early April), native seed mixtures shall be applied to the wetland creation area. Two seed mixtures shall be applied in separate zones, each at a rate of 25kg/ha: a "Riparian Mixture" intended for the saturated wetland fringe and an "Upland Mixture". The riparian mixture will contain: Blue Vervain (*Verbena hastata*), Blue Flag Iris (*Iris versicolor*), Purple-stemmed Aster (*Symphyotrichum puniceum*), Fox Sedge (*Carex vulpinoidea*), Green Bulrush (*Scirpus atrovirens*), New England Aster (*Symphyotrichum novae-angliae*), Rice Cutgrass (*Leersia oryzoides*), Soft Rush (*Juncus effusus*), Spotted Joe Pye Weed (*Eutrochium maculatum),* Square-stemmed Monkeyflower (*Mimulus ringens*), Swamp Milkweed (*Asclepias incarnata*), Virginia Wild Rye (*Elymus virginicus*), Wool Grass (*Scirpus cyperinus*). The upland mixture will contain: Black-eyed Susan (*Rudbeckia hirta*), Blue Wood Aster (*Symphyotrichum cordifolium*), Canada Anemone (*Anemone canadensis*), Canada Goldenrod (*Solidago canadensis*), Common Milkweed (*Asclepias syriaca*), Evening Primrose (*Oenothera biennis*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Meadow Sedge (*Carex granularis*), New England Aster (*Symphyotrichum novae-angliae*), Riverbank Wild Rye (*Elymus riparius*), Virgin's Bower (*Clematis virginiana*) and Wild Bergamot (*Monarda fistulosa*). Site photographs shall be taken to document the spring hydrological condition within the created wetland.
- If erosion is evident in the area seeded in Year 1, additional nurse crop seed shall be applied to these areas in the spring of Year 2.
- In mid to late-spring of Year 2, tree and shrub plantings shall be installed in the riparian and upland areas surrounding the shallow water. All woody species shall be planted

before June 1st. Native trees shall be planted to a density that is equivalent to 1,200 trees/ha and will include White Pine (*Pinus strobus*), Red Maple (*Acer rubrum*), Trembling Aspen (*Populus tremuloides*). Native shrubs shall be planted at a ratio of one shrub to four trees and will include Sandbar Willow (*Salix interior*) and Nannyberry (*Viburnum lentago*) in the saturated fringe area and Gray Dogwood (*Cornus racemosa*), Staghorn Sumac (*Rhus typhina*) in the upland area adjacent to the wetland. All trees and shrubs shall be planted into the graded topsoil using hand tools, an auger or a mini-excavator. All material shall comprise of whips (bare root or plug) and small potted material (2-to-5-gallon pot size).

- Wildlife microhabitat features shall be installed within the wetland prior to tree and shrub planting. Logs and woody debris shall be placed within the wetland, including along the perimeters of the permanent and temporary pond features. Rock piles and/or concrete slabs shall be placed within seasonally drier portions of the wetland.

Wetland Removals

- The existing wetlands located within the footprint of the central infiltration pond shall be removed outside of the period of October 1 to May 15.
- Immediately prior to the removal of the wetlands, a wildlife salvage shall be undertaken to capture and relocate herpetofauna from the wetlands. The wildlife salvage shall be undertaken in accordance with the following:
    - Wildlife exclusion fencing that is suitable to inhibit salamanders and anurans shall first be installed around the habitat features.
    - If required, the wetland ponds shall be partially drained to allow for the wildlife salvage to be undertaken, and then progressively drained in conjunction with the wildlife salvage until they have been fully or near-fully drained.
    - The wetland features shall be comprehensively searched by qualified biologists and captured individuals shall be documented by the biologists prior to release in suitable wetlands on-site.
    - The wildlife exclusion fencing shall remain installed and functional until the habitat features are removed.

Rehabilitation Recommendations

- Outside of the agricultural rehabilitation area, ecological restoration and enhancement of the site shall be undertaken during rehabilitation and includes the following zones: Native meadow; Woodland; Side Slopes; and a Quarry Lake Littoral Zone.

Native Meadow

The native meadow area as shown on Site Plan Drawing 4 of 5 (MHBC 2024) shall be created in the following steps:

- Grading of soil and placement of at least 20cm of topsoil shall occur across the entire meadow restoration area. This shall be completed outside of the breeding bird window (April 1 to August 31).
- The meadow restoration area shall be seeded in April or May with Red Clover (*Trifolium pratense*) and Alfalfa (*Medicago sativa*). The area shall be seeded at a rate of 10kg/ha.
- A native seed mix of Black-eyed Susan (*Rudbeckia hirta*), Blue Wood Aster (*Symphyotrichum cordifolium*), Canada Anemone (*Anemone canadensis*), Canada Goldenrod (*Solidago canadensis*), Common Milkweed (*Asclepias syriaca*), Evening Primrose (*Oenothera biennis*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Meadow Sedge (*Carex granularis*), New England Aster (*Symphyotrichum novae-angliae*), Riverbank Wild Rye (*Elymus riparius*), Virgin's Bower (*Clematis virginiana*) and Wild Bergamot (*Monarda fistulosa*) shall be seeded via hand-broadcasting in the spring, either before or after seeding the Red Clover and Alfalfa. All seeding shall be completed by June 1. The native seed mixture shall be applied at 25kg/ha.
- 50 equally-spaced trees shall be planted along the western boundary in the spring either concurrent with the seeding work, or in the following year.
- The tree stock shall be potted material (2-to-5-gallon pot size) and species may include White Pine, Red Maple or Trembling Aspen. A 5-gallon pail of wood mulch, or an equivalent coconut fibre mat, shall be placed at the base of each tree following the planting.
- The successful establishment of the meadow area shall entail the establishment of 95-100% herbaceous cover after two growing seasons and the accumulation of thatch.

Woodland

The woodland area as shown on Drawing 4 of 5 of the Site Plan (MHBC 2024) shall be created in the following steps:

- The woodland area shall be graded and shall include vernal pool features.
- 20cm of topsoil shall be graded across the area.
- The area shall be cultivated to minimize soil compaction.
- Following cultivation, a nurse crop of proso millet (*Panicum miliaceum*), annual rye (*Lolium multiflorum*) or oats (*Avena sativa*), or any combination of these species, shall be applied at a rate of 25 kg/ha.
- A native meadow seed mix consisting of the following species shall be applied at a rate of 25kg/ha. The native seed mix shall be planted in conjunction with or following application of the nurse crop. Species: Black-eyed Susan (*Rudbeckia hirta*), Blue Wood Aster (*Symphyotrichum cordifolium*), Canada Anemone (*Anemone canadensis*), Canada Goldenrod (*Solidago canadensis*), Common Milkweed (*Asclepias syriaca*), Evening Primrose (*Oenothera biennis*), Grass-leaved Goldenrod (*Euthamia graminifolia*), Meadow Sedge (*Carex granularis*), New England Aster (*Symphyotrichum novae-angliae*), Riverbank Wild Rye (*Elymus riparius*), Virgin's Bower (*Clematis virginiana*) and Wild Bergamot (*Monarda fistulosa*)
- Nursery stock of the following native tree species such as White Pine (50% of the area), Trembling Aspen, Red Maple, Sugar Maple, Black Cherry, Hop Hornbeam and American Basswood shall be planted to a density that is equivalent to 1,200 trees/ha. Plantings within the vernal pool features shall be planted at a higher density of 1,400 trees/ha. Planting of nursery stock may be supplemented through tree seed collection within the adjacent woodland features.
- The following native shrub species shall be planted at a ratio of one shrub to four trees: Gray Dogwood and Staghorn Sumac.
- Taking into account anticipated tree mortality, the goal of the woodland area is to include approximately 2,500 trees and 1,000 shrubs after three growing seasons.

Side Slopes

The side slope area as shown on Drawing 4 of 5 of the Site Plan (MHBC 2024) shall be created in the following steps:

- A nurse crop of proso millet, annual rye or oats, or any combination of these species, shall be applied at a rate of 25kg/ha once final grading of the side slopes is completed.
- A native meadow seed mix consisting of asters and goldenrods shall be applied via hand broadcasting to the area at a rate of 25kg/ha. The native meadow seed mix shall be planted in conjunction with or following the application of the nurse crop.
- Nodes of trees and shrubs seedlings consisting of White Pine, Trembling Aspen, Staghorn Sumac and Gray Dogwood shall be planted in the early spring at various locations in the area spaced approximately every 100m in staggered elevations. Along the side slopes adjacent to the eastern licence boundary between the Significant Woodlands identified on Drawing 1 of 5 of the Site Plan, the nodes shall be created every 50m in this area.
- Each tree and shrub node shall include 15 stems of plug stock for each species, for a total of 60 planted stems per node.

Quarry Lake Littoral Zone

The Quarry Lake Littoral Zone area as shown on Drawing 4 of 5 of the Site Plan (MHBC 2024) shall be created in the following steps:

- Seeding of emergent species along the nearshore area around the perimeter of the lake shall include the following native species: Broad-leaved Cattail, Broad-leaved Arrowhead, Water Plantain, Soft Rush, Soft-stemmed Bulrush, White Water Lily and Variegated Pond Lily.
- The seeding shall be completed at any time of the year outside of frozen conditions once the final lake level has been achieved.
- Seeding in this area shall be completed via hand broadcasting at a rate of 4kg/ha of shoreline. The species mixture will include: Blue Vervain (*Verbena hastata*), Blue Flag Iris (*Iris versicolor*), Purple-stemmed Aster (*Symphyotrichum puniceum*), Fox Sedge (*Carex vulpinoidea*), Green Bulrush (*Scirpus atrovirens*), New England Aster (*Symphyotrichum novae-angliae*), Rice Cutgrass (*Leersia oryzoides*), Soft Rush (*Juncus*

effusus), Spotted Joe Pye Weed (*Eutrochium maculatum*), Square-stemmed Monkeyflower (*Mimulus ringens*), Swamp Milkweed (*Asclepias incarnata*), Virginia Wild Rye (*Elymus virginicus*), Wool Grass (*Scirpus cyperinus*).

Ecological Monitoring Pre-, During Operations and Rehabilitation

In addition to the Water Resources Monitoring Program, the following Ecological Monitoring Program shall be implemented during operations and rehabilitation of the license.

- In the wetland locations identified on Map 11, amphibian call surveys shall be completed in accordance with the Marsh Monitoring Program amphibian survey protocol (BSC 2009). The monitoring of wetlands located outside of the licence boundary shall be conducted subject to landowner permission/assess being granted. The above surveys shall be completed as follows:
    - Two years prior to commencement of quarry operation, monitoring shall be undertaken to establish a baseline condition, except for in the created wetland.
    - During Years 1 to 5 of the quarry operation, monitoring shall be undertaken annually.
    - Commencing in Year 6 and continuing for the duration of the operations, and three years after rehabilitation, monitoring shall be undertaken bi-annually.
- In the watercourse locations identified on Map 11, electrofishing shall be completed to track the presence and occurrence of sensitive fish species (e.g., Brook Trout) subject to landowner permission/assess being granted. The above surveys shall be completed as follows:
    - Two years prior to commencement of quarry operation, monitoring shall be undertaken to establish a baseline condition.
    - During Years 1 to 5 of the quarry operation, monitoring shall be undertaken annually.
    - Commencing in Year 6 and continuing for the duration of the operations and rehabilitation, monitoring shall be undertaken bi-annually.
- In the watercourse locations identified on Map 11, continuous water temperature monitoring shall be completed through the use of data loggers for April through November to track the maintenance of cool/coldwater watercourse thermal regimes

subject to landowner permission/assess being granted. The above surveys shall be completed as follows:

  - Two years prior to commencement of quarry operation, monitoring shall be undertaken to establish a baseline condition.
  - Commencing in Year 1 of quarry operation and continuing for the duration of the operations and rehabilitation, monitoring shall be undertaken annually.

- Water levels within the created wetland shall be monitored through the use of continuous water level data loggers and staff gauges for April through November to ensure that the desired seasonal hydrological conditions are being maintained throughout the quarry operational period. These results will be used to determine the amount of water to be pumped from the quarry sump or clean water pond. No process water will be discharged from the quarry directly into the created wetland prior to it being treated. During rehabilitation, the land surrounding the created wetland shall be graded in accordance with Drawing 4 of 5 of the Site Plan (MHBC 2024) to provide surface water to this feature and no further pumping shall be required once the surrounding landform is established.

The following inspections of restoration and enhancement vegetation seeding and plantings shall be undertaken by a qualified biologist during the quarry operational and rehabilitation stages.

- Monitoring shall be undertaken during the peak growing season (June-September) of the first year following restoration of the following:
  - Restored areas between the pit limit of extraction and protected wetland and woodland edges
  - Created wetland
  - Rehabilitation areas (e.g. Native Meadow, Woodlands, Side Slopes and Quarry Lake Littoral Zone)
- Monitoring of these areas shall continue during Years 2, 3 and 5 following the installation of plant material.

The monitoring plan shall include an inspection to assess the success of herbaceous, shrub and tree species growth, establishment and survival. The assessment will determine is the site is

progressing toward the desired vegetation community type and will provide generalized percentage survival of tree and shrub stems, by species, as well as an assessment of seed mixture representation. If required, recommendations from a qualified biologist shall be implemented to create the desired rehabilitated areas. This may include supplemental seeding of seeded vegetation that is showing signs of inadequate growth or establishment, supplemental native tree/shrub plantings to counter observed die-off or decline, and/or remedial measures to improve vegetation growth conditions or rehabilitate declining growth (e.g., placement of tree guards to mitigate deer browse effects, enhanced watering during drought, cutting back competing vegetation). Invasive species growth shall be managed where feasible as per qualified biologist recommendations. Observation of wildlife usage of the restoration zones, including placed microhabitat features, shall be documented.

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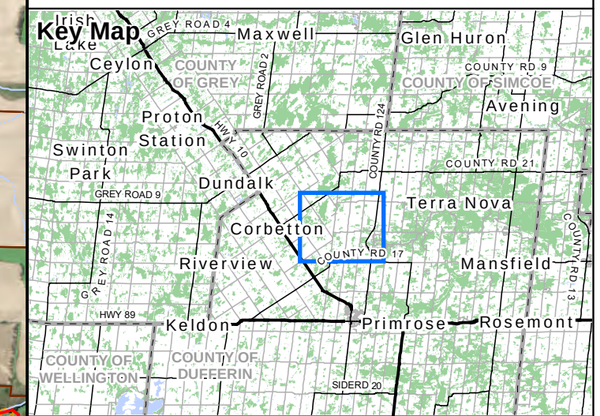
Maps

Map 1-1

Strada Pit/Quarry Natural Environmental Assessment

Study Area



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Watershed Boundary
- Regulation Limit (GRCA 2024)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Water Body
- Provincially Significant Wetland (PSW)
- Other Wetland (Non-PSW)
- Unevaluated Wetland
- Wooded Area
- Lot and Concession Boundary
- White-tailed Deer Overwintering
- White-tailed Deer Yarding

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Project: 2473A
Date: January 24, 2025

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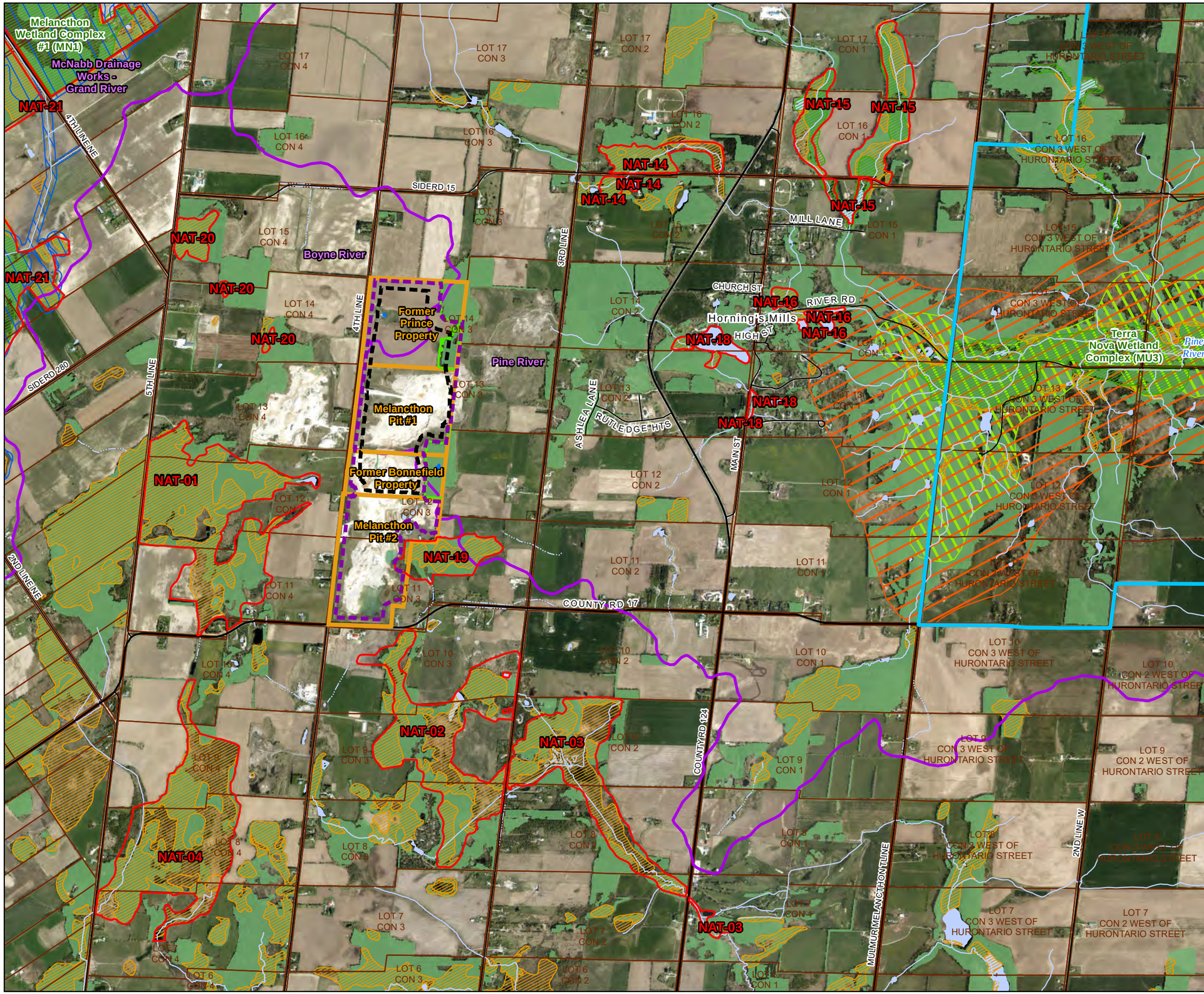
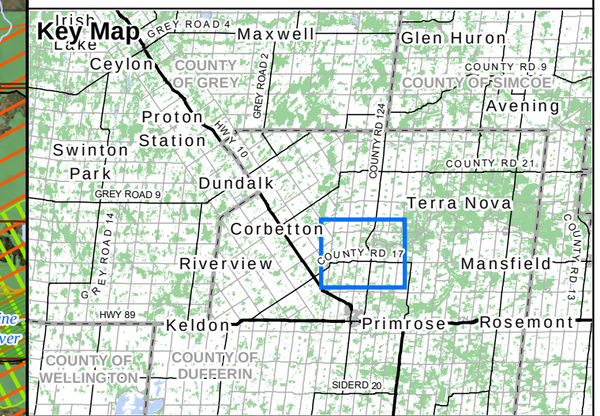
Map 1-2

Strada Pit/Quarry Natural Environmental Assessment

Study Area





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Watershed Boundary
- Regulation Limit (GRCA 2024)
- Niagara Escarpment Plan Boundary
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Water Body
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Wooded Area
- Lot and Concession Boundary
- White-tailed Deer Overwintering
- White-tailed Deer Yarding

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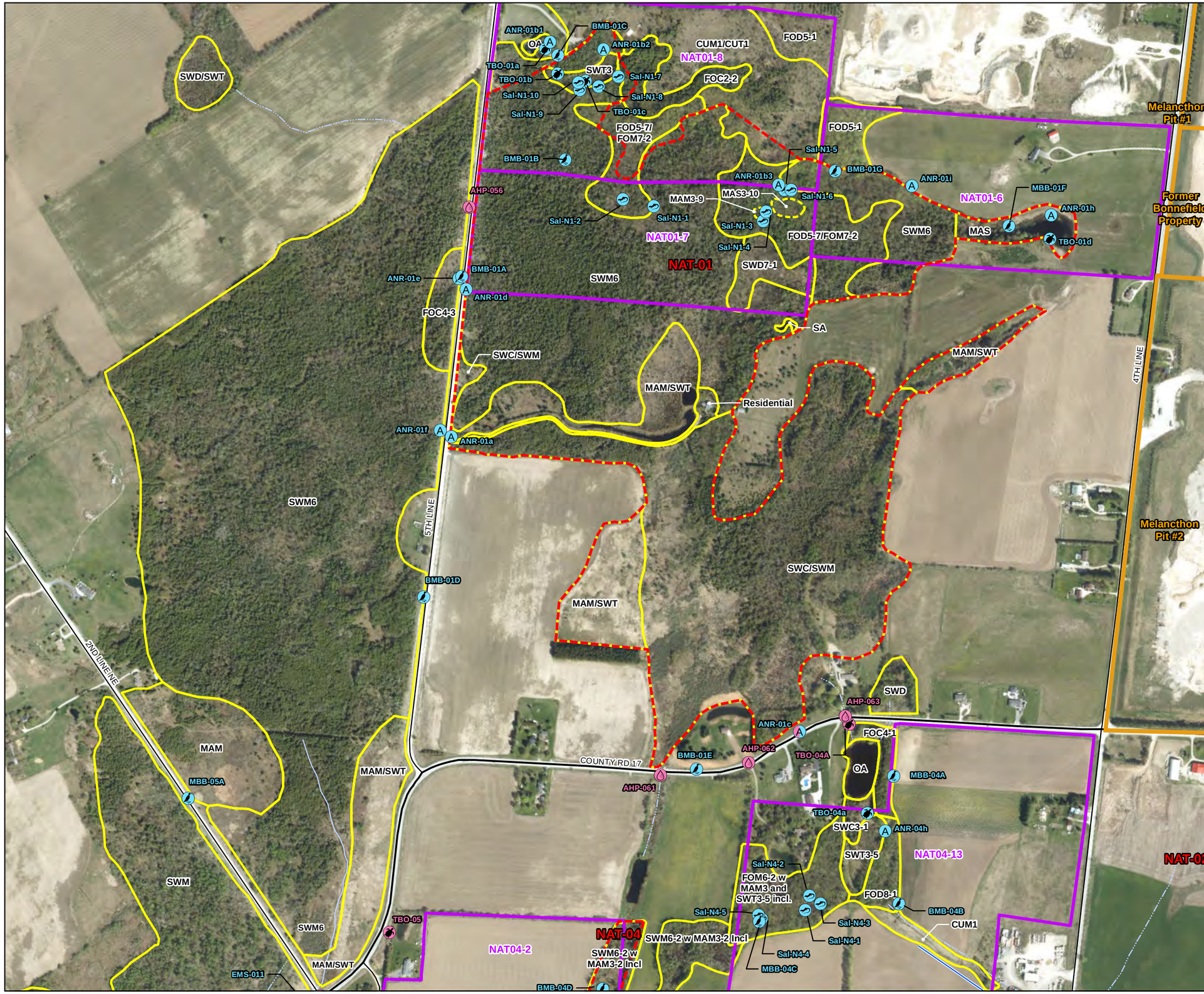
Map 2-1

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



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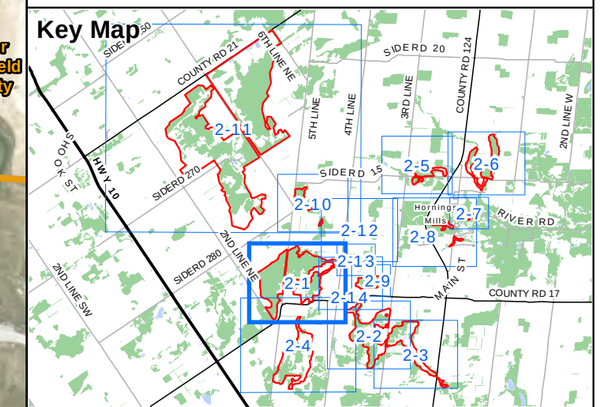

Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUM1) Mineral Cultural Meadow Ecosite
(CUT1) Mineral Cultural Thicket Ecosite
(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOC4-3) Fresh - Moist White Cedar - Balsam Fir Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(MAM) Meadow Marsh
(MAM3-9) Forb Organic Meadow Marsh Type
(MAS) Shallow Marsh
(MAS3-10) Forb Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3-1) White Cedar Organic Coniferous Swamp Type
(SWD) Deciduous Swamp
(SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type
(SWM) Mixed Swamp
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
(SWT) Thicket Swamp
(SWT3) Organic Thicket Swamp Ecosite
(SWT3-5) Red-osier Organic Thicket Swamp Type

Survey Year

- 2020 / 2021
- 2022

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

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Project: 2473
Date: September 18, 2024

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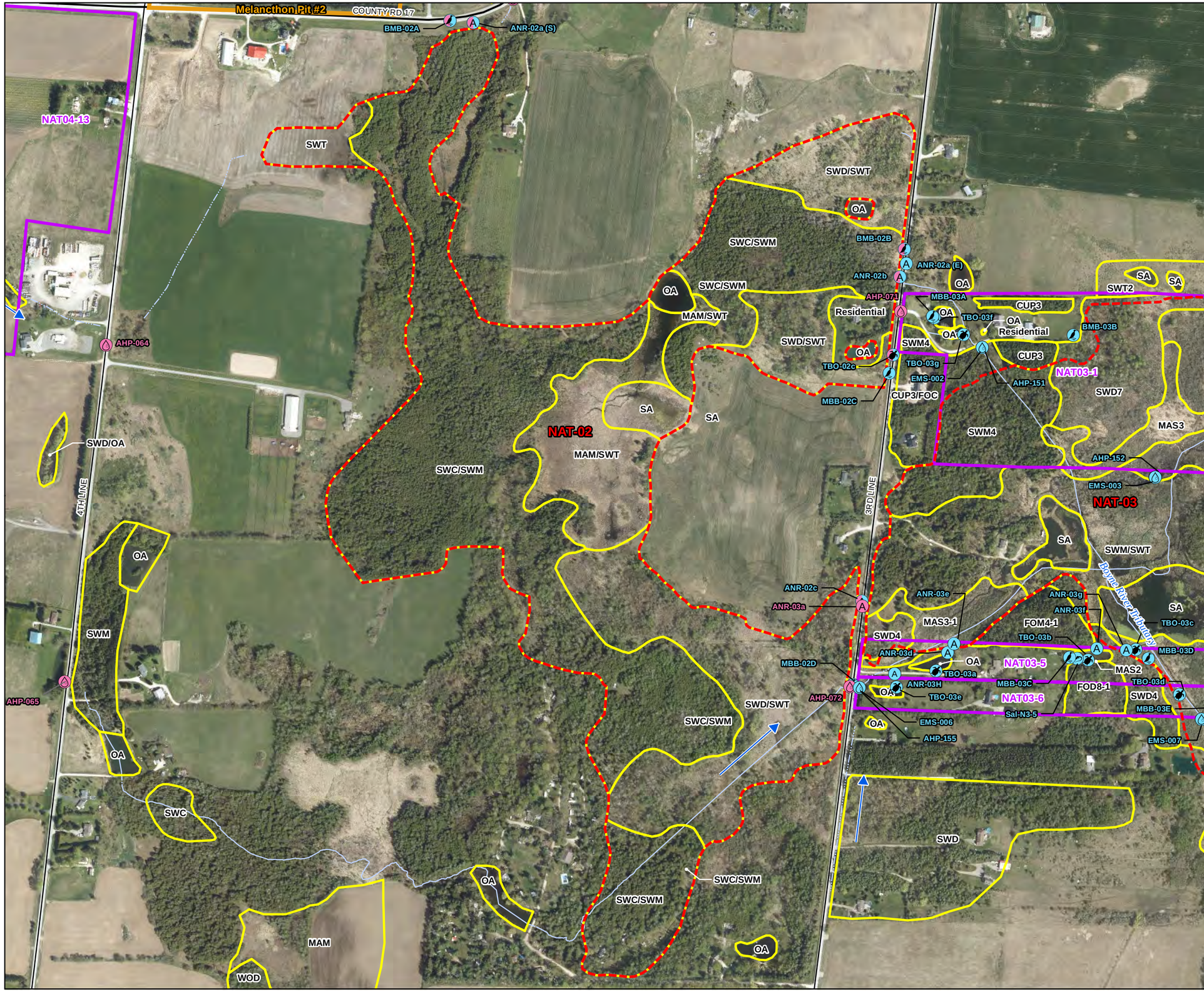
Map 2-2

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



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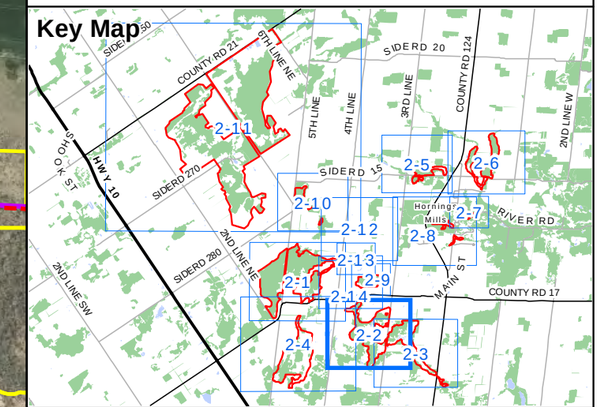

Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type
(WOD) Woodland

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

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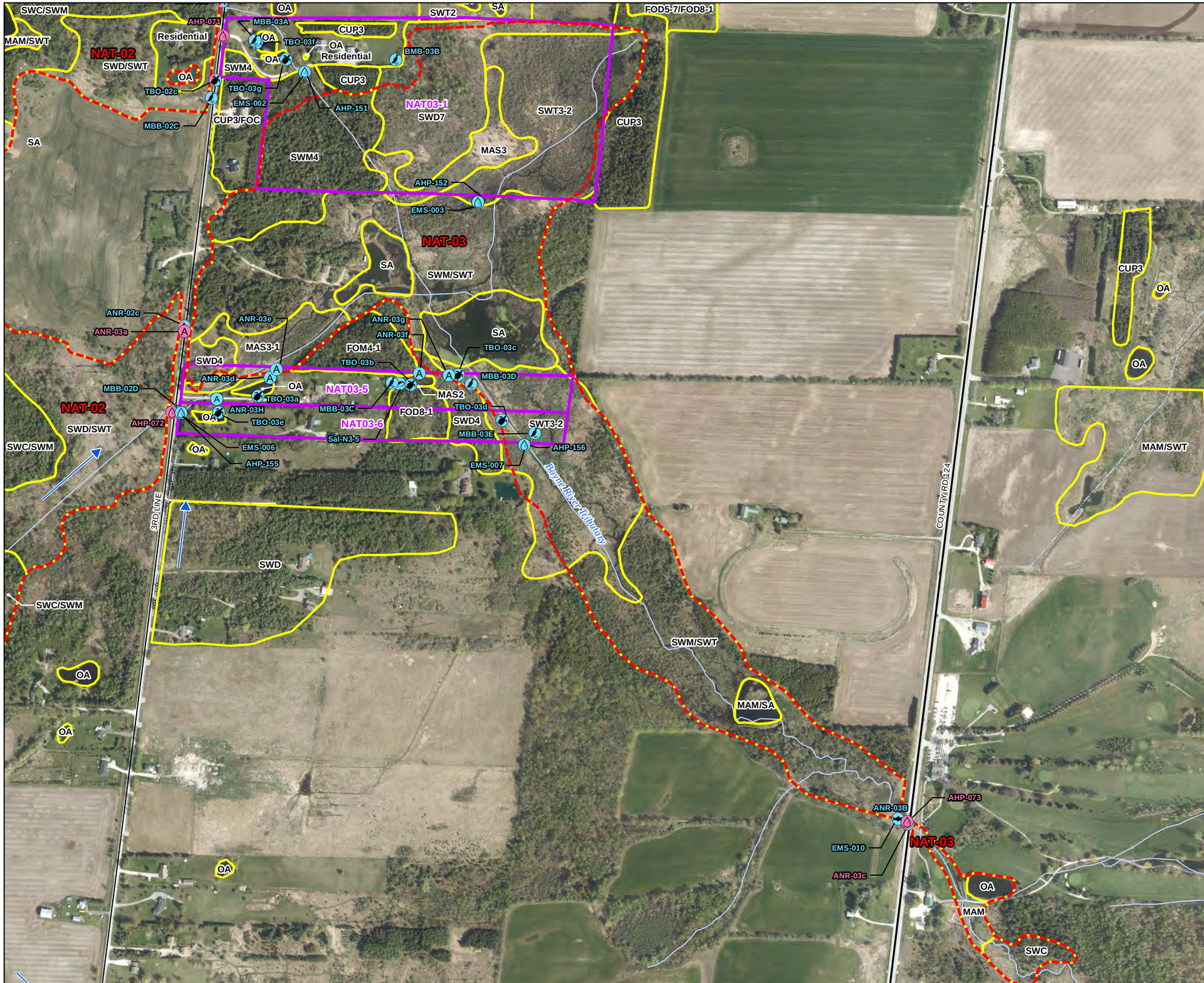
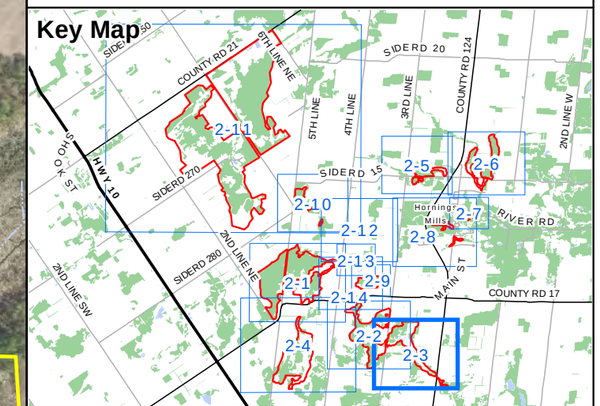
Map 2-3

Strada Pit/Quarry Natural Environment Assessment

Survey Stations





Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

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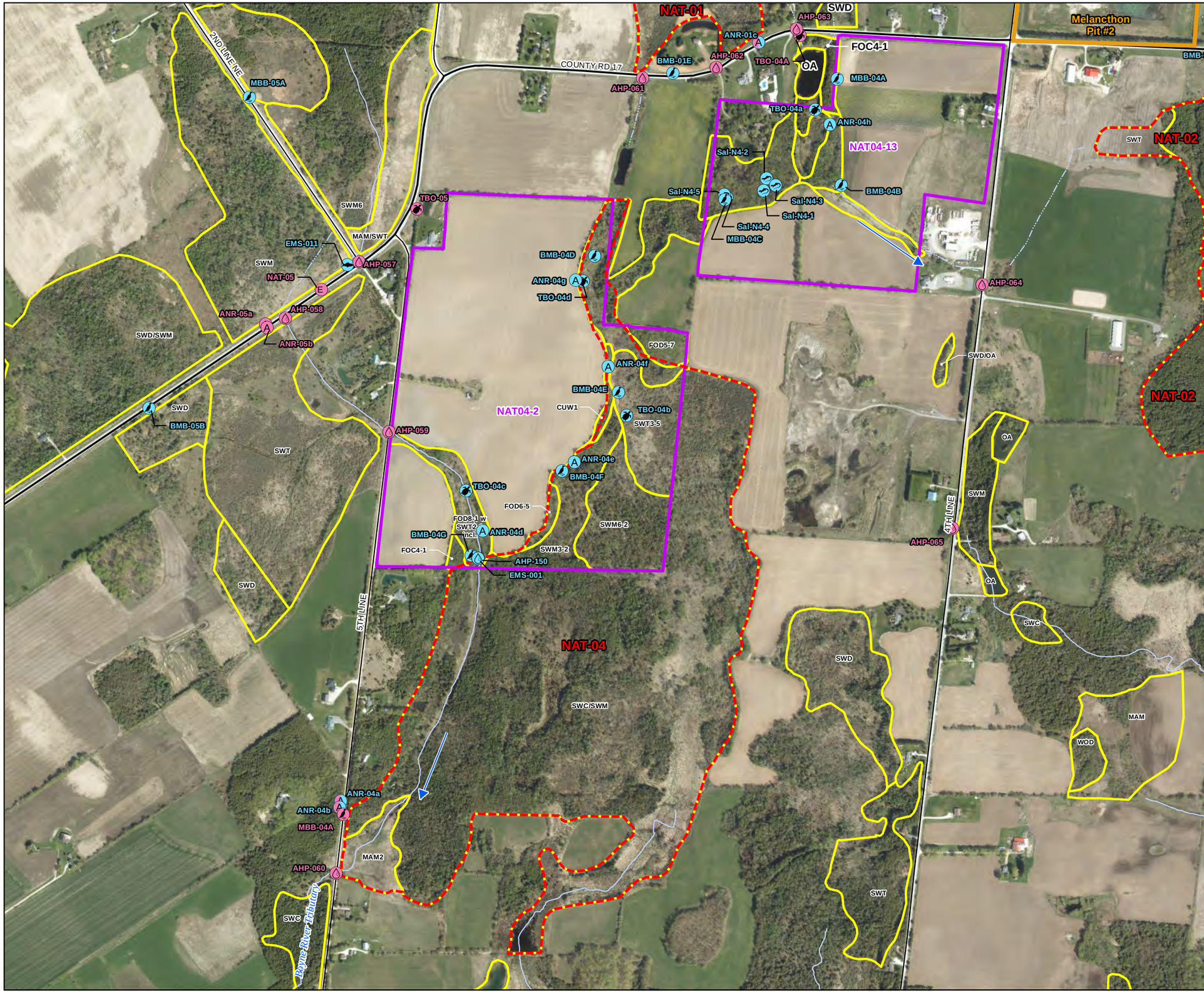
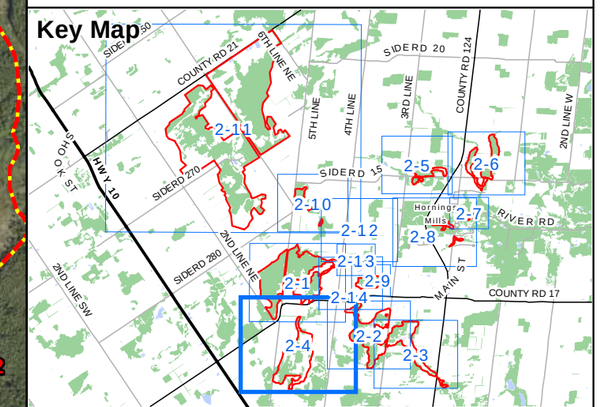
Map 2-4

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUW1) Mineral Cultural Woodland Ecosite
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
(MAM) Meadow Marsh
(MAM2) Mineral Meadow Marsh Ecosite
(OA) Open Water
(SWC) Coniferous Swamp
(SWC3-1) White Cedar Organic Coniferous Swamp Type
(SWD) Deciduous Swamp
(SWD/SWM) Deciduous Swamp/Mixed Swamp
(SWM) Mixed Swamp
(SWM3-2) Poplar - Conifer Mineral Mixed Swamp Type
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
(SWT) Thicket Swamp
(SWT3-5) Red-osier Organic Thicket Swamp Type
(WOD) Woodland

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

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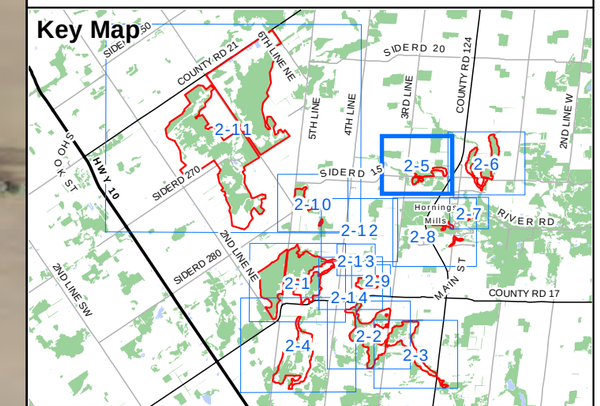
Map 2-5

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(MAS) Shallow Marsh
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3) White Cedar Organic Coniferous Swamp Ecosite
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM) Mixed Swamp
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

Survey Station

- Aquatic (AHP)

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Project: 2473
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,500

0 100 200 300 Meters

N

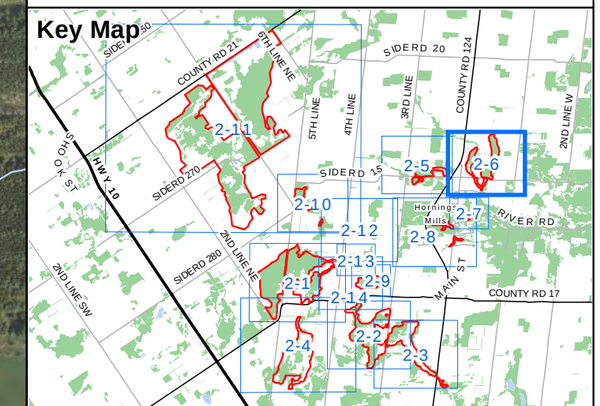
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

Map 2-6

Strada Pit/Quarry Natural Environment Assessment

Survey Stations

Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUP3) Coniferous Plantations
(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-10) Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type
(FOM4) Dry - Fresh White Cedar Mixed Forest Ecosite
(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
(MAM3-4) Fowl Manna Grass Organic Meadow Marsh Type
(MAS) Shallow Marsh
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3-2) White Cedar - Conifer Organic Coniferous Swamp Type
(SWM) Mixed Swamp

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

0 100 200 300 400 Meters

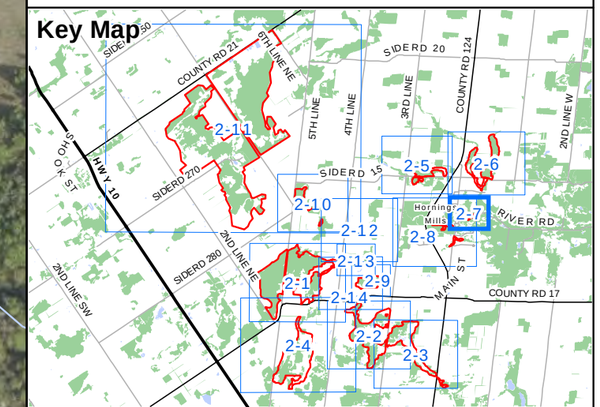
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

Map 2-7

Strada Pit/Quarry Natural Environment Assessment

Survey Stations

Key Map



Legend

- Priority Natural Feature (NAT)
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
(SA) Shallow Water
(SWM4) White Cedar Organic Mixed Swamp Ecosite

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

0 100 200 Meters

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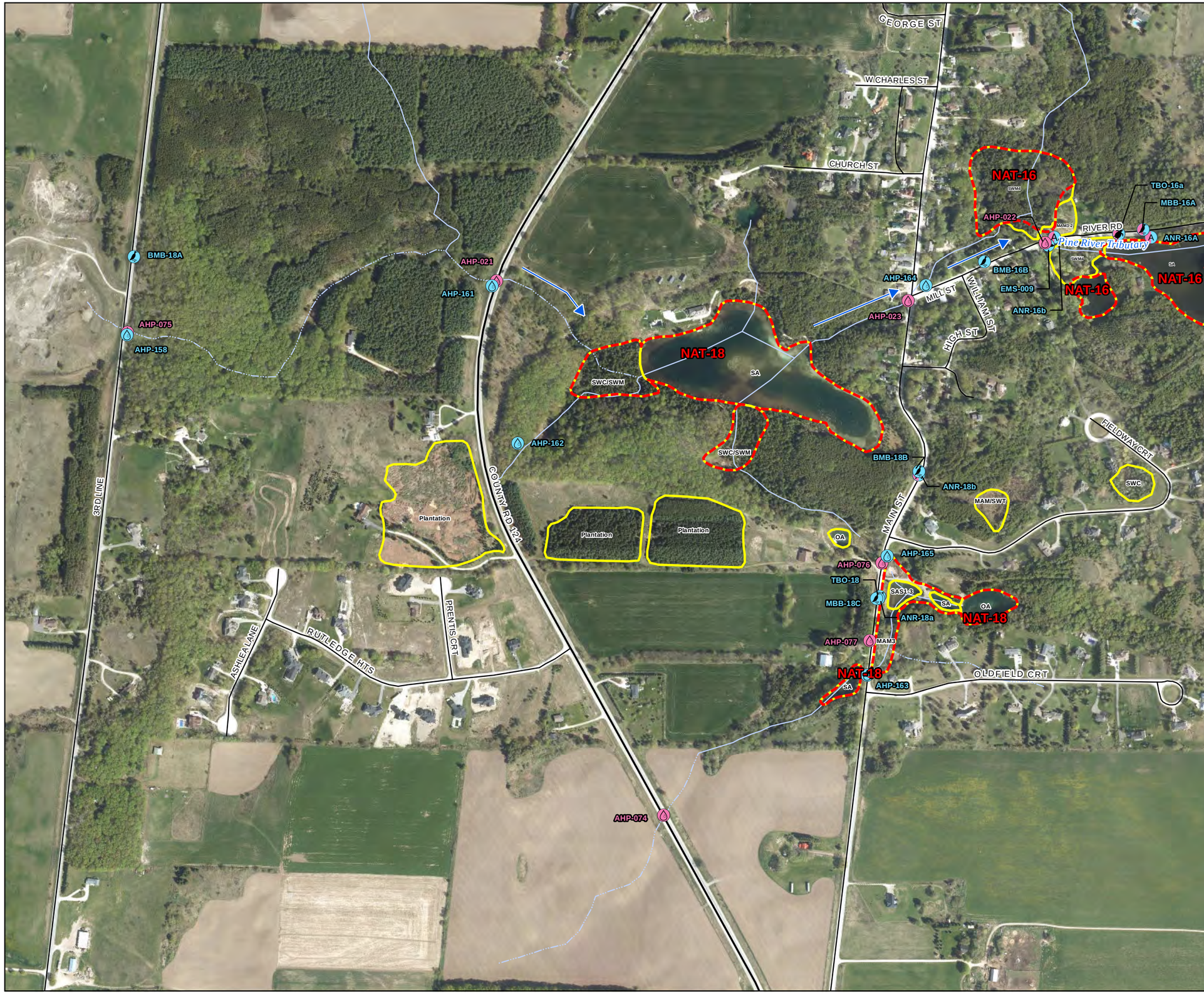
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

Map 2-8

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



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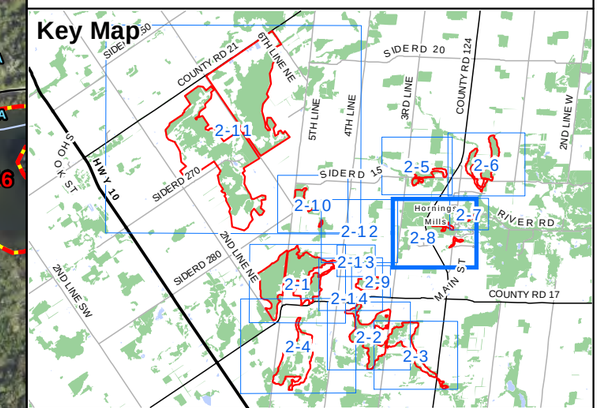

Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWC) Coniferous Swamp
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,500

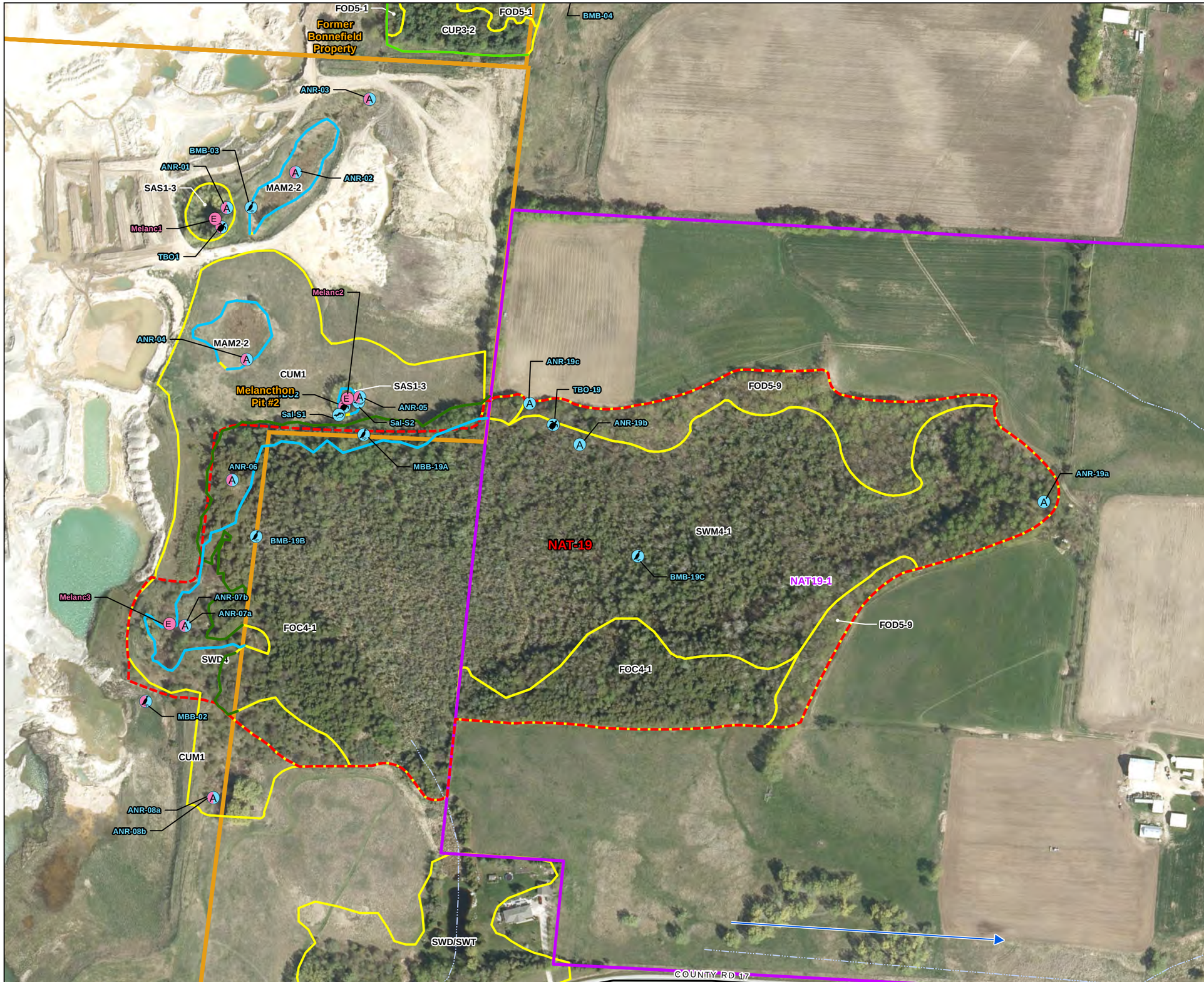
0 100 200 300 400 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

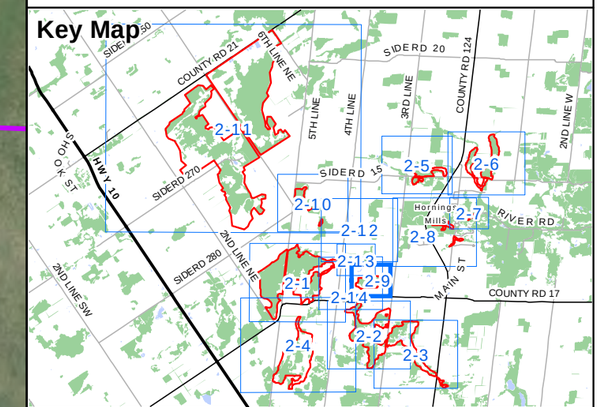
Map 2-9

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-2) White Pine Coniferous Plantation Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

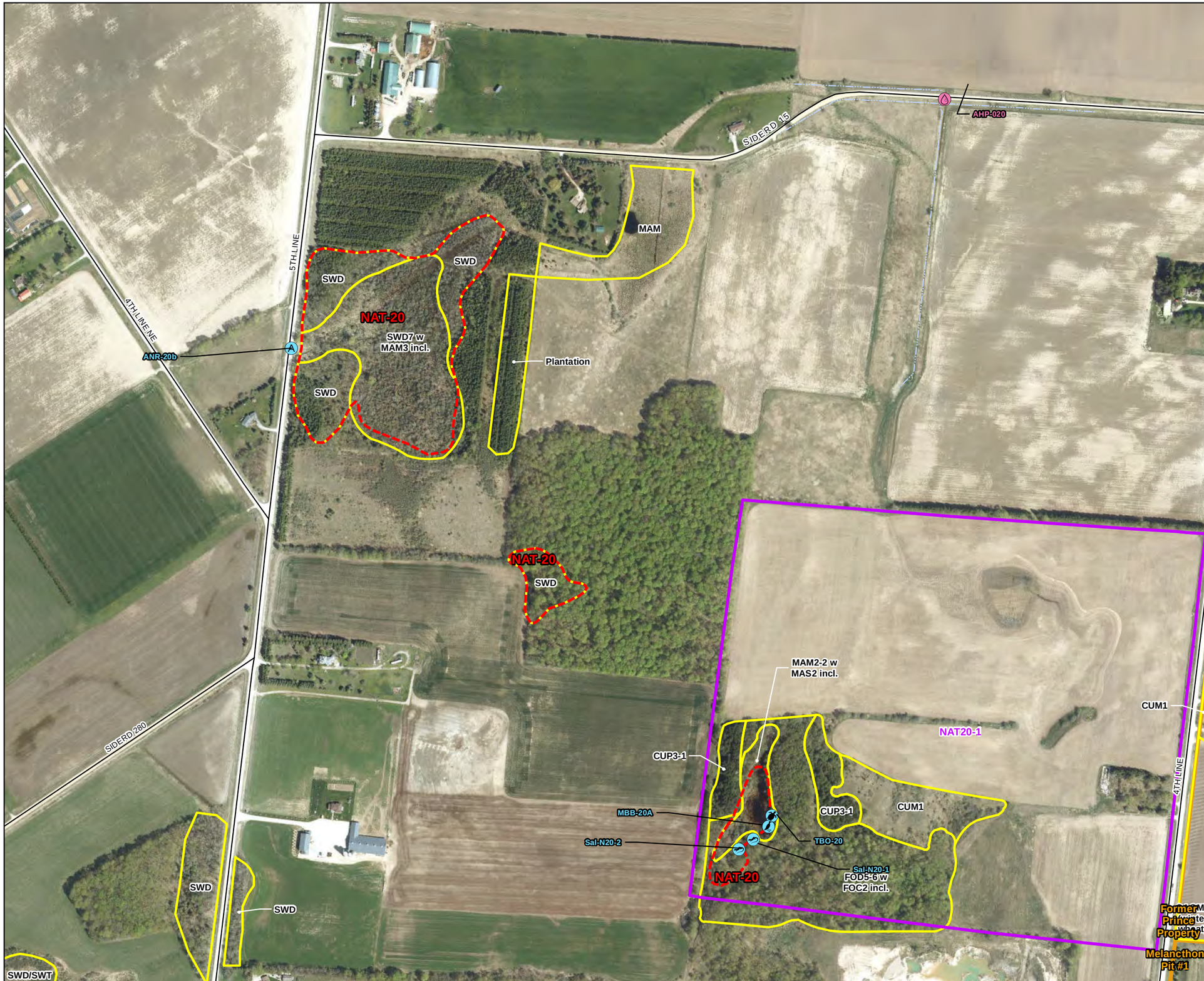
0 100 200 Meters

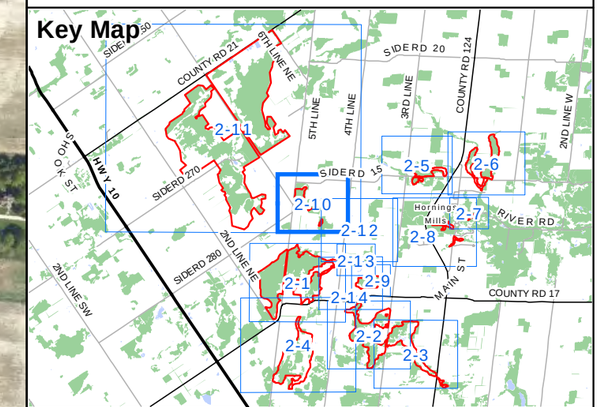
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

Map 2-10

Strada Pit/Quarry Natural Environment Assessment

Survey Stations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(CUP3-1) Red Pine Coniferous Plantation Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(MAM) Meadow Marsh
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(OAG) Open Agriculture
(SWD) Deciduous Swamp
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWT) Thicket Swamp

- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,500

0 100 200 300 Meters

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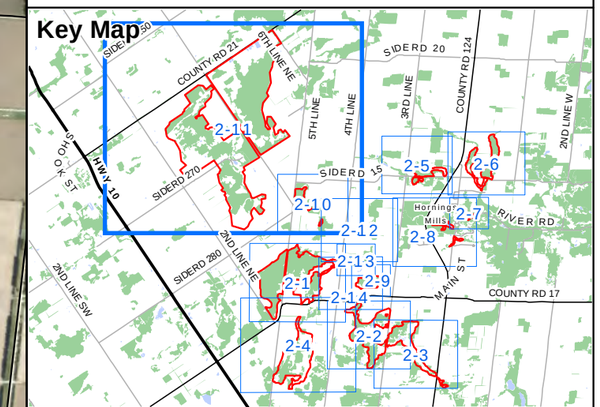
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_2024_09_18_DNH.mxd

Map 2-11

Strada Pit/Quarry Natural Environment Assessment

Survey Stations

Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Wetland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(CUP3-1) Red Pine Coniferous Plantation Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(H) Hedgerow
(MAM) Meadow Marsh
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS2) Mineral Shallow Marsh Ecosite
(OAG) Open Agriculture
(SWD) Deciduous Swamp
(SWD/SWM) Deciduous Swamp/Mixed Swamp
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM/SWT) Mixed Swamp/Thicket Swamp
(SWT) Thicket Swamp

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:20,000

0 200 400 600 800 1,000 1,200 Meters

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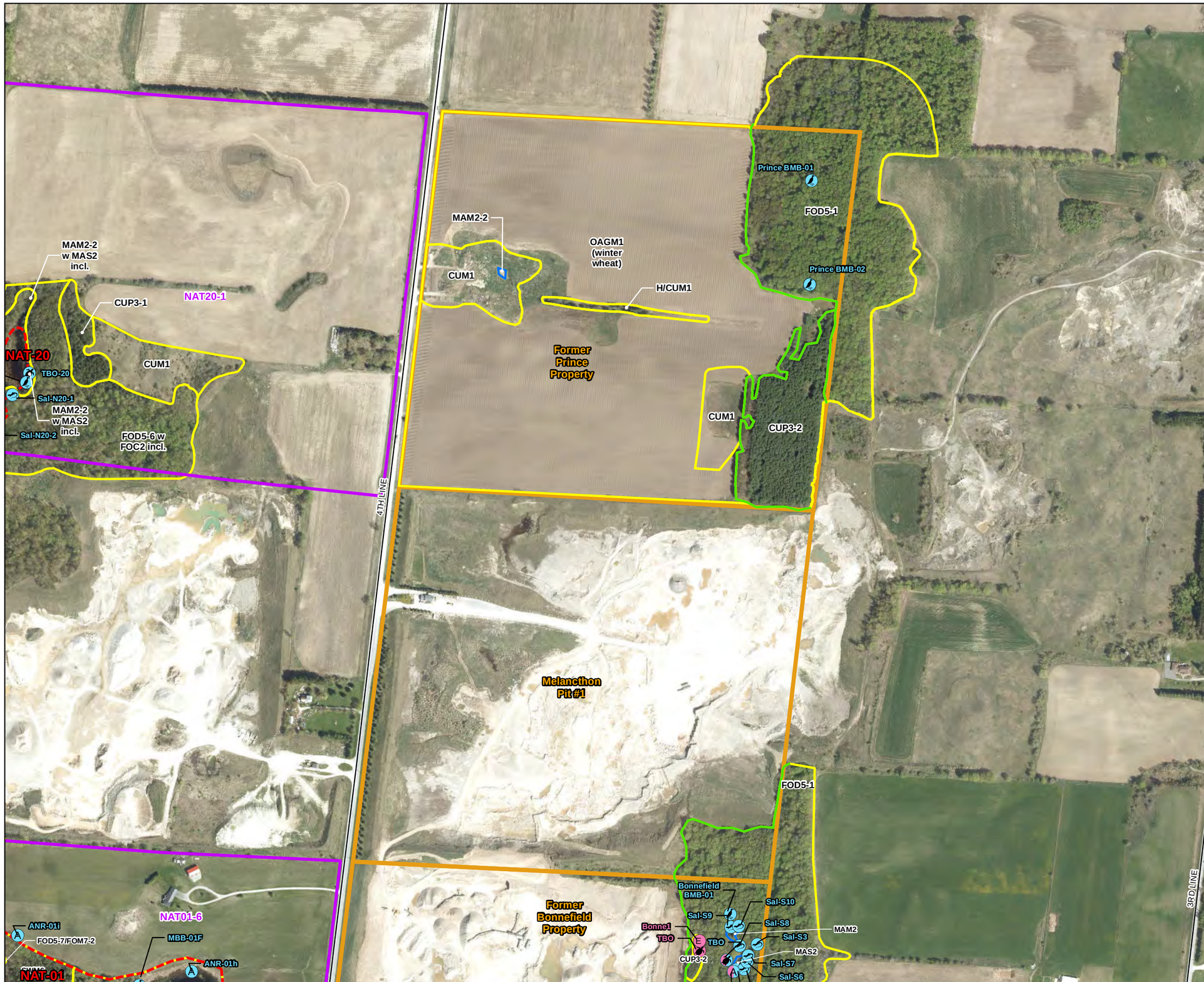
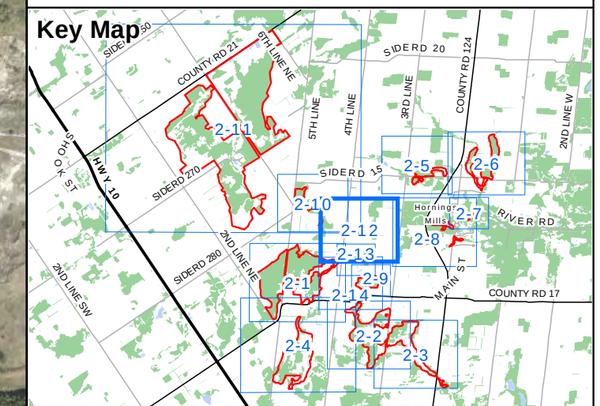
Map 2-12

Strada Pit/Quarry Natural Environment Assessment

Survey Stations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-1) Red Pine Coniferous Plantation Type
(CUP3-2) White Pine Coniferous Plantation Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(H) Hedgerow
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS) Shallow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(OAG) Open Agriculture
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

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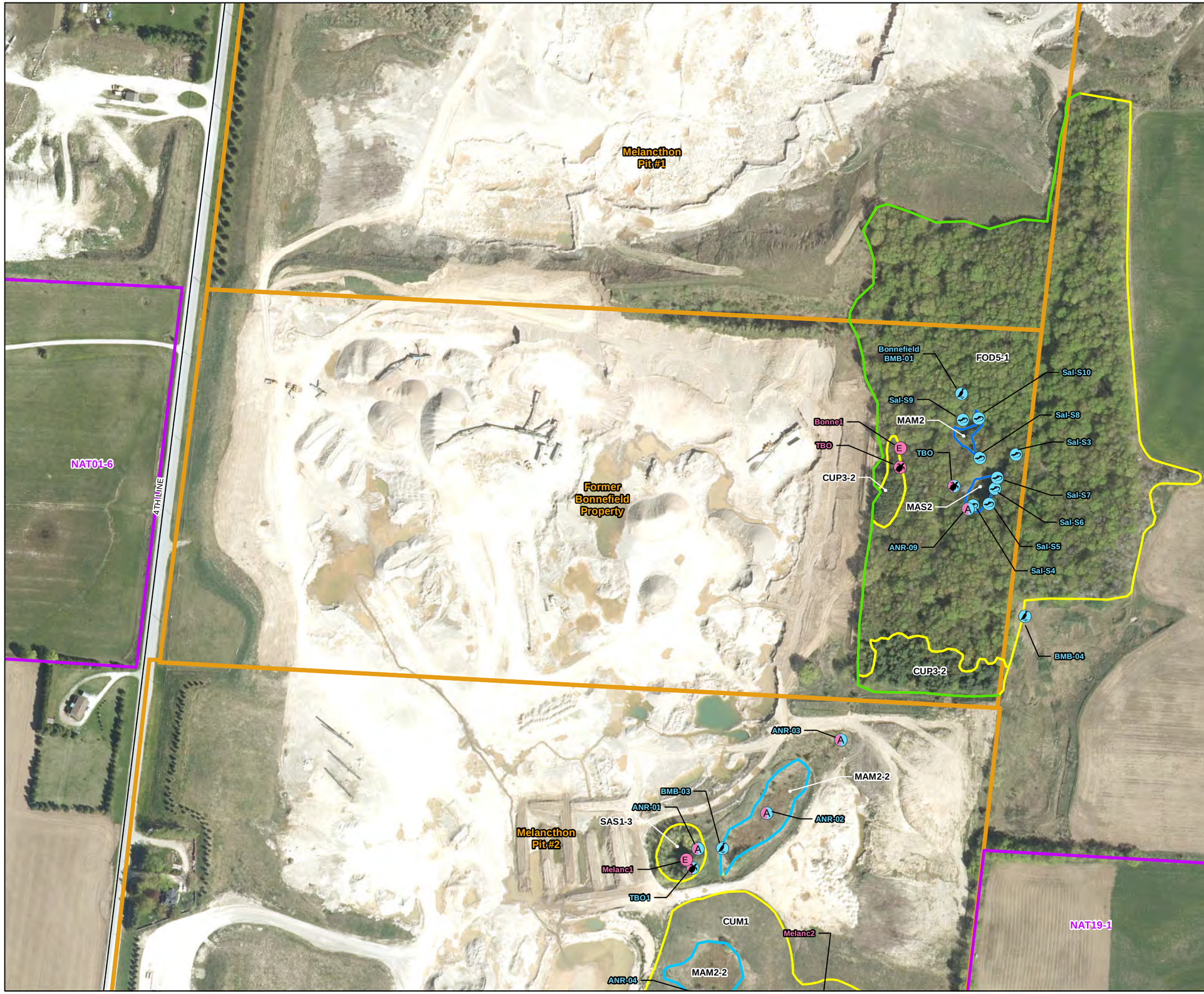
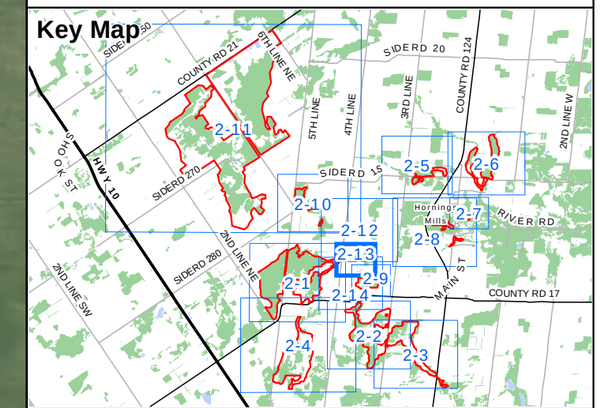
Map 2-13

Strada Pit/Quarry Natural Environment Assessment

Survey Stations





Legend

- Subject Lands
- Participating Property
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-2) White Pine Coniferous Plantation Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS2) Mineral Shallow Marsh Ecosite
(SAS1-3) Stonewort Submerged Shallow Aquatic Type

- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)

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NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

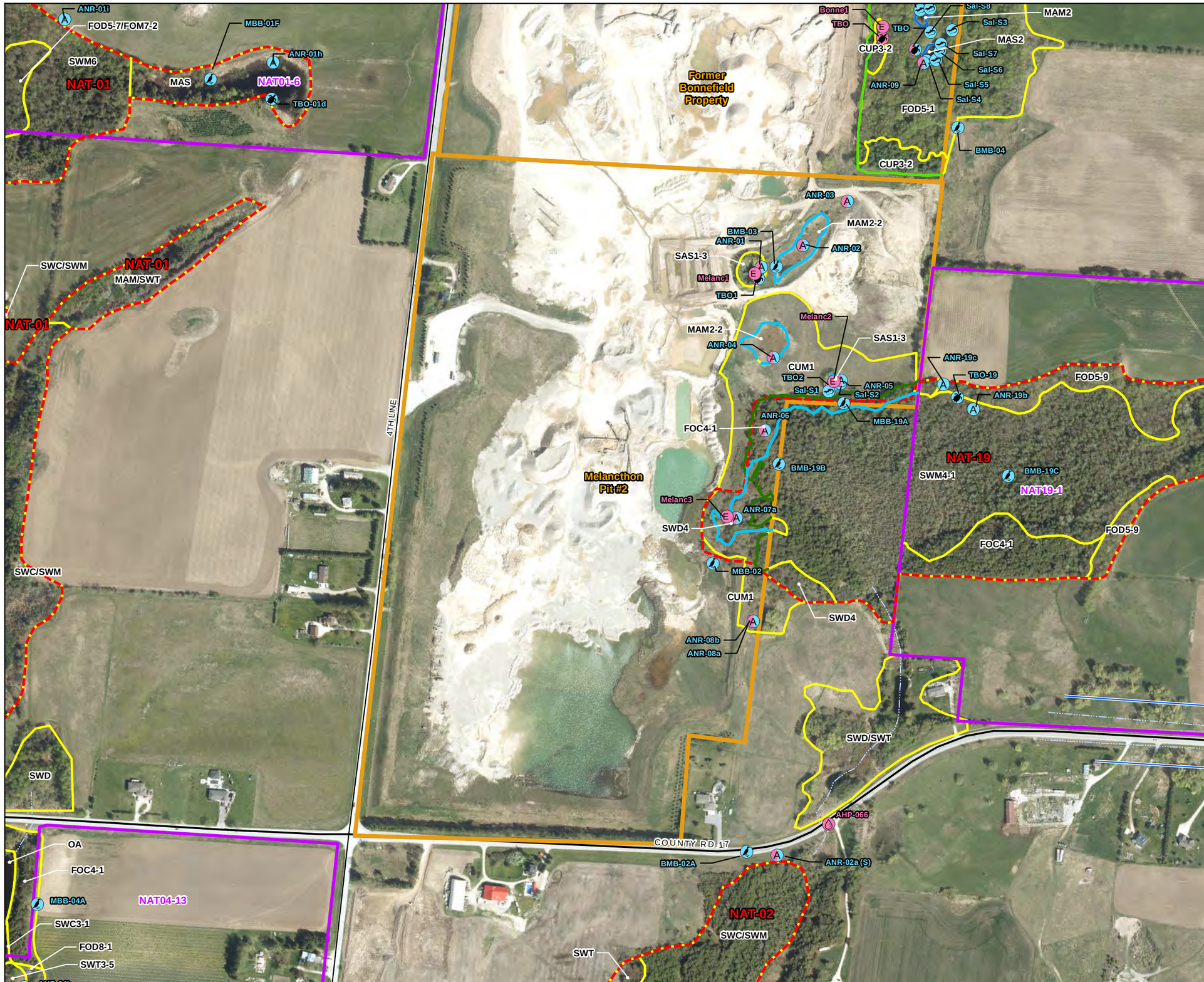
0 100 200 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_Pg12-14_2024_09_18_DNH.mxd

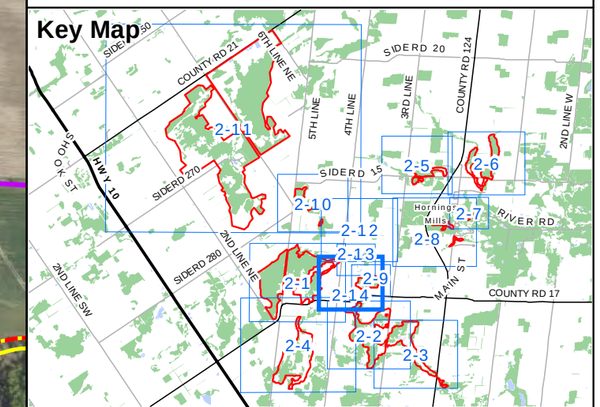
Map 2-14

Strada Pit/Quarry Natural Environment Assessment

Survey Stations



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-2) White Pine Coniferous Plantation Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(MAM) Meadow Marsh
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS) Shallow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(OA) Open Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWC) Coniferous Swamp
(SWC3-1) White Cedar Organic Coniferous Swamp Type
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT3-5) Red-osier Organic Thicket Swamp Type

Survey Station

- Aquatic (AHP)
- Aquatic (EMS)
- Bird (BMB / MBB)
- Anuran (ANR)
- Salamander (SAL)
- Turtle (TBO)
- Egg Mass (NAT)

Survey Year

- 2020 / 2021
- 2022

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Project: 2473
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,000

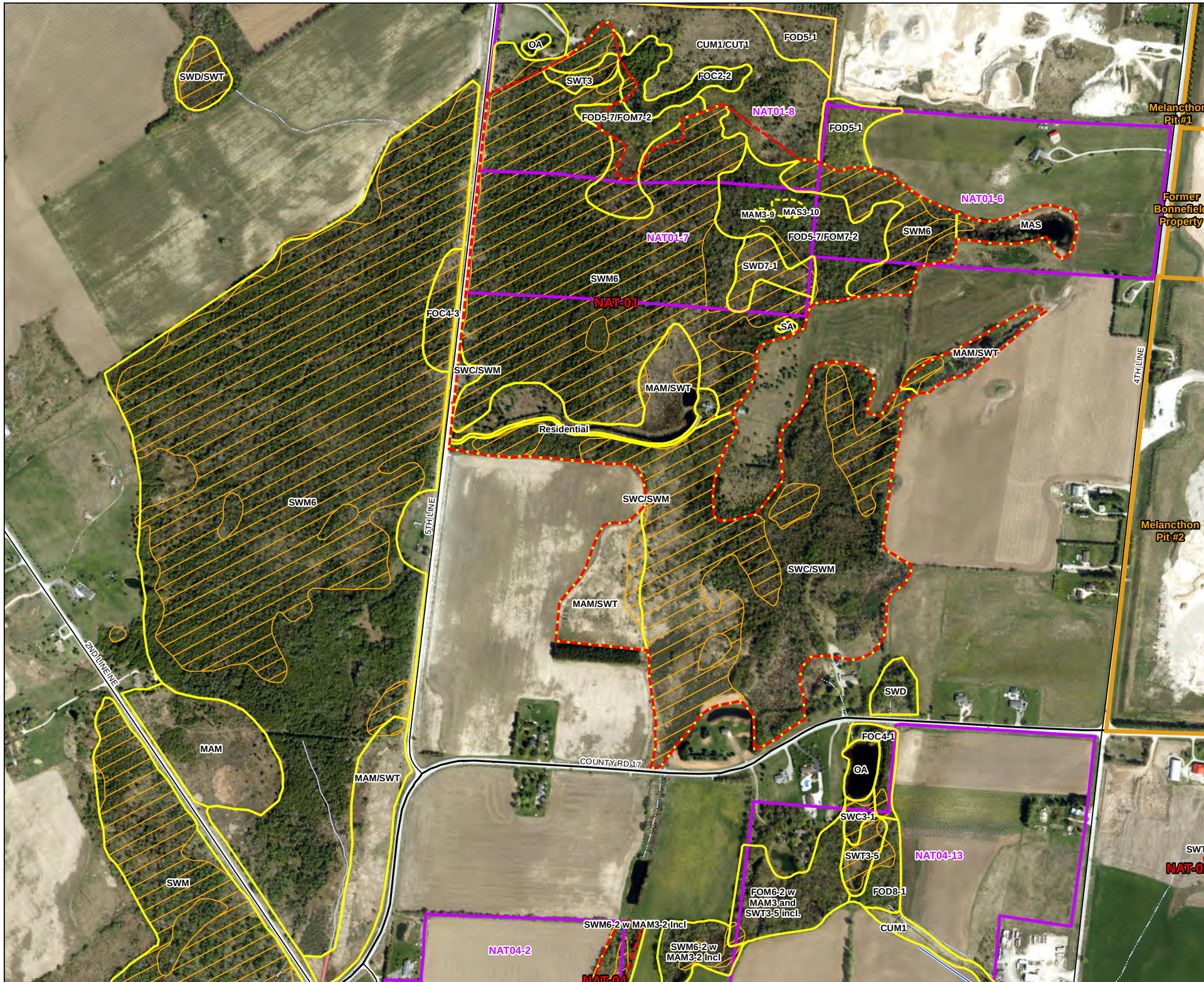
0 100 200 300 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map2_StationLocationsTerrestrial_Pg12-14_2024_09_18_DNH.mxd

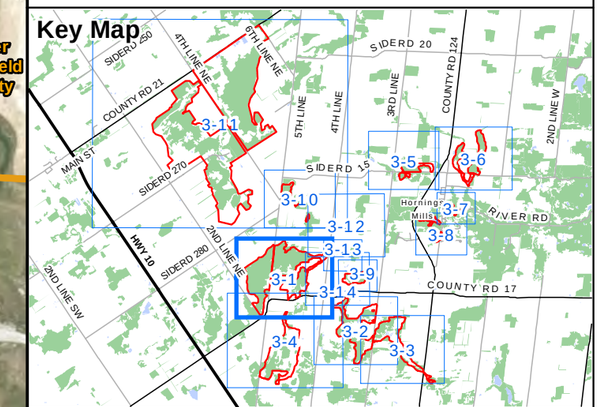
Map 3-1

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUM1) Mineral Cultural Meadow Ecosite

(CUT1) Mineral Cultural Thicket Ecosite

(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOC4-3) Fresh - Moist White Cedar - Balsam Fir Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM3-9) Forb Organic Meadow Marsh Type

(MAS) Shallow Marsh

(MAS3-10) Forb Organic Shallow Marsh Type

(OA) Open Water

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type

(SWM) Mixed Swamp

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

(SWT) Thicket Swamp

(SWT3) Organic Thicket Swamp Ecosite

(SWT3-5) Red-osier Organic Thicket Swamp Type

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:7,500

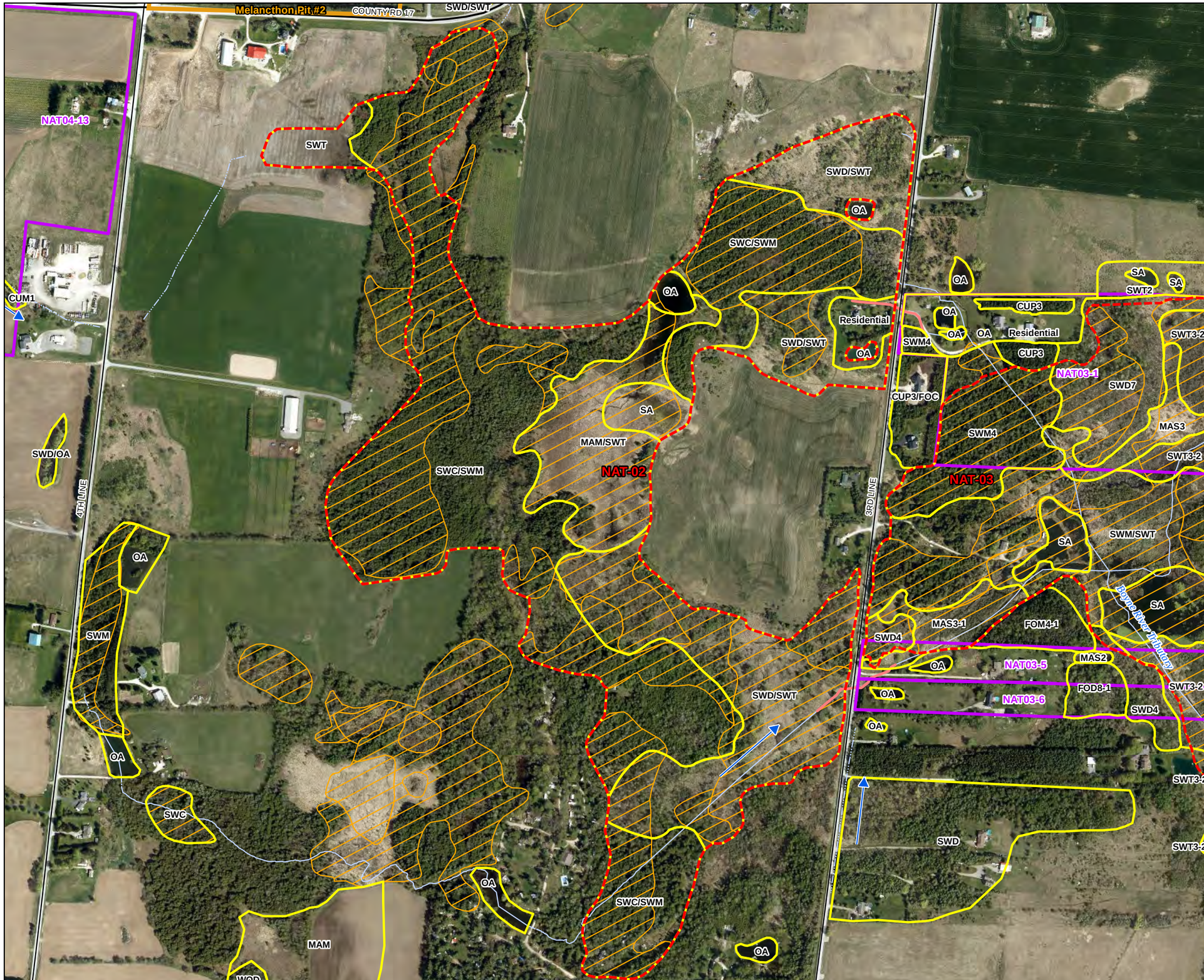
0 100 200 300 400 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map3_ExistingNaturalFeatures_2024_09_18_DNH.mxd

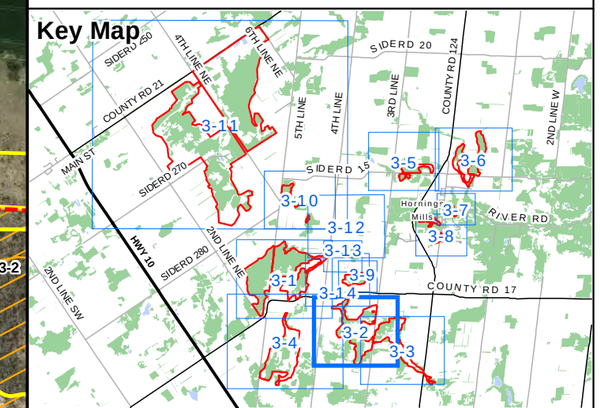
Map 3-2

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type
(WOD) Woodland

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1:6,500

0 100 200 300 400 Meters

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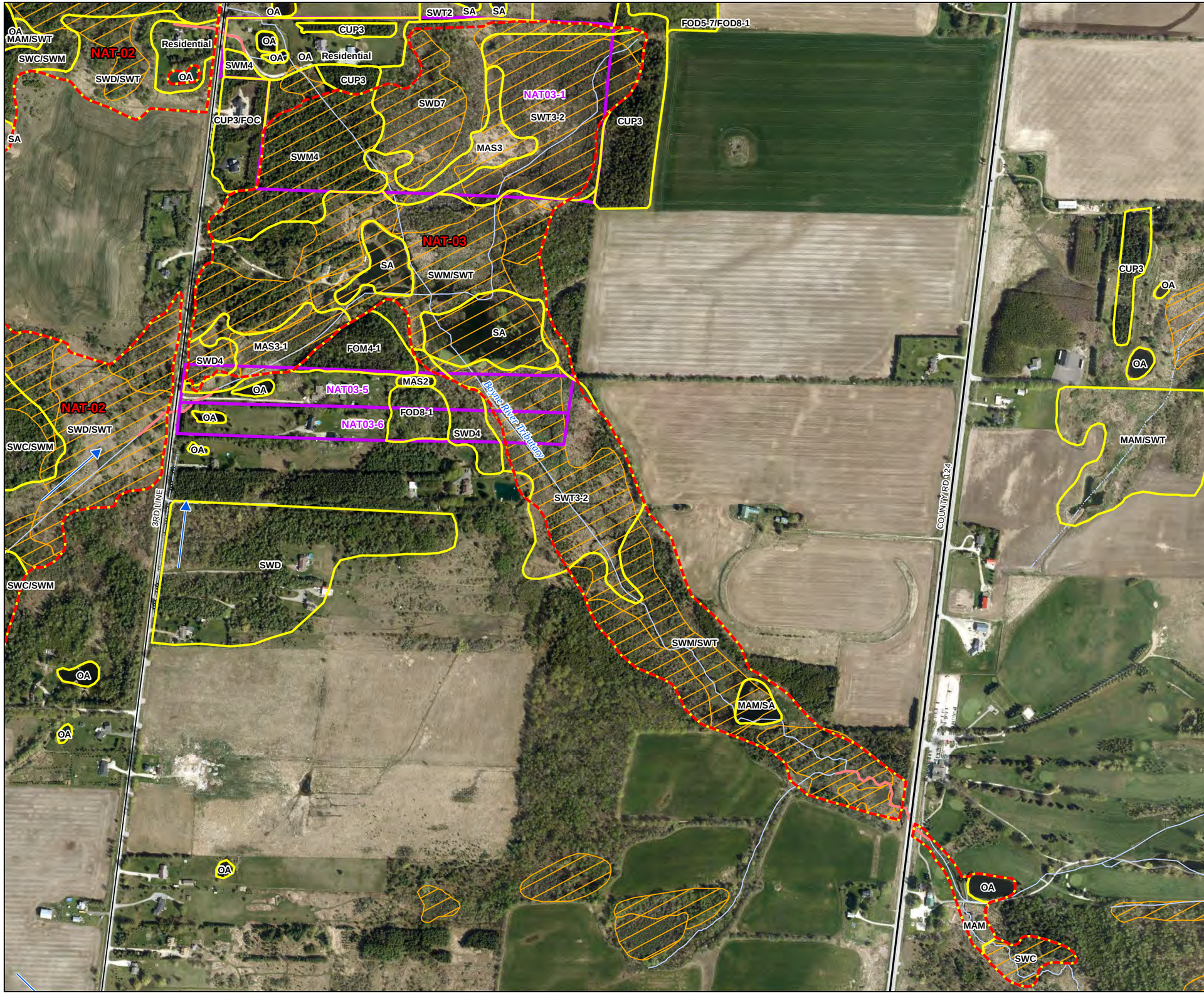
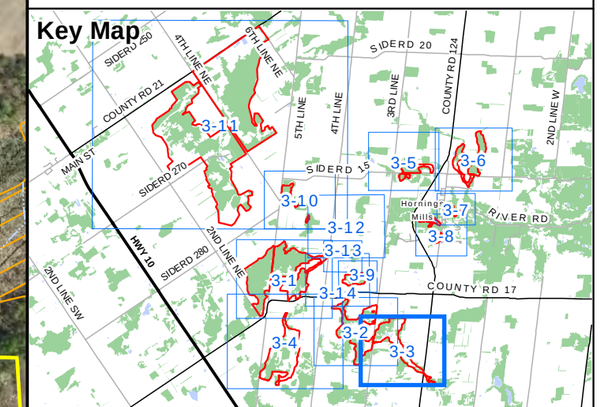
Map 3-3

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features





Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)
- (CUP3) Coniferous Plantations
- (FOC) Coniferous Forest
- (FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
- (MAM) Meadow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (MAS3) Organic Shallow Marsh Ecosite
- (MAS3-1) Cattail Organic Shallow Marsh Type
- (OA) Open Water
- (SA) Shallow Water
- (SWC) Coniferous Swamp
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
- (SWM) Mixed Swamp
- (SWM4) White Cedar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp
- (SWT2) Mineral Thicket Swamp Ecosite
- (SWT3-2) Willow Organic Thicket Swamp Type

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Size: 11x17"
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0 100 200 300 400 Meters

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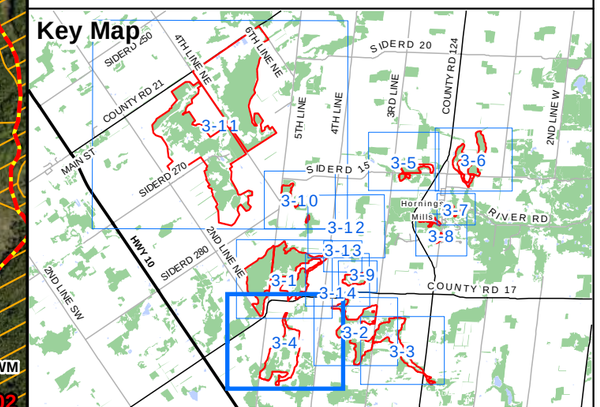
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map3_ExistingNaturalFeatures_2024_09_18_DNH.mxd

Map 3-4

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUW1) Mineral Cultural Woodland Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(OA) Open Water

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWD/SWM) Deciduous Swamp/Mixed Swamp

(SWM) Mixed Swamp

(SWM3-2) Poplar - Conifer Mineral Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

(SWT) Thicket Swamp

(SWT3-5) Red-osier Organic Thicket Swamp Type

(WOD) Woodland

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NAD83 - UTM Zone 17
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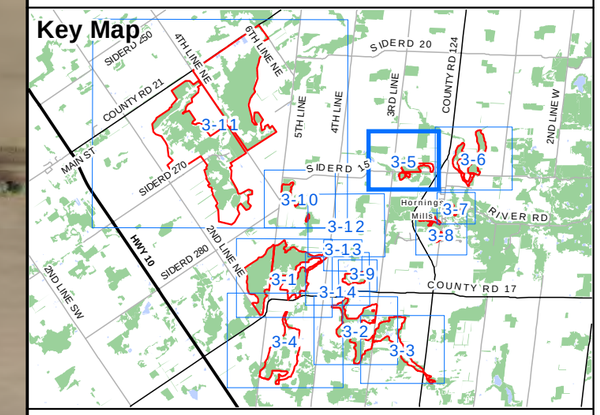
Map 3-5

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features

Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(MAM) Meadow Marsh

(MAM3) Organic Meadow Marsh Ecosite

(MAS) Shallow Marsh

(OA) Open Water

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3) White Cedar Organic Coniferous Swamp Ecosite

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM) Mixed Swamp

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

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NAD83 - UTM Zone 17
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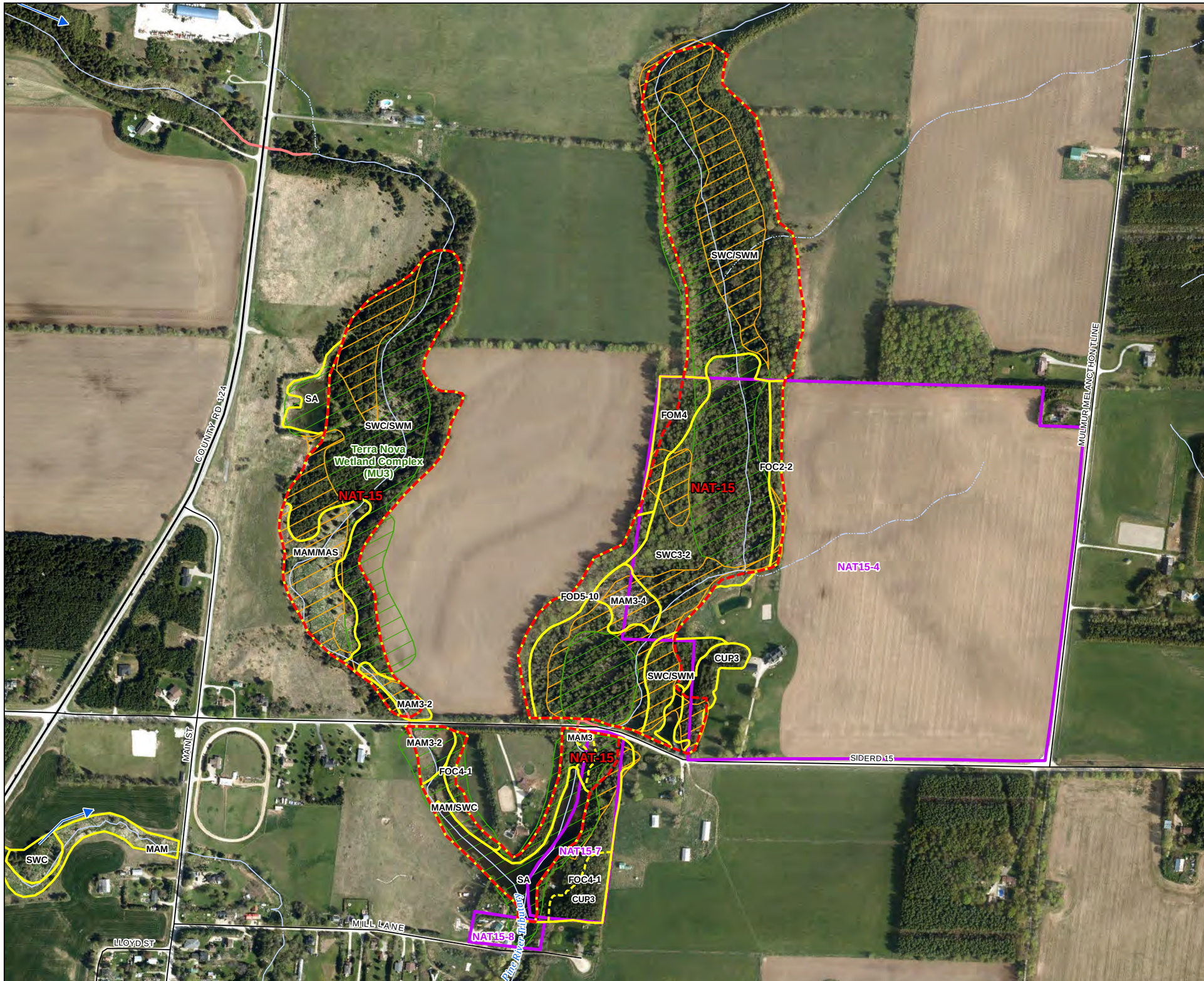
Map 3-6

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



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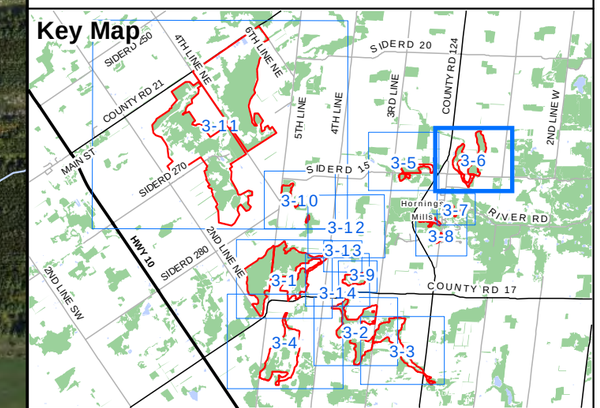

Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Ecological Land Classification (ELC)
- ELC Inclusion
- (CUP3) Coniferous Plantations
- (FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-10) Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type
- (FOM4) Dry - Fresh White Cedar Mixed Forest Ecosite
- (MAM) Meadow Marsh
- (MAM3) Organic Meadow Marsh Ecosite
- (MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
- (MAM3-4) Fowl Manna Grass Organic Meadow Marsh Type
- (MAS) Shallow Marsh
- (SA) Shallow Water
- (SWC) Coniferous Swamp
- (SWC3-2) White Cedar - Conifer Organic Coniferous Swamp Type
- (SWM) Mixed Swamp

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1:6,000

0 100 200 300 Meters

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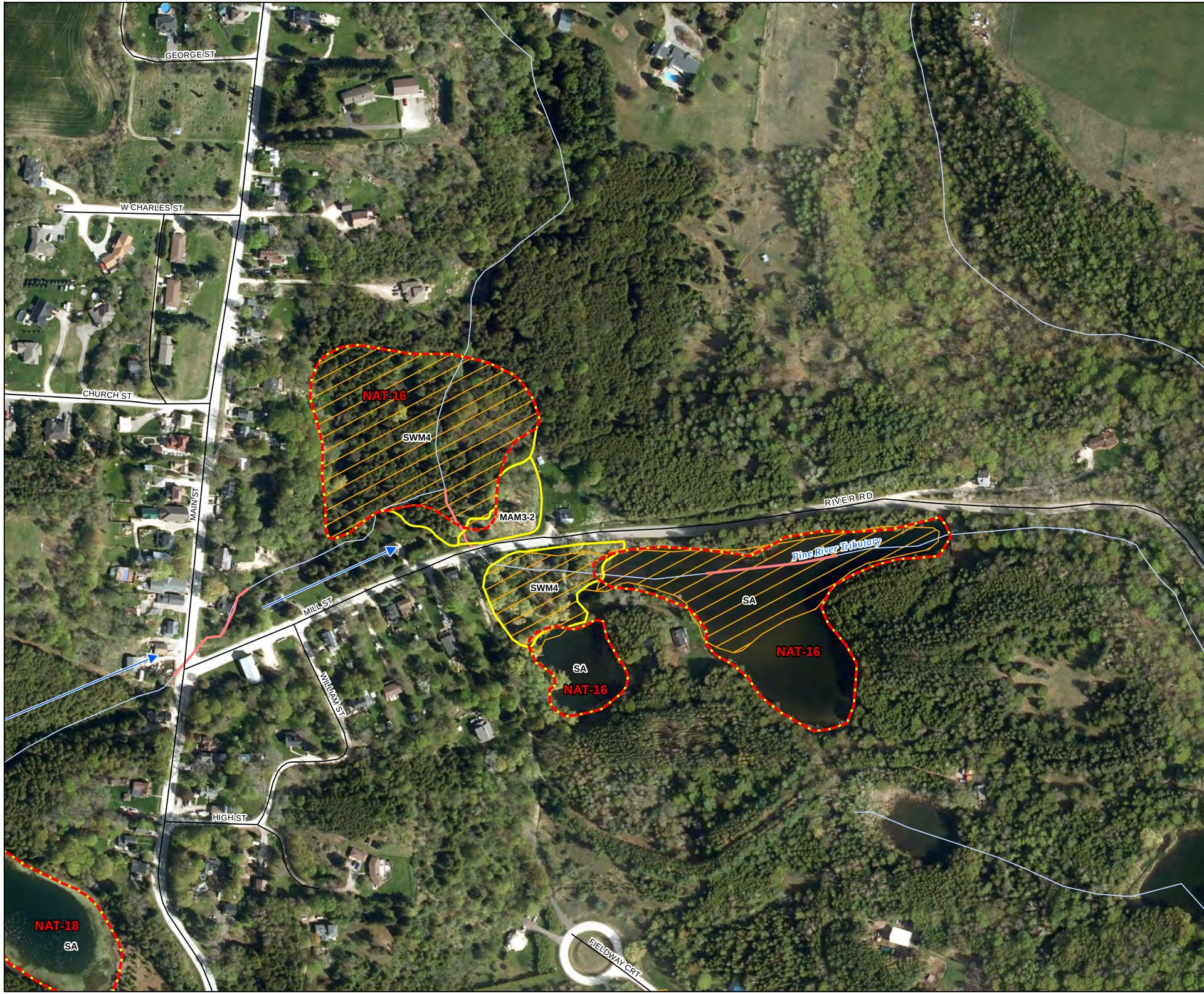
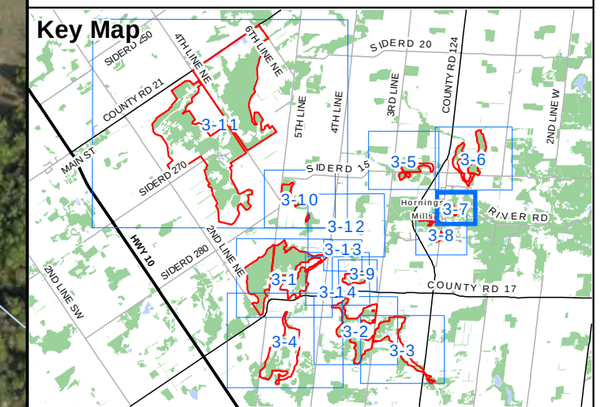
Map 3-7

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features





Legend

- Priority Natural Feature (NAT)
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type

(SA) Shallow Water

(SWM4) White Cedar Organic Mixed Swamp Ecosite

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NAD83 - UTM Zone 17
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1:3,000

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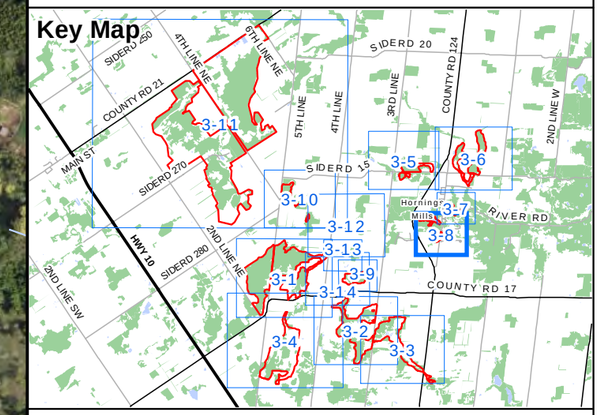
Map 3-8

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features

Key Map



Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(OA) Open Water
(SA) Shallow Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWC) Coniferous Swamp
(SWM) Mixed Swamp
(SWT) Thicket Swamp

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Project: 2473A Date: September 18, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:4,000**

0 100 200 Meters

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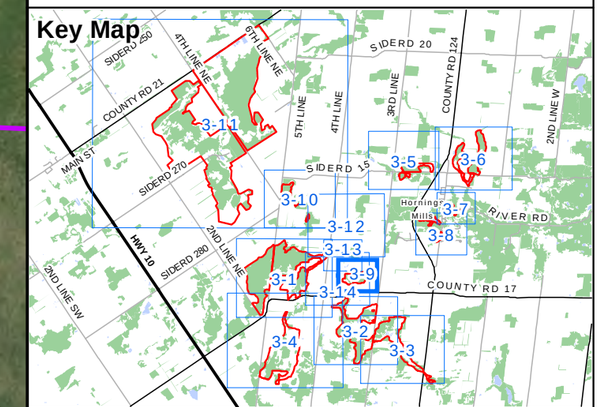
Map 3-9

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Evidence of Groundwater Influence
- Unevaluated Wetland
- Non-Provincially Significant Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

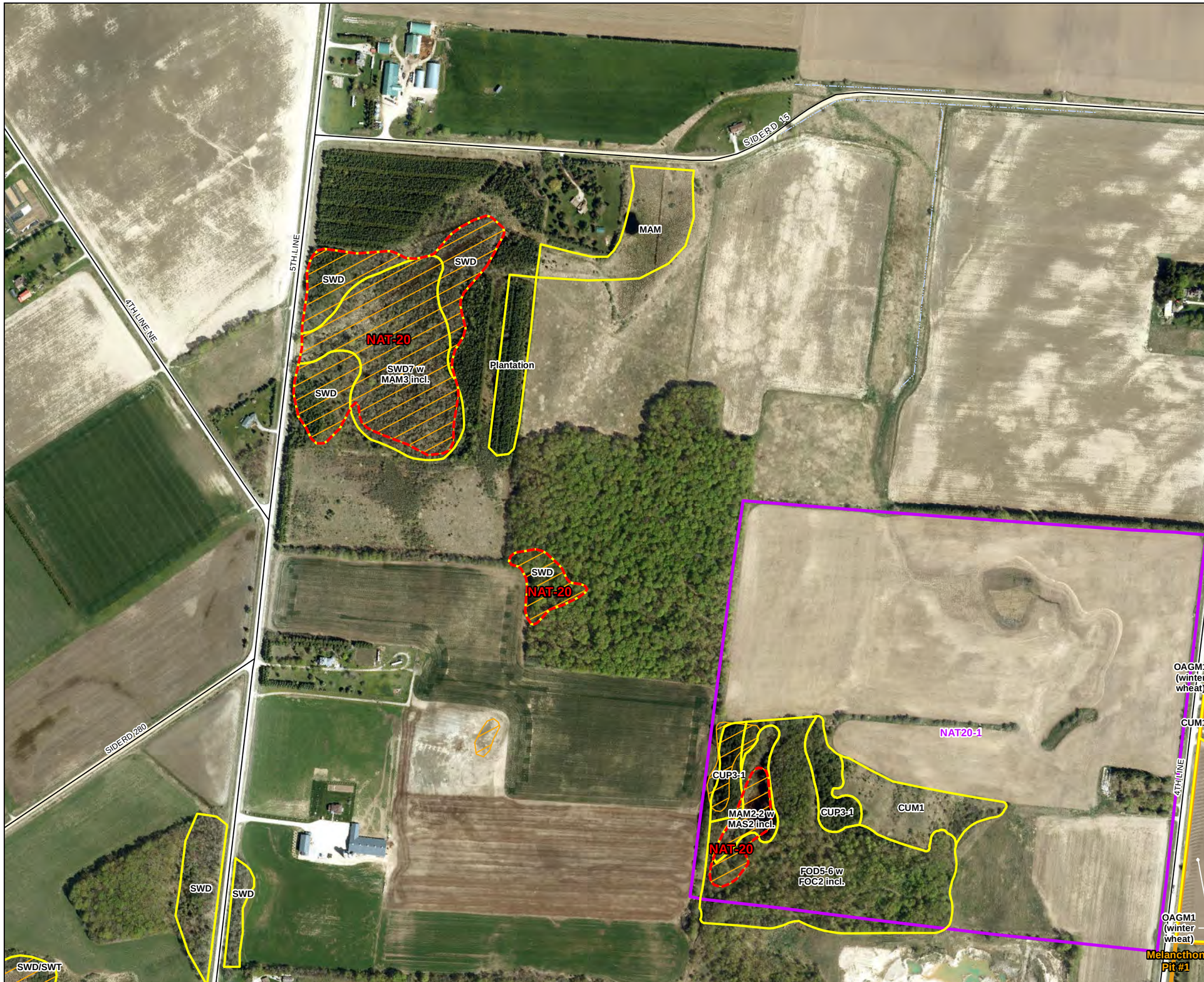
0 100 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map3_ExistingNaturalFeatures_2024_09_18_DNH.mxd

Map 3-10

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features



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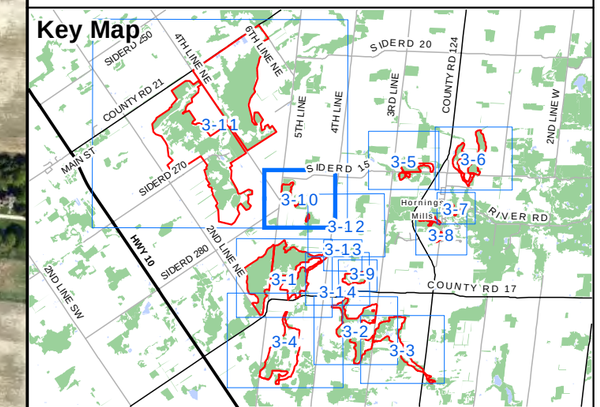

Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(CUP3-1) Red Pine Coniferous Plantation Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(MAM) Meadow Marsh
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(OAG) Open Agriculture
(SWD) Deciduous Swamp
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWT) Thicket Swamp

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Size: 11x17"
1:5,500

0 100 200 300 Meters

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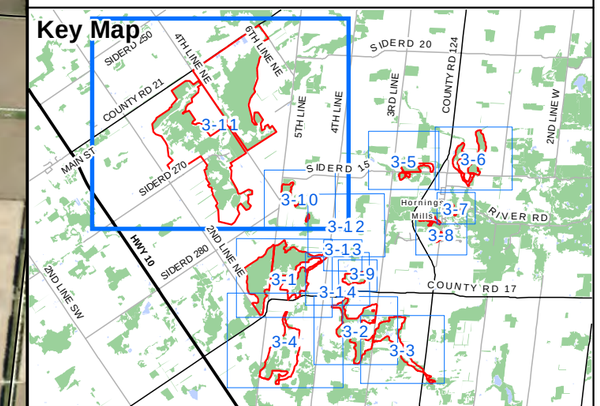
Map 3-11

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features

Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Wetland Boundary (NRSI 2022)
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3) Coniferous Plantations

(CUP3-1) Red Pine Coniferous Plantation Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(H) Hedgerow

(MAM) Meadow Marsh

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(OAG) Open Agriculture

(SWD) Deciduous Swamp

(SWD/SWM) Deciduous Swamp/Mixed Swamp

(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite

(SWM/SWT) Mixed Swamp/Thicket Swamp

(SWT) Thicket Swamp

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NAD83 - UTM Zone 17
Size: 11x17"
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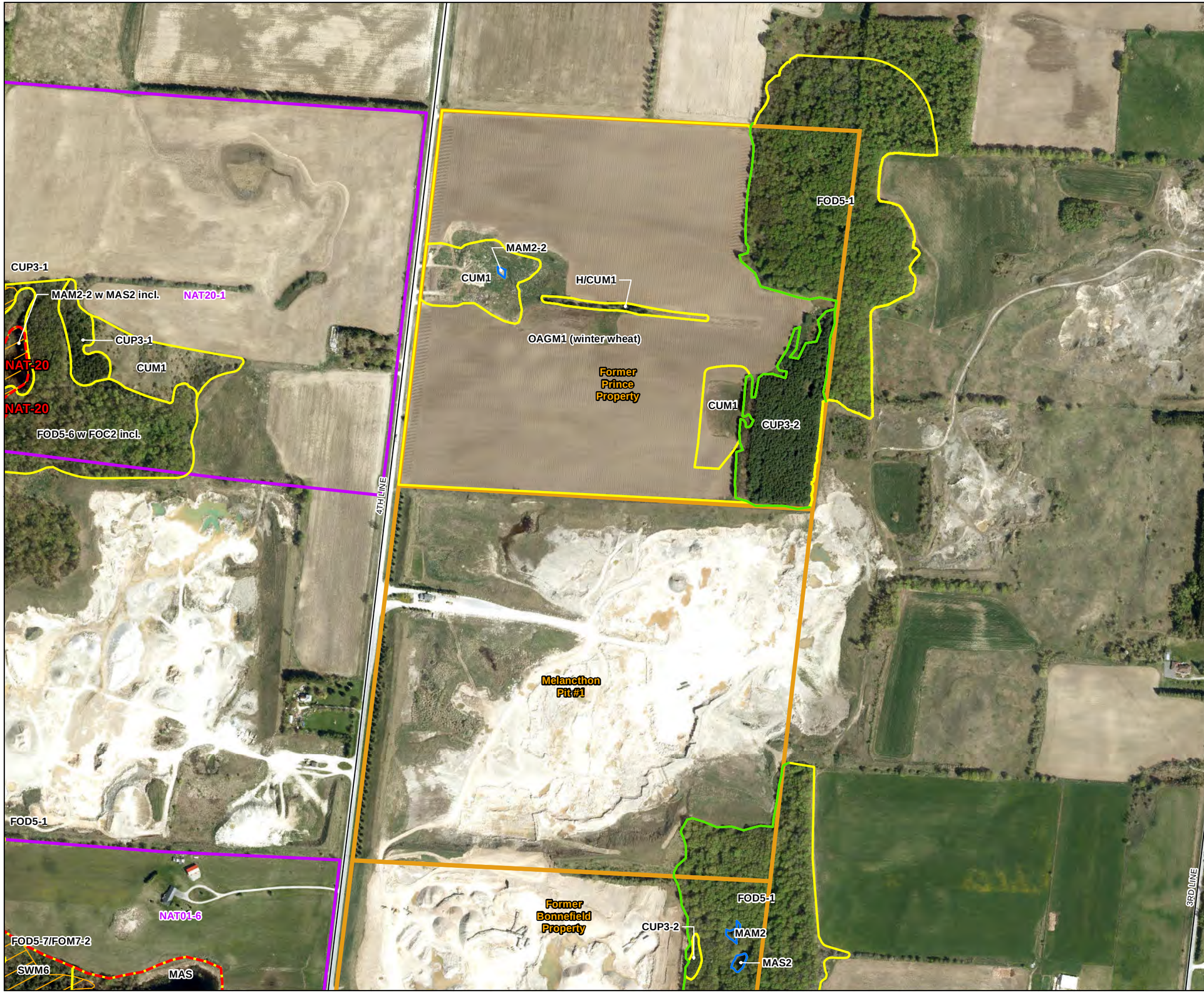
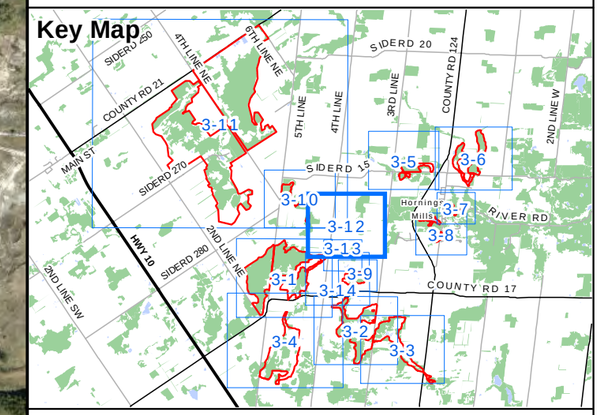
Map 3-12

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Unevaluated Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-1) Red Pine Coniferous Plantation Type
(CUP3-2) White Pine Coniferous Plantation Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(H) Hedgerow
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS) Shallow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(OAG) Open Agriculture
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

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0 100 200 300 Meters

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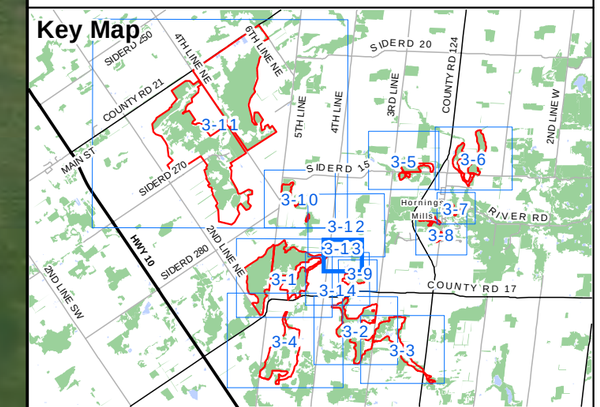
Map 3-13

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features

Key Map



Legend

- Subject Lands
- Participating Property
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Non-Provincially Significant Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

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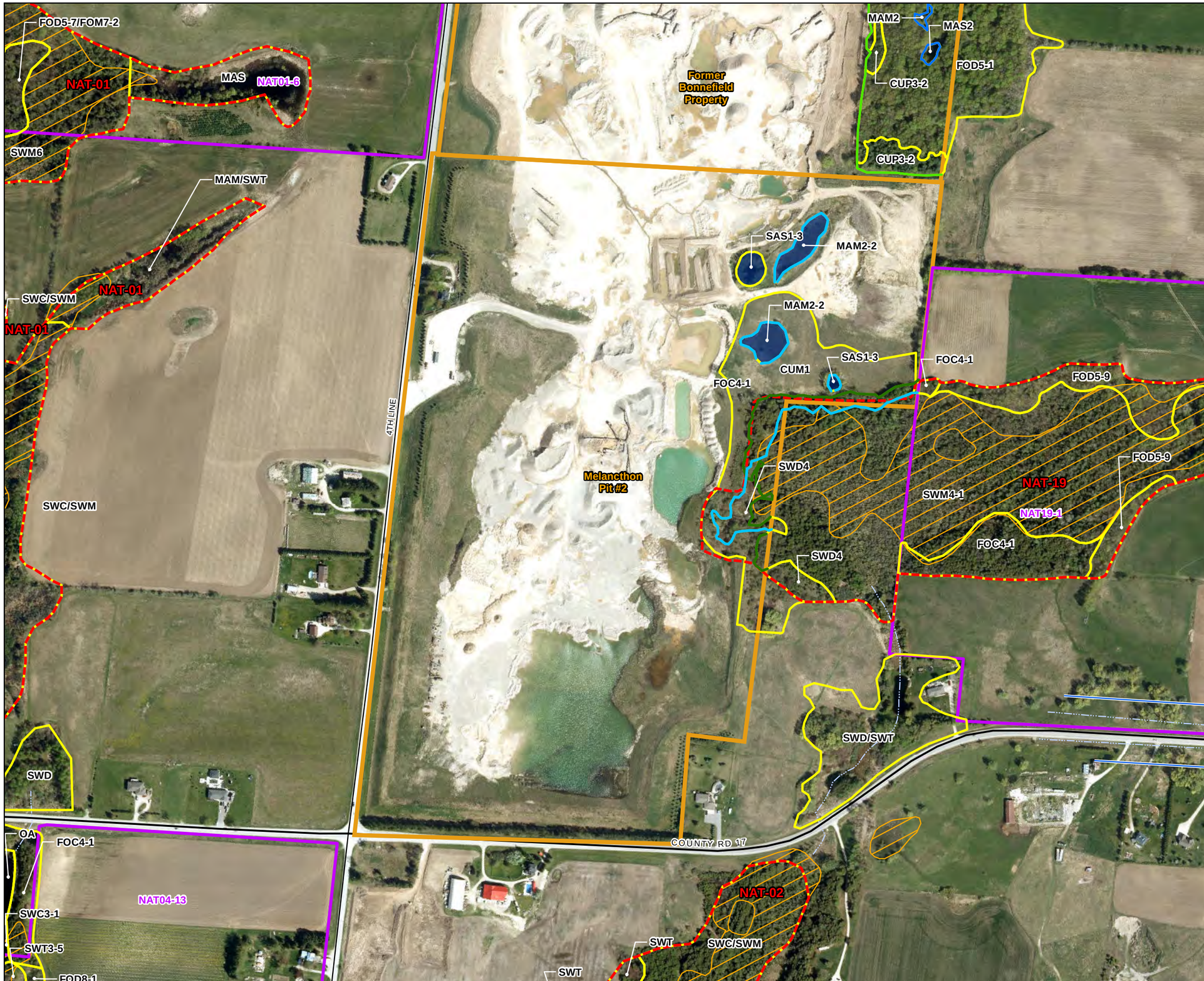
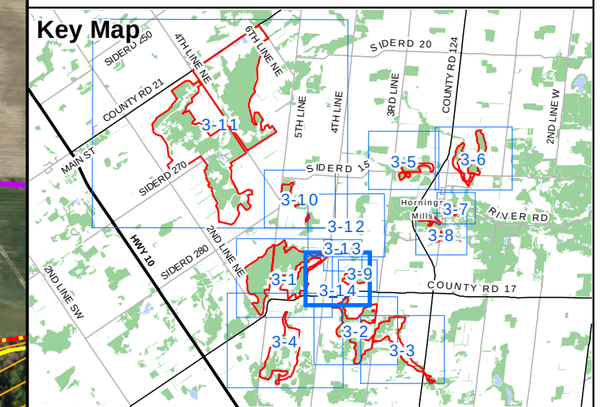
Map 3-14

Strada Pit/Quarry Natural Environment Assessment

Existing Natural Features





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Unevaluated Wetland
- Non-Provincially Significant Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS) Shallow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(OA) Open Water

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWT) Thicket Swamp

(SWT3-5) Red-osier Organic Thicket Swamp Type

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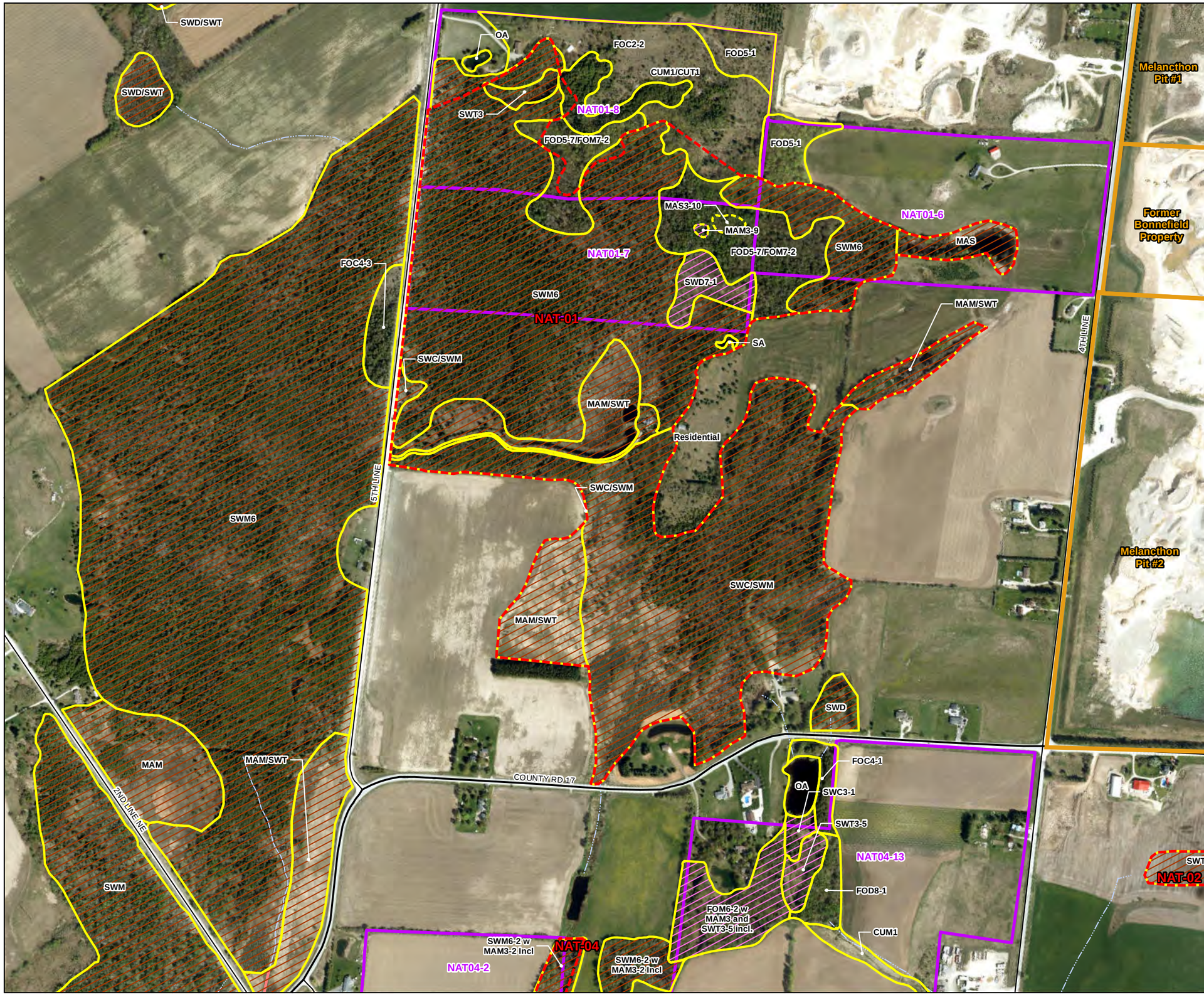
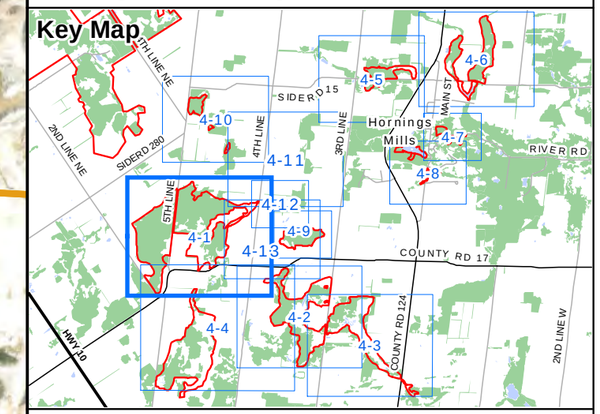
Map 4-1

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium

- Ecological Land Classification (ELC)
- ELC Inclusion

(CUM1) Mineral Cultural Meadow Ecosite
(CUT1) Mineral Cultural Thicket Ecosite
(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOC4-3) Fresh - Moist White Cedar - Balsam Fir Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(MAM) Meadow Marsh
(MAM3-9) Forb Organic Meadow Marsh Type
(MAS) Shallow Marsh
(MAS3-10) Forb Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3-1) White Cedar Organic Coniferous Swamp Type
(SWD) Deciduous Swamp
(SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type
(SWM) Mixed Swamp
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
(SWT) Thicket Swamp
(SWT3) Organic Thicket Swamp Ecosite
(SWT3-5) Red-osier Organic Thicket Swamp Type

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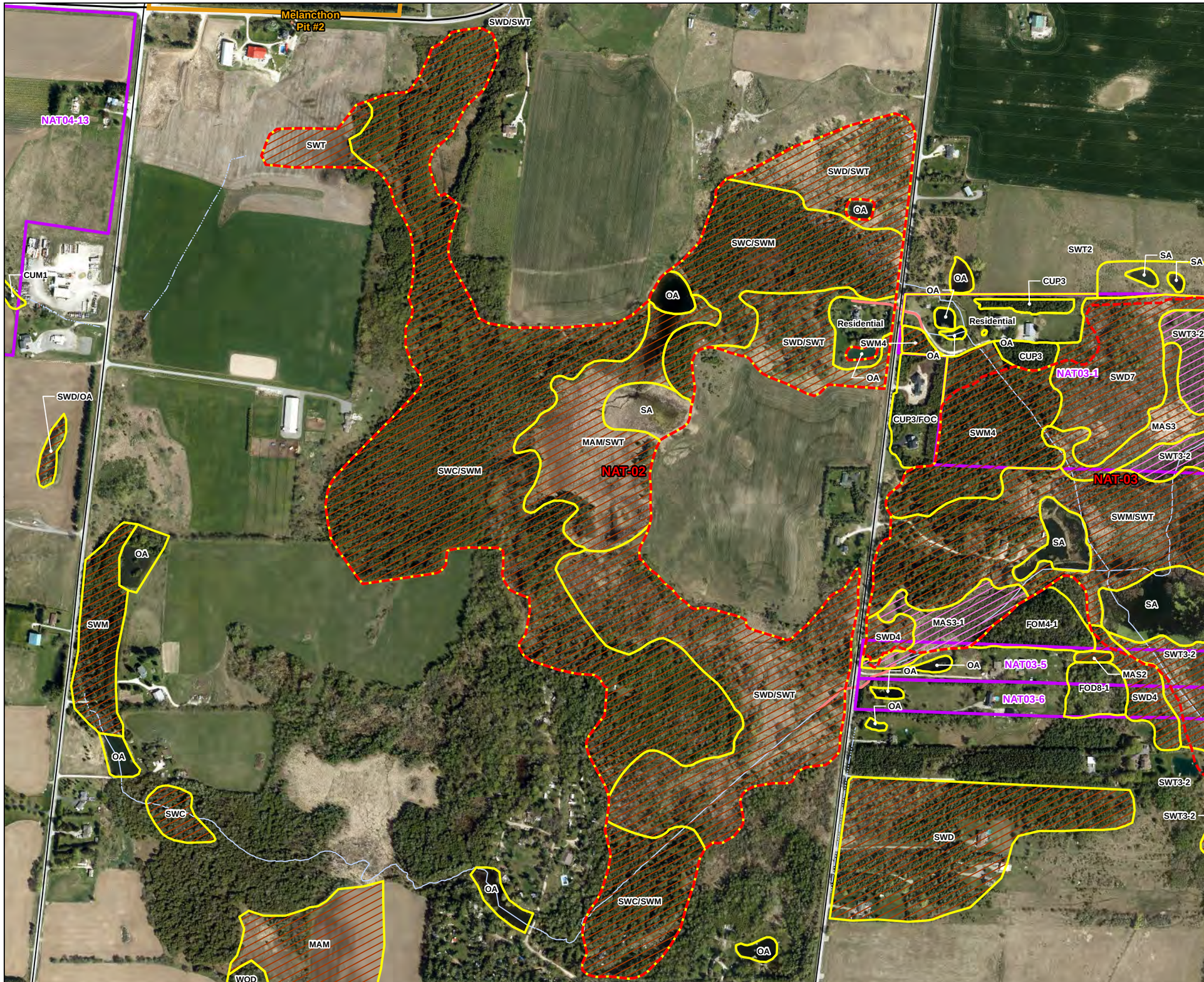
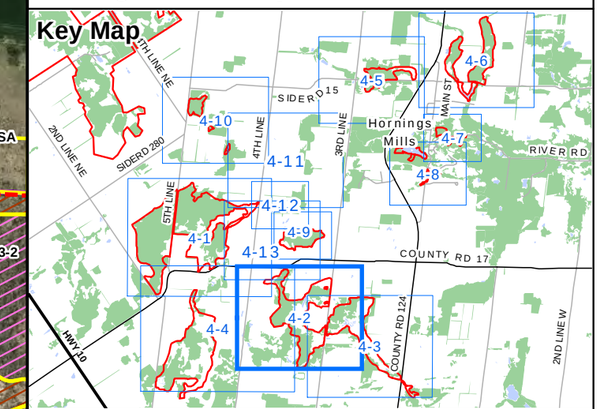
Map 4-2

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type
(WOD) Woodland

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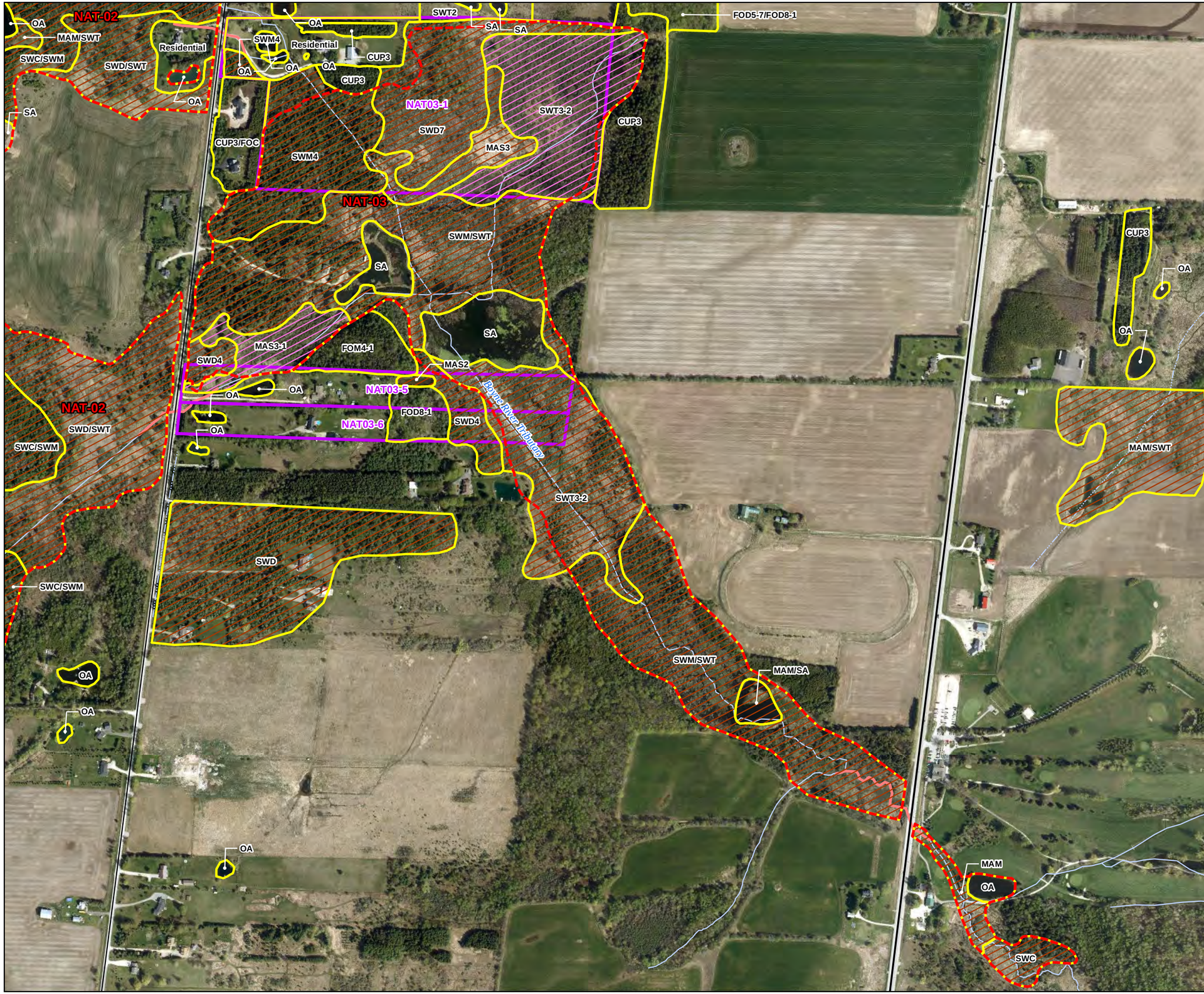
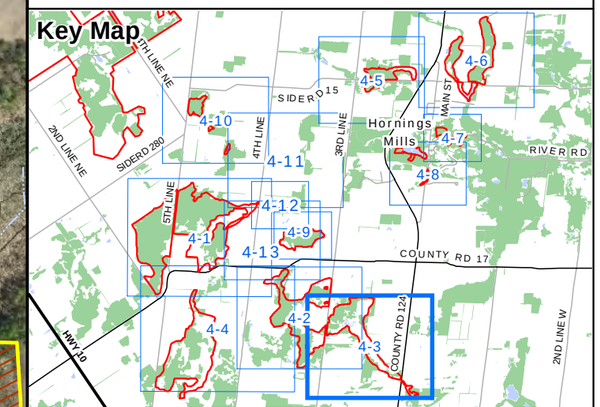
Map 4-3

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Ecological Land Classification (ELC)

(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type

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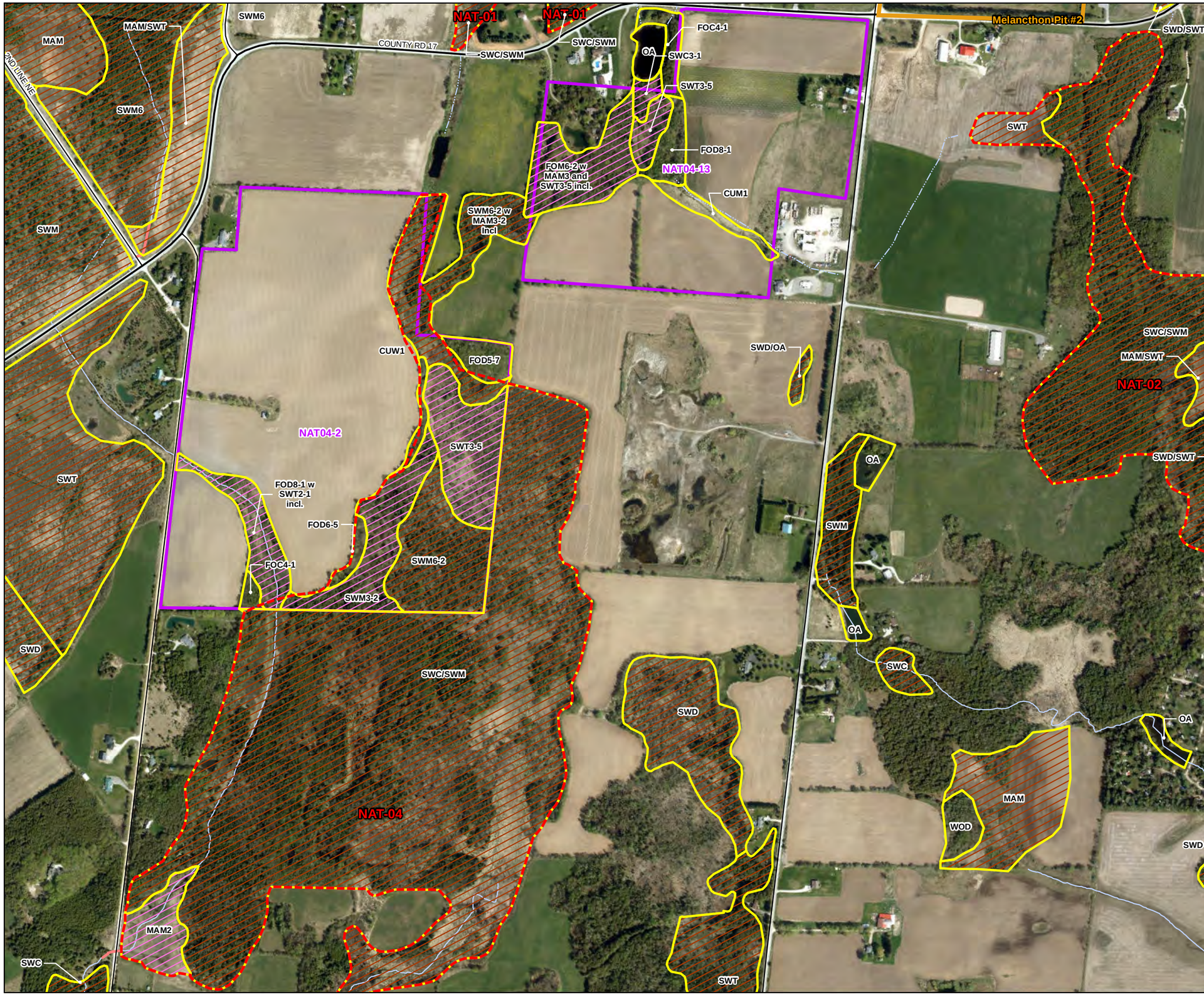
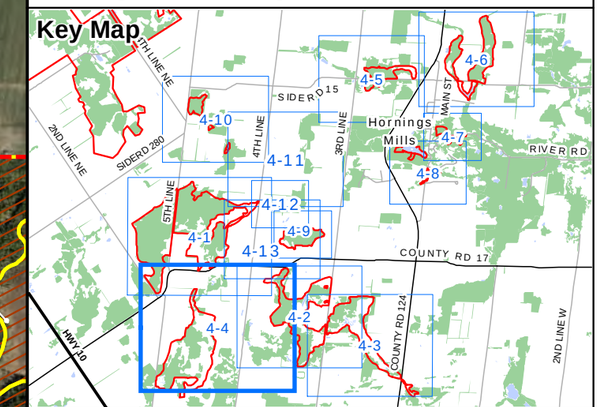
Map 4-4

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium

Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUW1) Mineral Cultural Woodland Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(OA) Open Water

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWM) Mixed Swamp

(SWM3-2) Poplar - Conifer Mineral Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

(SWT) Thicket Swamp

(SWT3-5) Red-osier Organic Thicket Swamp Type

(WOD) Woodland

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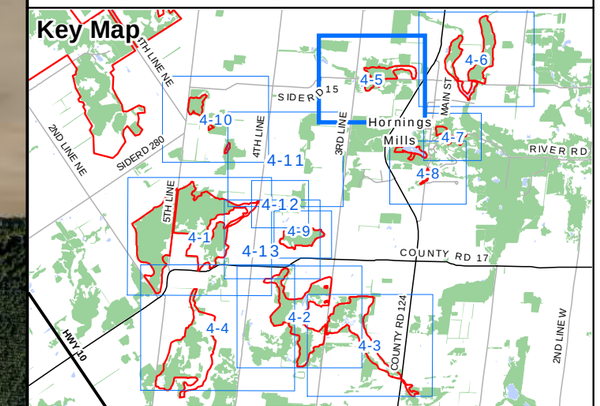
Map 4-5

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Ecological Land Classification (ELC)

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(MAM) Meadow Marsh

(MAM3) Organic Meadow Marsh Ecosite

(MAS) Shallow Marsh

(OA) Open Water

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3) White Cedar Organic Coniferous Swamp Ecosite

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM) Mixed Swamp

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

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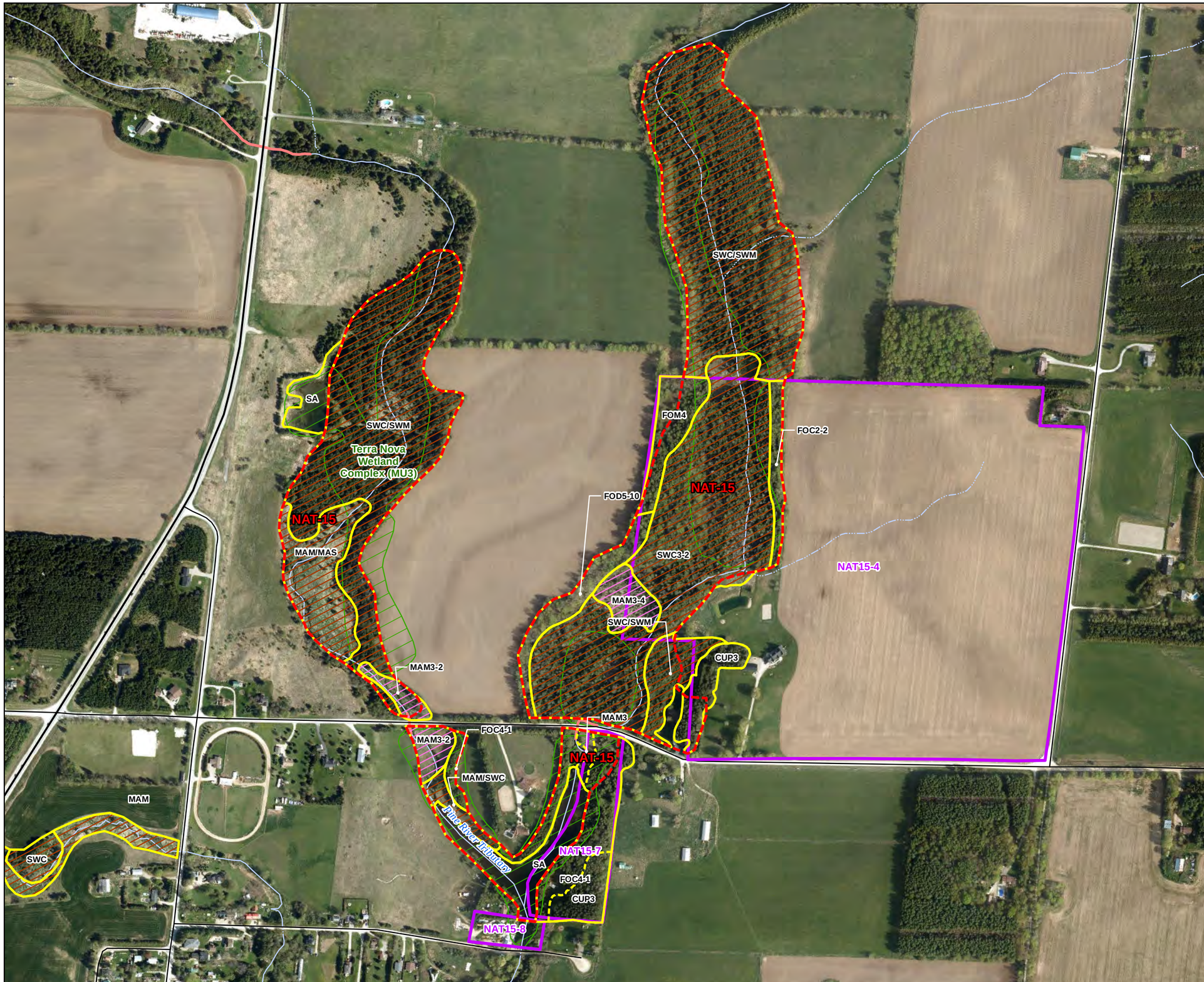
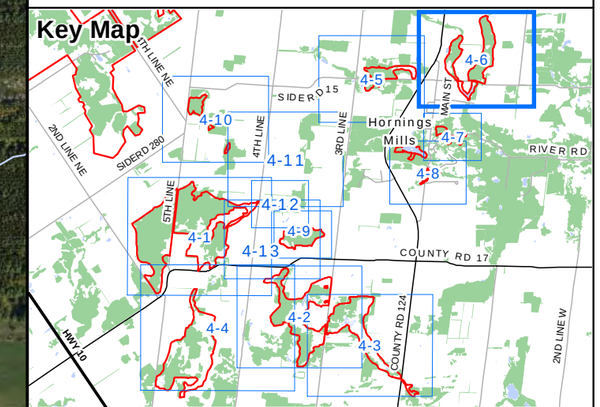
Map 4-6

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence
- Provincially Significant Wetland (PSW)

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUP3) Coniferous Plantations

(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-10) Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type

(FOM4) Dry - Fresh White Cedar Mixed Forest Ecosite

(MAM) Meadow Marsh

(MAM3) Organic Meadow Marsh Ecosite

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type

(MAM3-4) Fowl Manna Grass Organic Meadow Marsh Type

(MAS) Shallow Marsh

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3-2) White Cedar - Conifer Organic Coniferous Swamp Type

(SWM) Mixed Swamp

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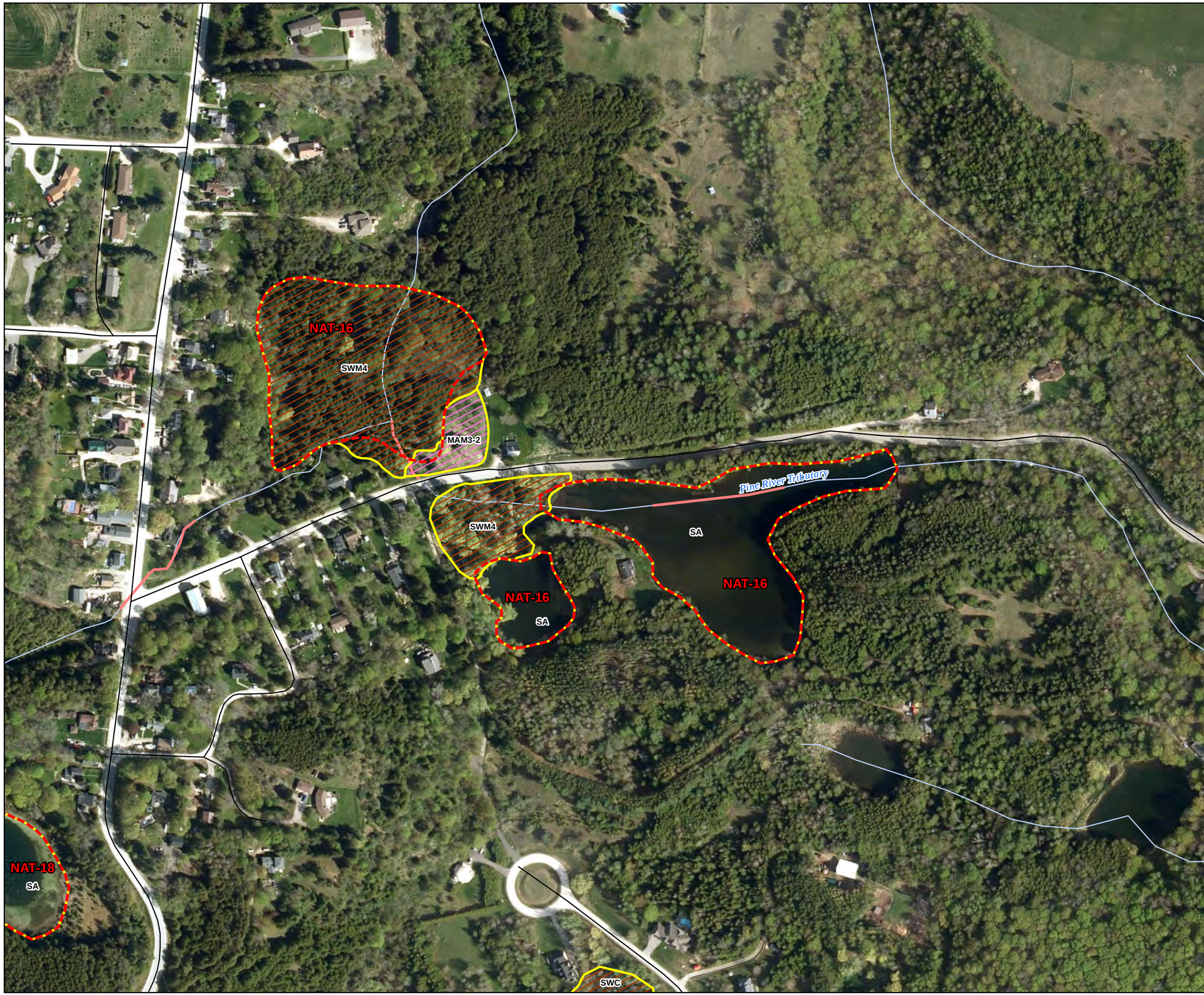
NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

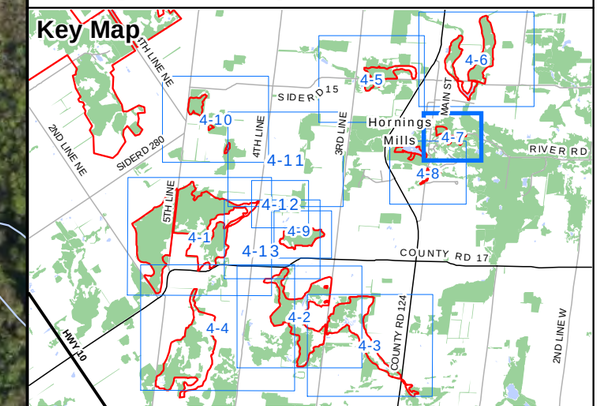
0 100 200 300 400 Meters

Map 4-7

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Priority Natural Feature (NAT)
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Ecological Land Classification (ELC)

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWM4) White Cedar Organic Mixed Swamp Ecosite

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0 100 200 Meters

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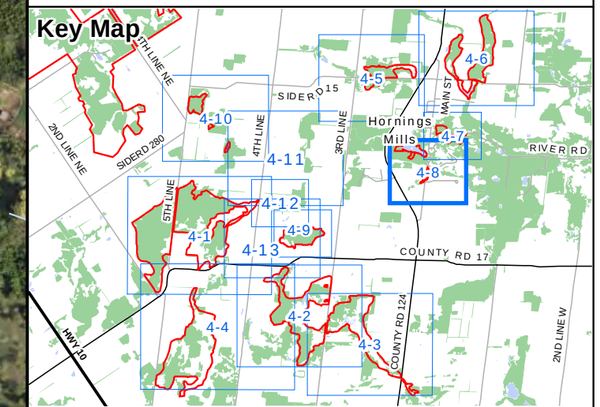
Map 4-8

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Evidence of Groundwater Influence

(SWC) Coniferous Swamp
(SWM) Mixed Swamp
(SWT) Thicket Swamp

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Ecological Land Classification (ELC)

(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(OA) Open Water
(SA) Shallow Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type

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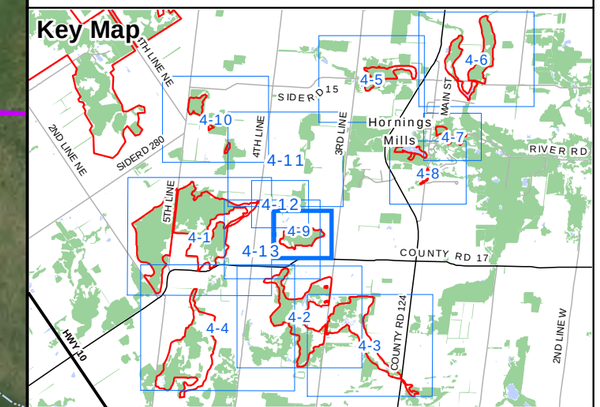
Map 4-9

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Evidence of Groundwater Influence

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Low
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-2) White Pine Coniferous Plantation Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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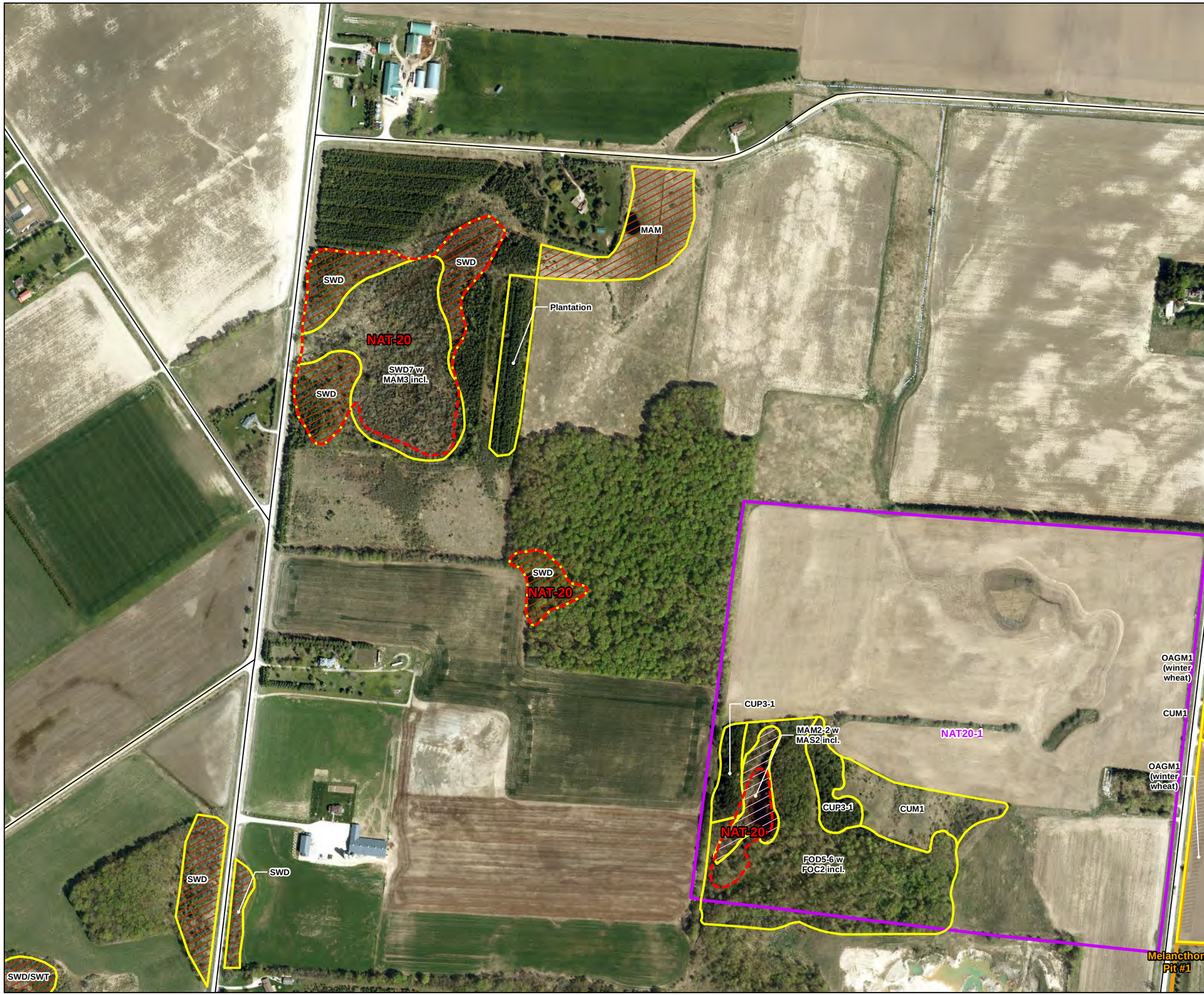
Size: 11x17"
1:3,000

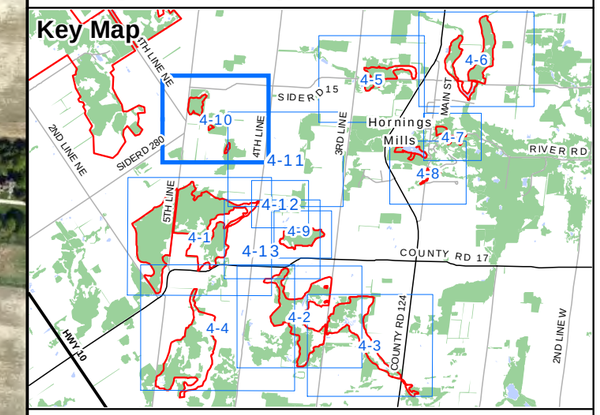
0 100 200 Meters

Map 4-10

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Low
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3) Coniferous Plantations

(CUP3-1) Red Pine Coniferous Plantation Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(MAM) Meadow Marsh

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(OAG) Open Agriculture

(SWD) Deciduous Swamp

(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite

(SWT) Thicket Swamp

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1:5,500

0 100 200 300 Meters

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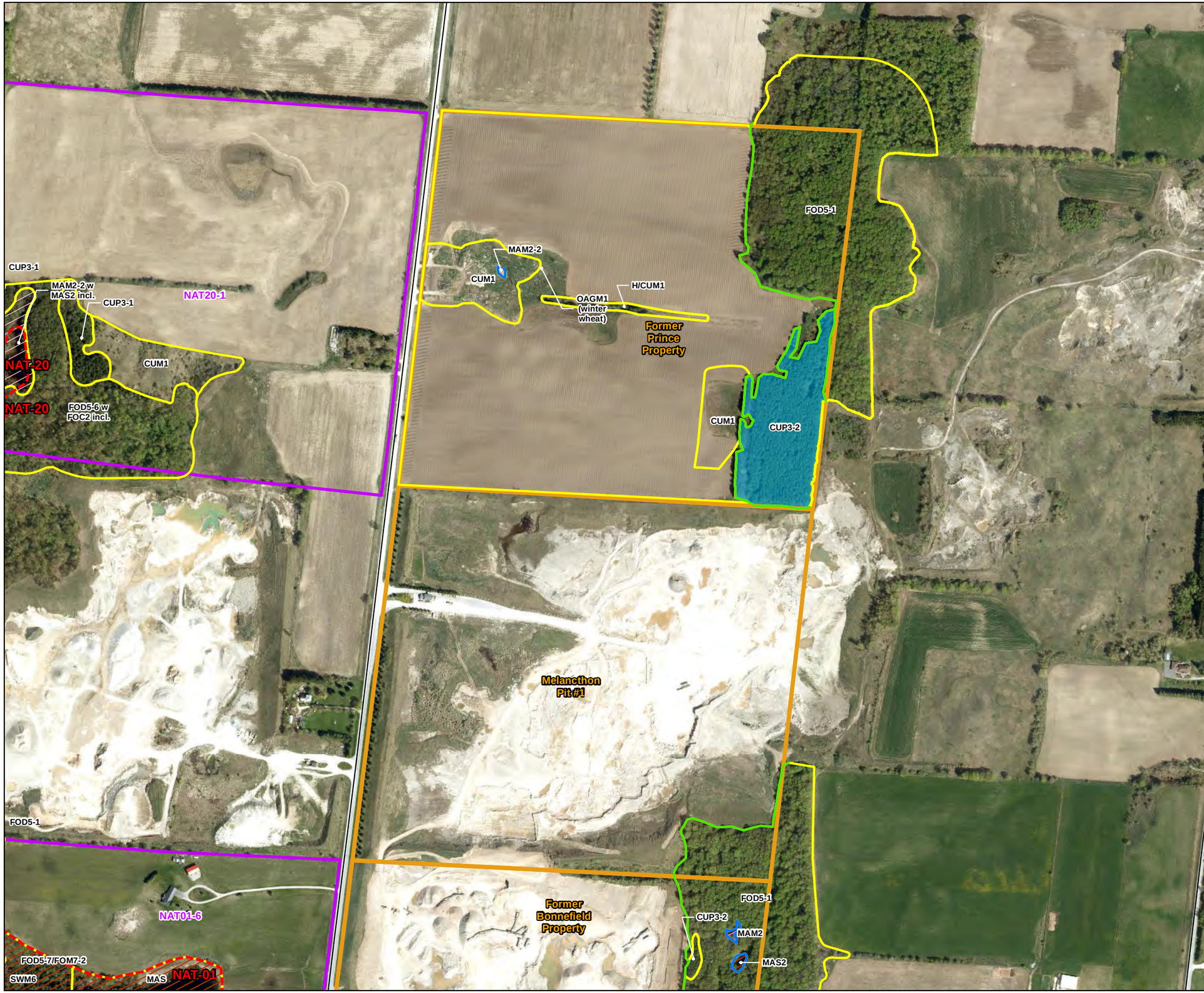
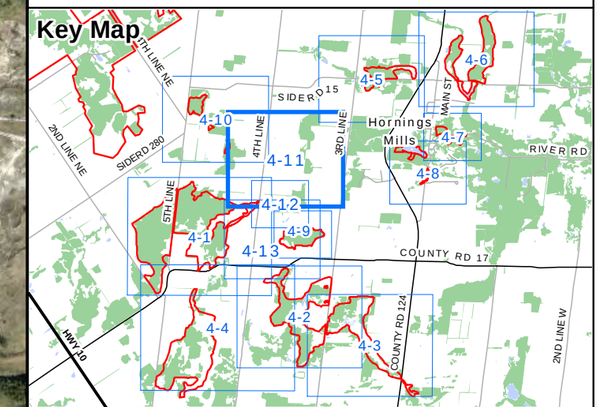
Map 4-11

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Low
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-1) Red Pine Coniferous Plantation Type
(CUP3-2) White Pine Coniferous Plantation Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(H) Hedgerow
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS) Shallow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(OAG) Open Agriculture
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

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NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

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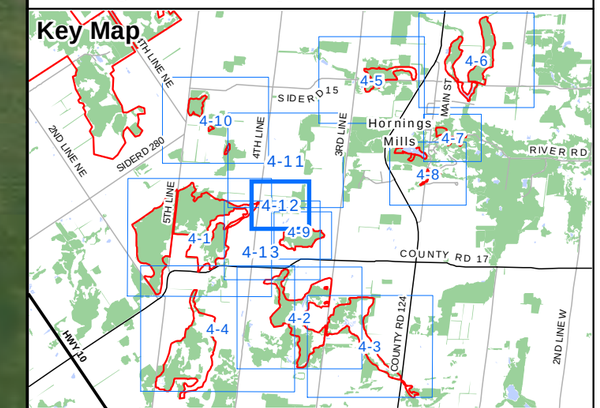
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map4_TRCA_HydrologicallySensitiveVegSpecies_2024_09_17_DNH.mxd

Map 4-12

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations



Legend

- Subject Lands
- Participating Property
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Low
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

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Size: 11x17"
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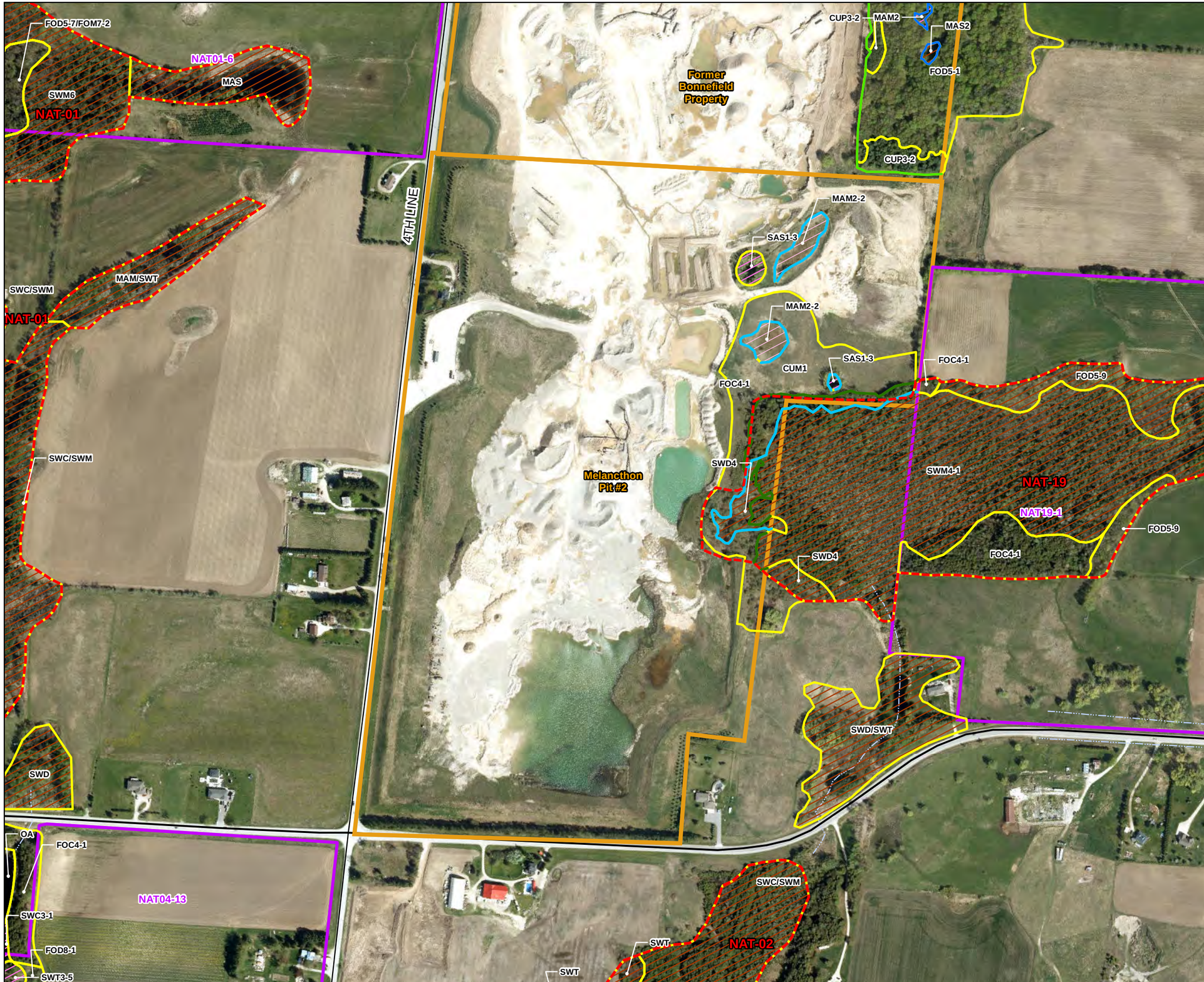
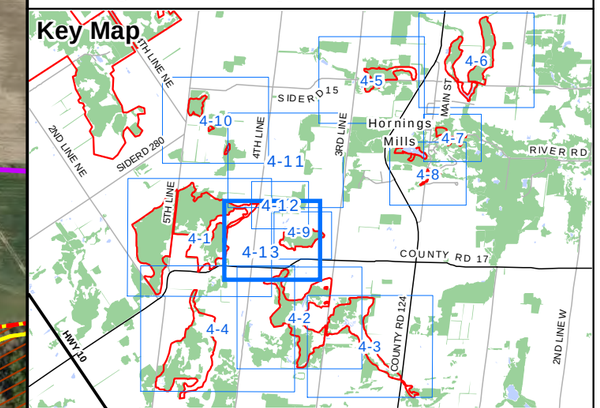
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map4_TRCA_HydrologicallySensitiveVegSpecies_2024_09_17_DNH.mxd

Map 4-13

Strada Pit/Quarry Natural Environment Assessment

Hydrologically Sensitive Vegetation Species Locations





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Vegetation Sensitivity to Hydrological Change (TRCA 2017)

- High
- Medium
- Low

- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
- (MAM) Meadow Marsh
- (MAM2) Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (MAS) Shallow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (OA) Open Water
- (SAS1-3) Stonewort Submerged Shallow Aquatic Type
- (SWC) Coniferous Swamp
- (SWC3-1) White Cedar Organic Coniferous Swamp Type
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp
- (SWT3-5) Red-osier Organic Thicket Swamp Type

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1:5,000

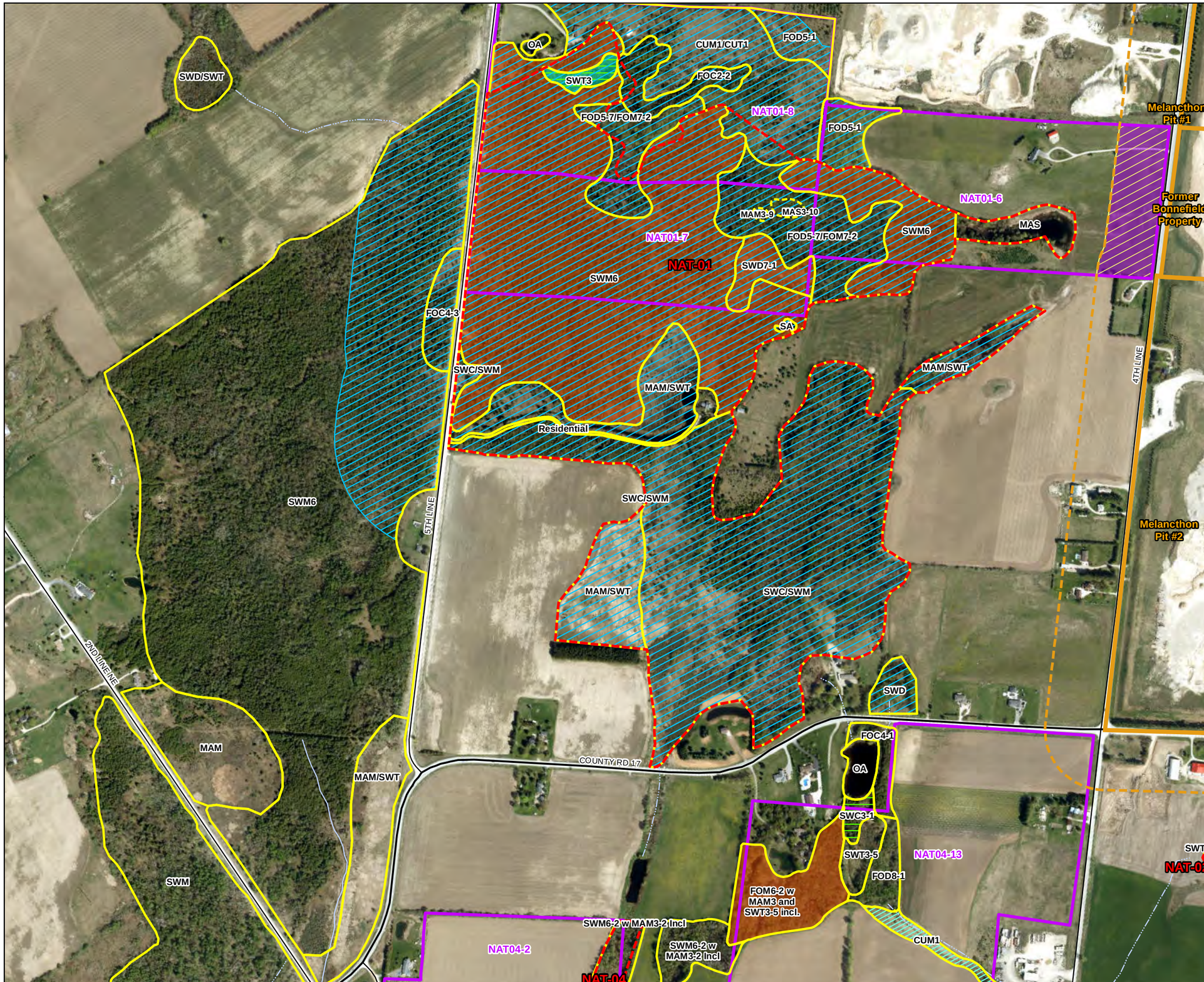
0 100 200 300 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map4_TRCA_HydrologicallySensitiveVegSpecies_2024_09_17_DNH.mxd

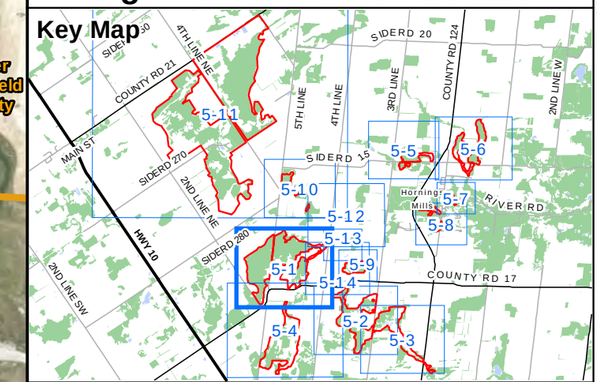
Map 5-1

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Key Map



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Species at Risk Habitat

- Black Ash
- Bobolink

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Chorus Frog
- Grasshopper Sparrow
- Northern Ribbonsnake
- Snapping Turtle
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUM1) Mineral Cultural Meadow Ecosite
(CUT1) Mineral Cultural Thicket Ecosite
(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOC4-3) Fresh - Moist White Cedar - Balsam Fir Coniferous Forest Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
(MAM) Meadow Marsh
(MAM3-9) Forb Organic Meadow Marsh Type
(MAS) Shallow Marsh
(MAS3-10) Forb Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3-1) White Cedar Organic Coniferous Swamp Type
(SWD) Deciduous Swamp
(SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type
(SWM) Mixed Swamp
(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
(SWT) Thicket Swamp
(SWT3) Organic Thicket Swamp Ecosite
(SWT3-5) Red-osier Organic Thicket Swamp Type

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Size: 11x17"
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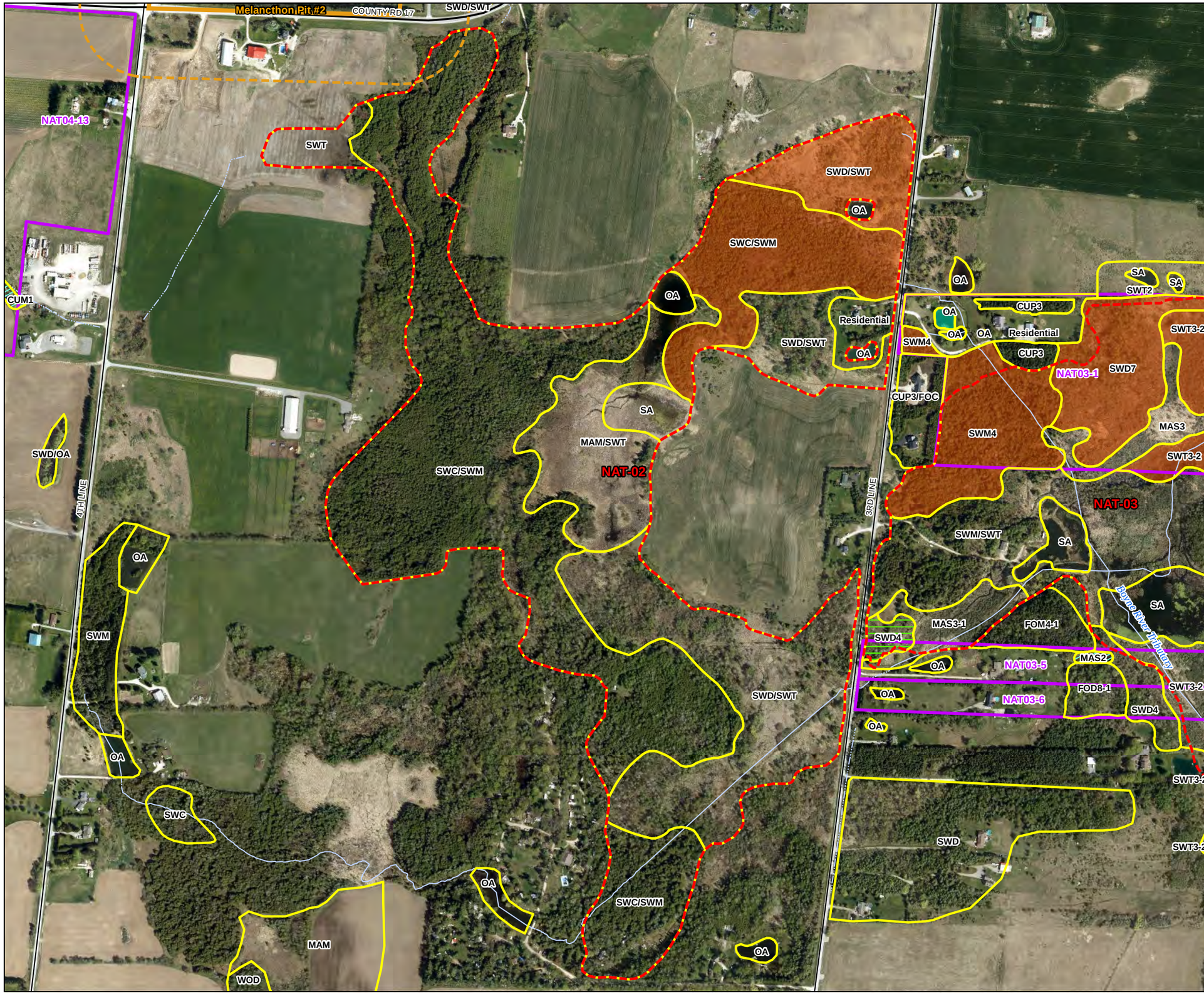
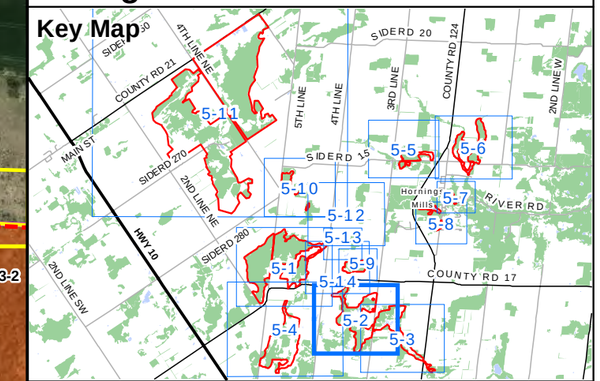
Map 5-2

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Key Map



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Species at Risk Habitat

- Black Ash

Significant Wildlife Habitat

- Chorus Frog
- Northern Ribbonsnake
- Snapping Turtle
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type
(WOD) Woodland

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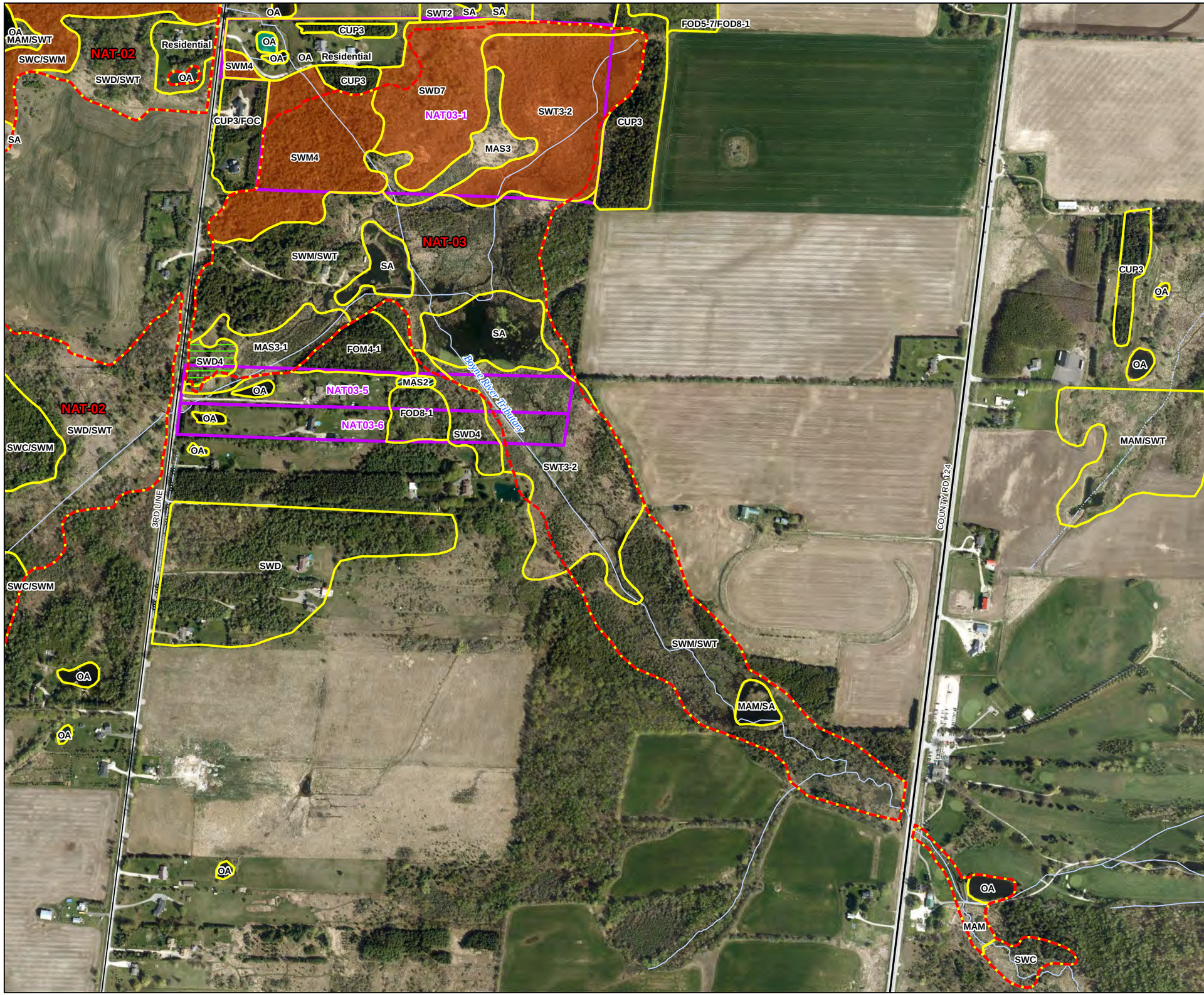
0 100 200 300 400 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

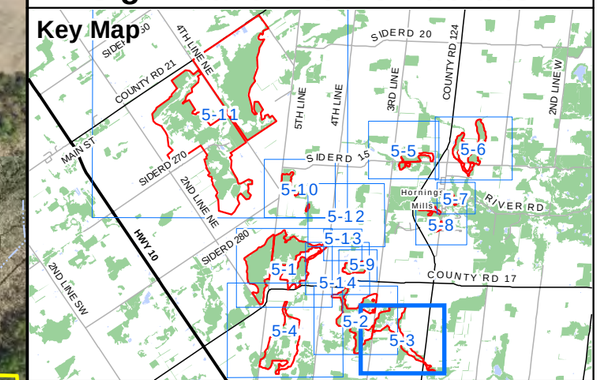
Map 5-3

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Species at Risk Habitat

- Black Ash

Significant Wildlife Habitat

- Chorus Frog
- Northern Ribbonsnake
- Snapping Turtle
- Ecological Land Classification (ELC)

(CUP3) Coniferous Plantations

(FOC) Coniferous Forest

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type

(MAM) Meadow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(MAS3) Organic Shallow Marsh Ecosite

(MAS3-1) Cattail Organic Shallow Marsh Type

(OA) Open Water

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite

(SWM) Mixed Swamp

(SWM4) White Cedar Organic Mixed Swamp Ecosite

(SWT) Thicket Swamp

(SWT2) Mineral Thicket Swamp Ecosite

(SWT3-2) Willow Organic Thicket Swamp Type

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1:6,500

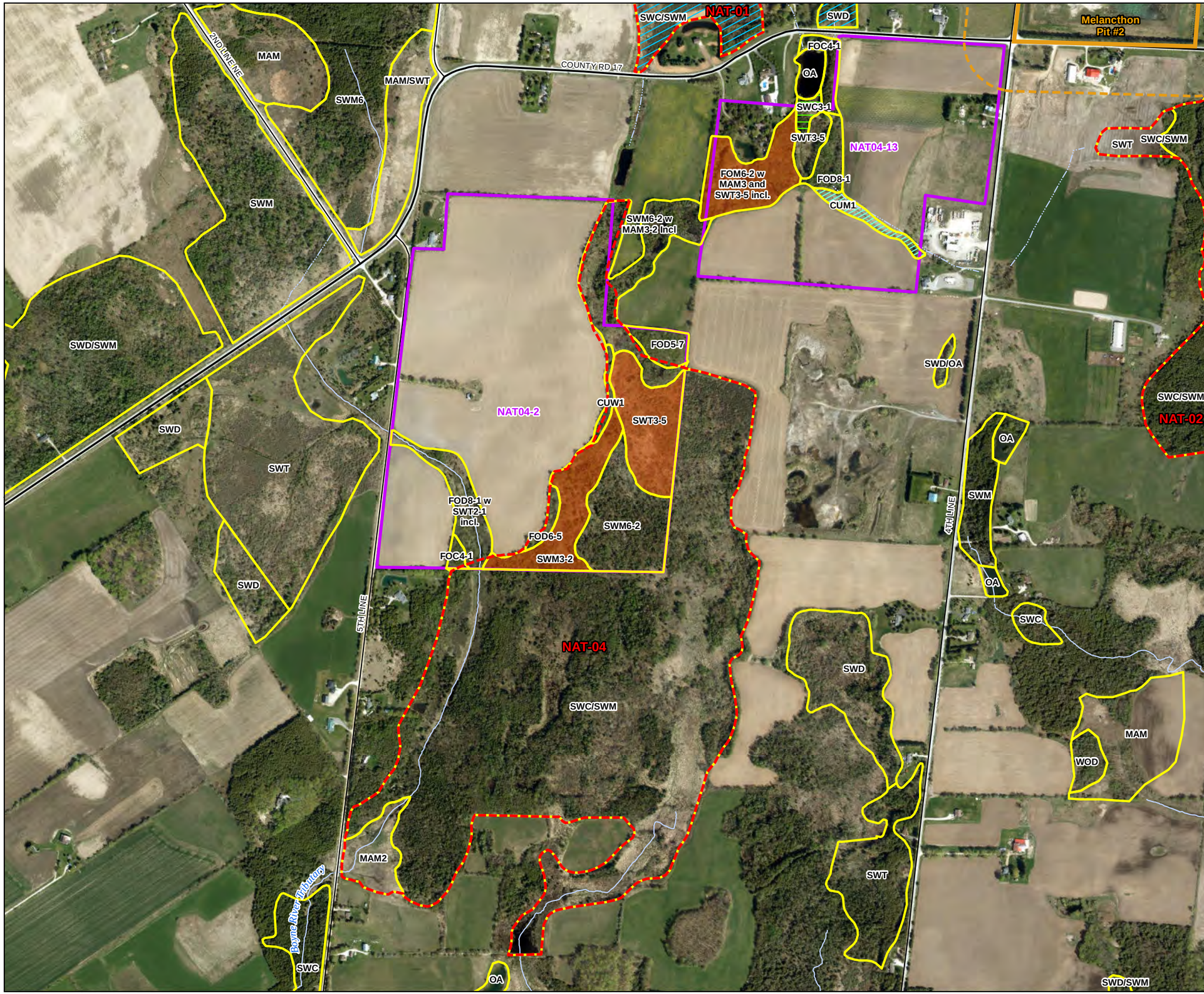
0 100 200 300 400 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

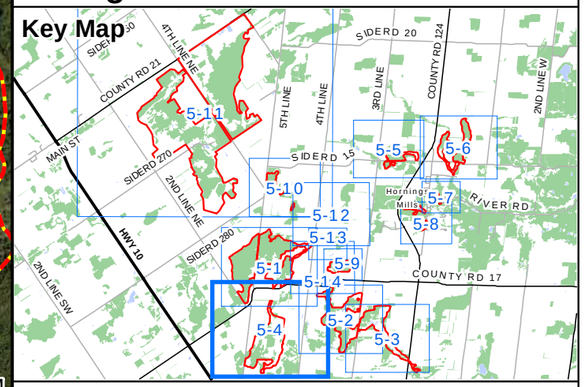
Map 5-4

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Key Map



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Species at Risk Habitat

- Black Ash

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Chorus Frog
- Northern Ribbonsnake
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUW1) Mineral Cultural Woodland Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(OA) Open Water

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWD/SWM) Deciduous Swamp/Mixed Swamp

(SWM) Mixed Swamp

(SWM3-2) Poplar - Conifer Mineral Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

(SWT) Thicket Swamp

(SWT3-5) Red-osier Organic Thicket Swamp Type

(WOD) Woodland

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NAD83 - UTM Zone 17
Size: 11x17"
1:9,000

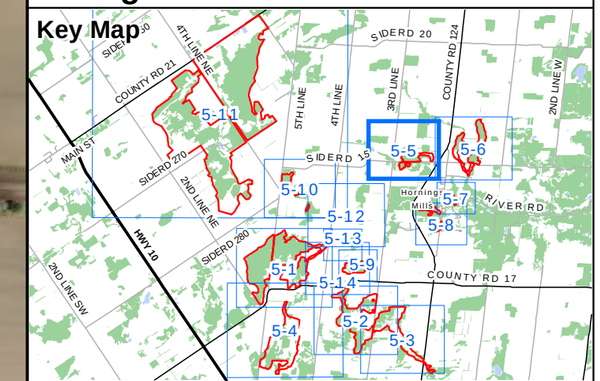
0 100 200 300 400 500 Meters

N

Map 5-5

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Species at Risk Habitat

- Black Ash

Significant Wildlife Habitat

- Seeps and Springs
- Ecological Land Classification (ELC)

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(MAM) Meadow Marsh

(MAM3) Organic Meadow Marsh Ecosite

(MAS) Shallow Marsh

(OA) Open Water

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3) White Cedar Organic Coniferous Swamp Ecosite

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM) Mixed Swamp

(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

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Size: 11x17"
1:5,500

0 100 200 300 Meters

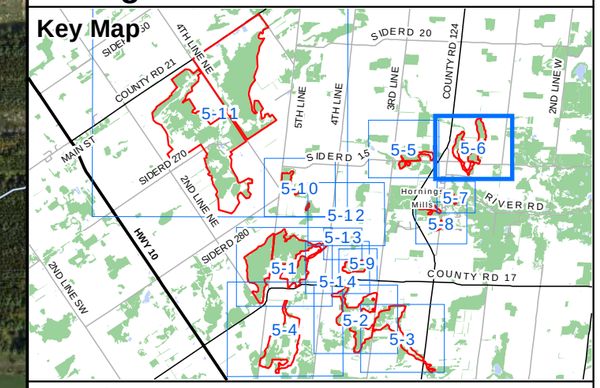
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

Map 5-6

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats

Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Significant Wildlife Habitat

- Seeps and Springs
- Snapping Turtle
- Ecological Land Classification (ELC)
- ELC Inclusion

(CUP3) Coniferous Plantations

(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-10) Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type

(FOM4) Dry - Fresh White Cedar Mixed Forest Ecosite

(MAM) Meadow Marsh

(MAM3) Organic Meadow Marsh Ecosite

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type

(MAM3-4) Fowl Manna Grass Organic Meadow Marsh Type

(MAS) Shallow Marsh

(SA) Shallow Water

(SWC) Coniferous Swamp

(SWC3-2) White Cedar - Conifer Organic Coniferous Swamp Type

(SWM) Mixed Swamp

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

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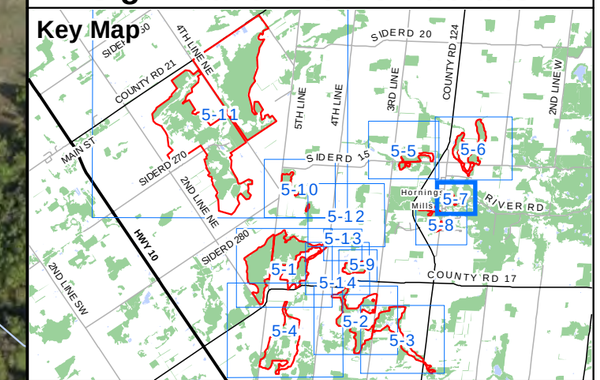
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

Map 5-7

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats

Key Map



Legend

- Priority Natural Feature (NAT)
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Significant Wildlife Habitat

- Snapping Turtle
- Ecological Land Classification (ELC)

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type

(SA) Shallow Water

(SWM4) White Cedar Organic Mixed Swamp Ecosite

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
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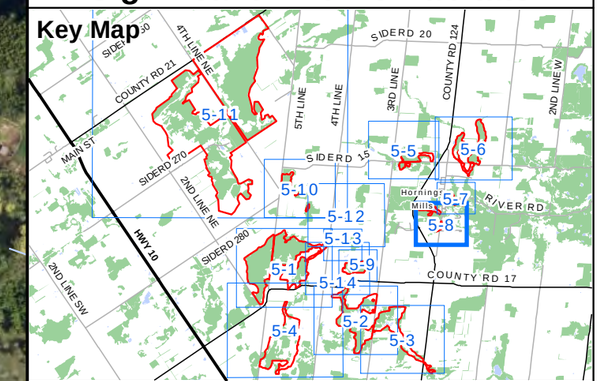
0 100 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

Map 5-8

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature

Significant Wildlife Habitat

- Snapping Turtle
- Ecological Land Classification (ELC)

(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(OA) Open Water
(SA) Shallow Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWC) Coniferous Swamp
(SWM) Mixed Swamp
(SWT) Thicket Swamp

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Project: 2473A Date: September 18, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:4,000**

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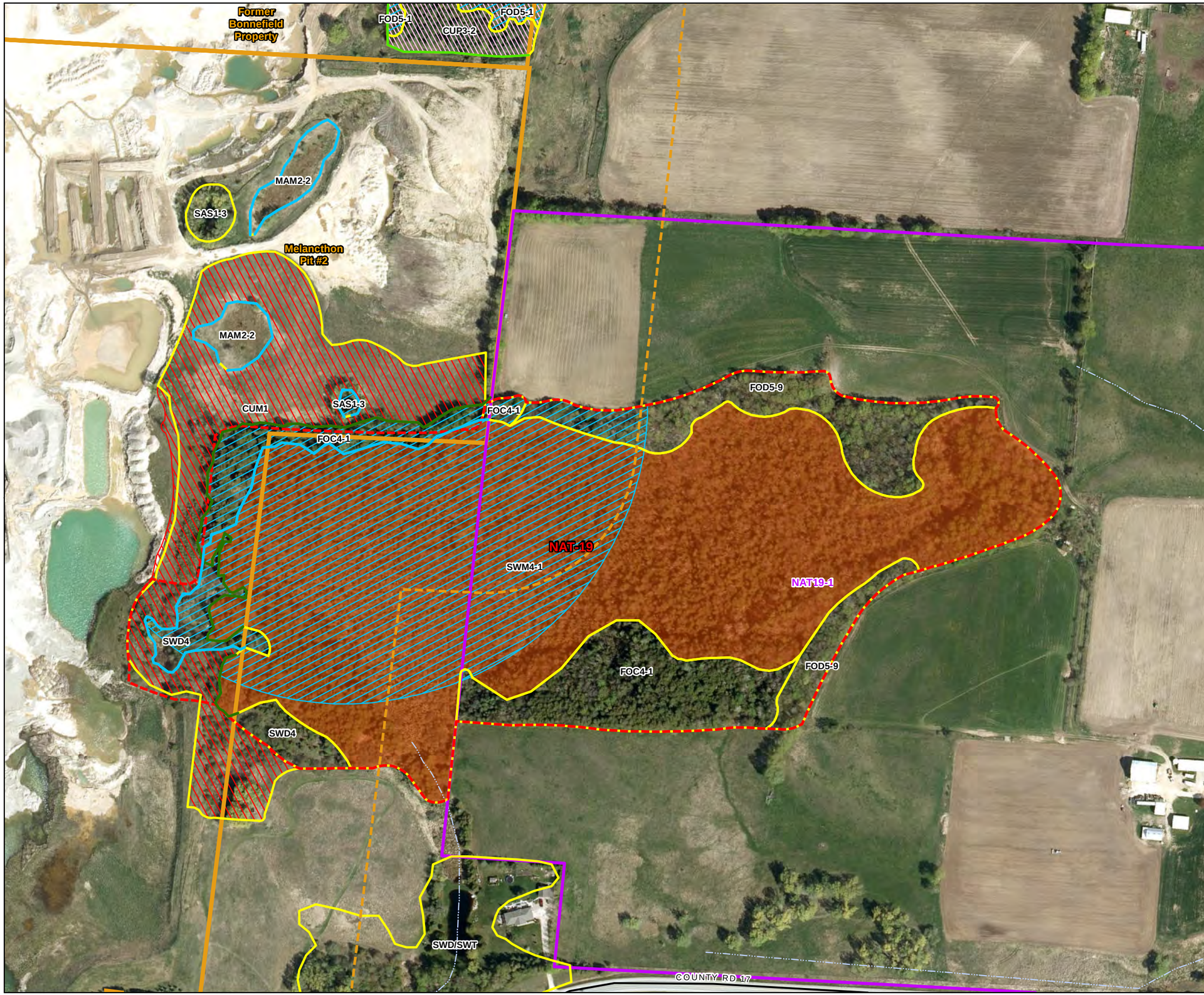
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_2024_09_18_DNH.mxd

Map 5-9

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



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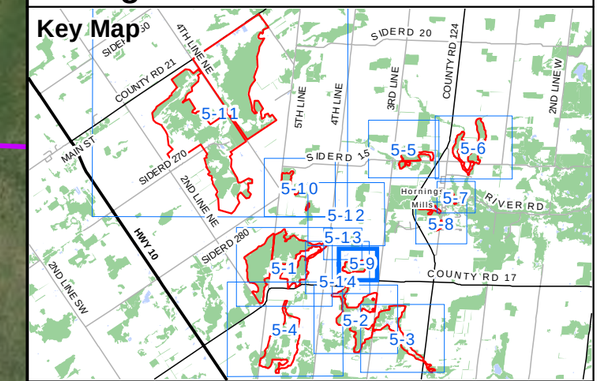

Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)

Species at Risk Habitat

- Black Ash
- Eastern Meadowlark

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Eastern Wood-Pewee
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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Date: September 18, 2024

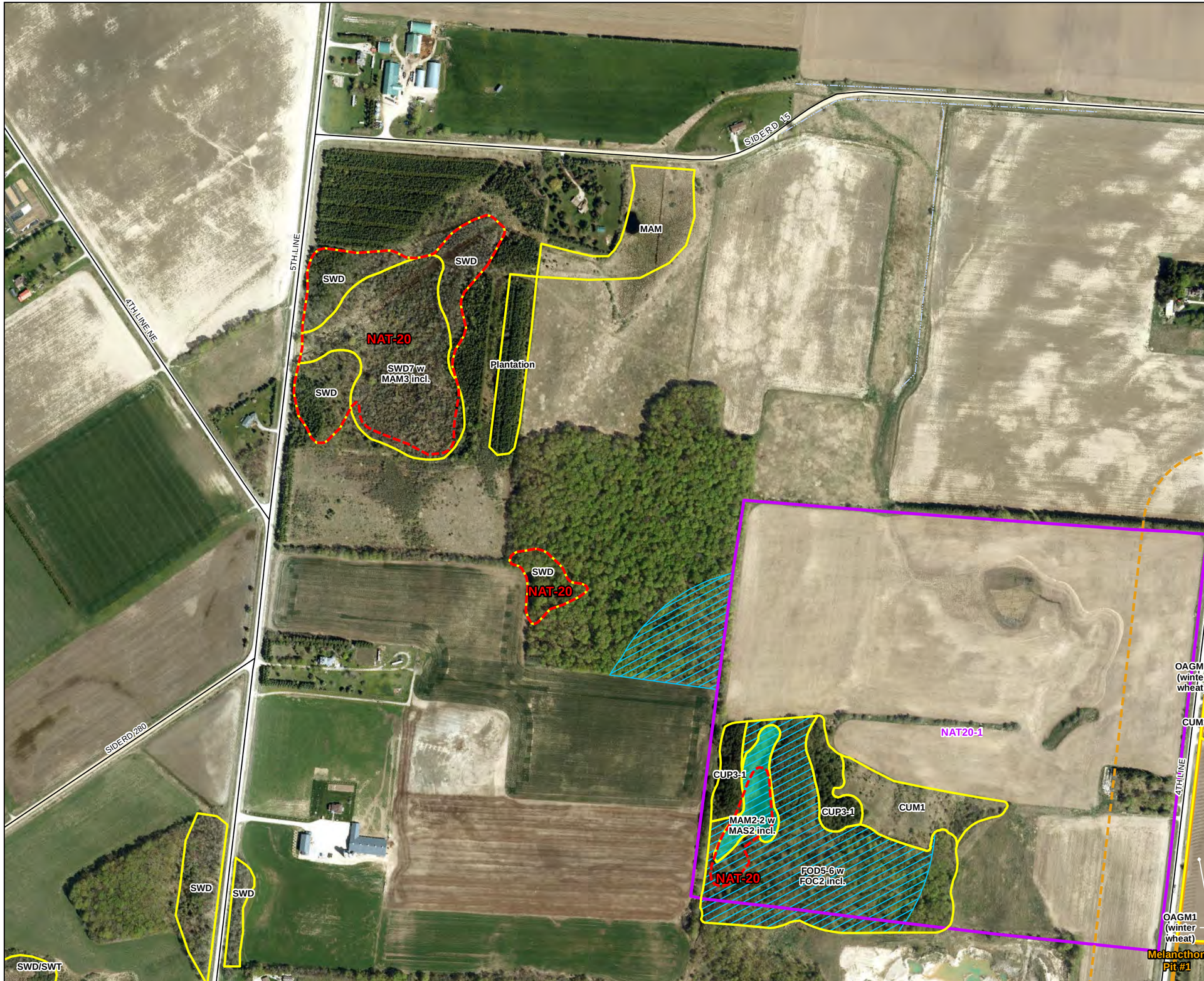
NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

0 100 Meters

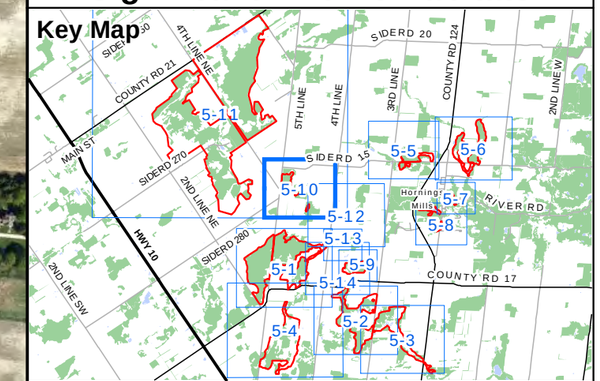
Map 5-10

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats



Key Map



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(OAG) Open Agriculture
(SWD) Deciduous Swamp
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWT) Thicket Swamp

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Snapping Turtle
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(CUP3-1) Red Pine Coniferous Plantation Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(MAM) Meadow Marsh

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
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0 100 200 300 Meters

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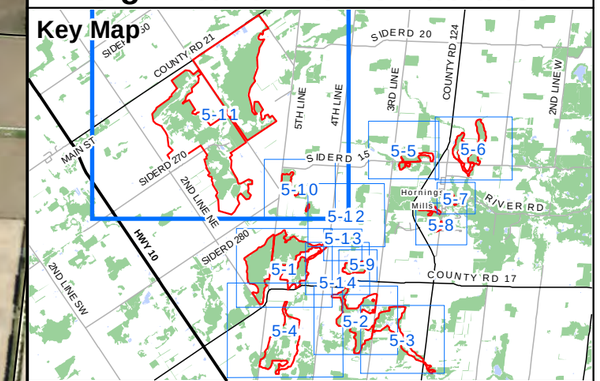
Map 5-11

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats

Key Map



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Wetland Boundary (NRSI 2022)

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Snapping Turtle
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3) Coniferous Plantations

(CUP3-1) Red Pine Coniferous Plantation Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(H) Hedgerow

(MAM) Meadow Marsh

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(OAG) Open Agriculture

(SWD) Deciduous Swamp

(SWD/SWM) Deciduous Swamp/Mixed Swamp

(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite

(SWM/SWT) Mixed Swamp/Thicket Swamp

(SWT) Thicket Swamp

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
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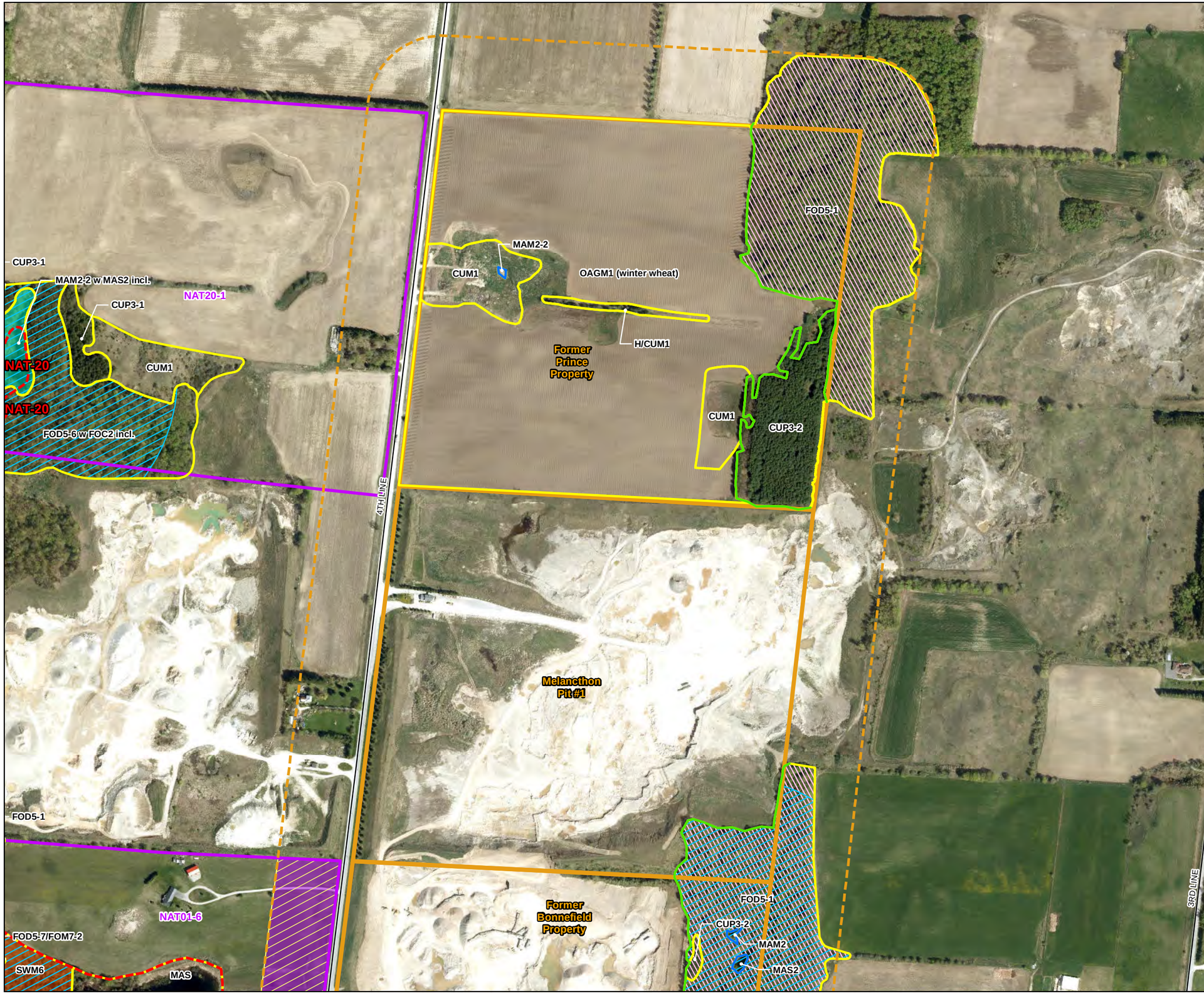
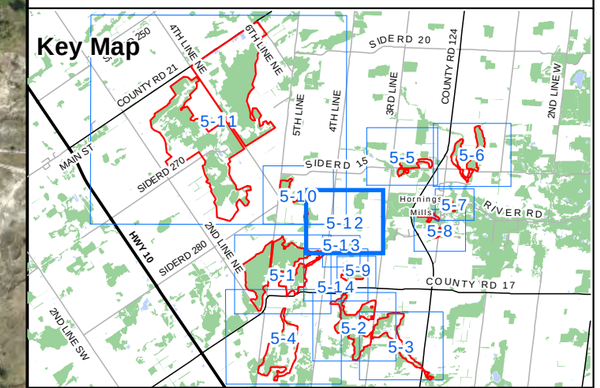
Map 5-12

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats





Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Species at Risk Habitat

- Black Ash
- Bobolink

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Eastern Wood-Pewee
- Grasshopper Sparrow
- Snapping Turtle
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-1) Red Pine Coniferous Plantation Type

(CUP3-2) White Pine Coniferous Plantation Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(H) Hedgerow

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS) Shallow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(OAG) Open Agriculture

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

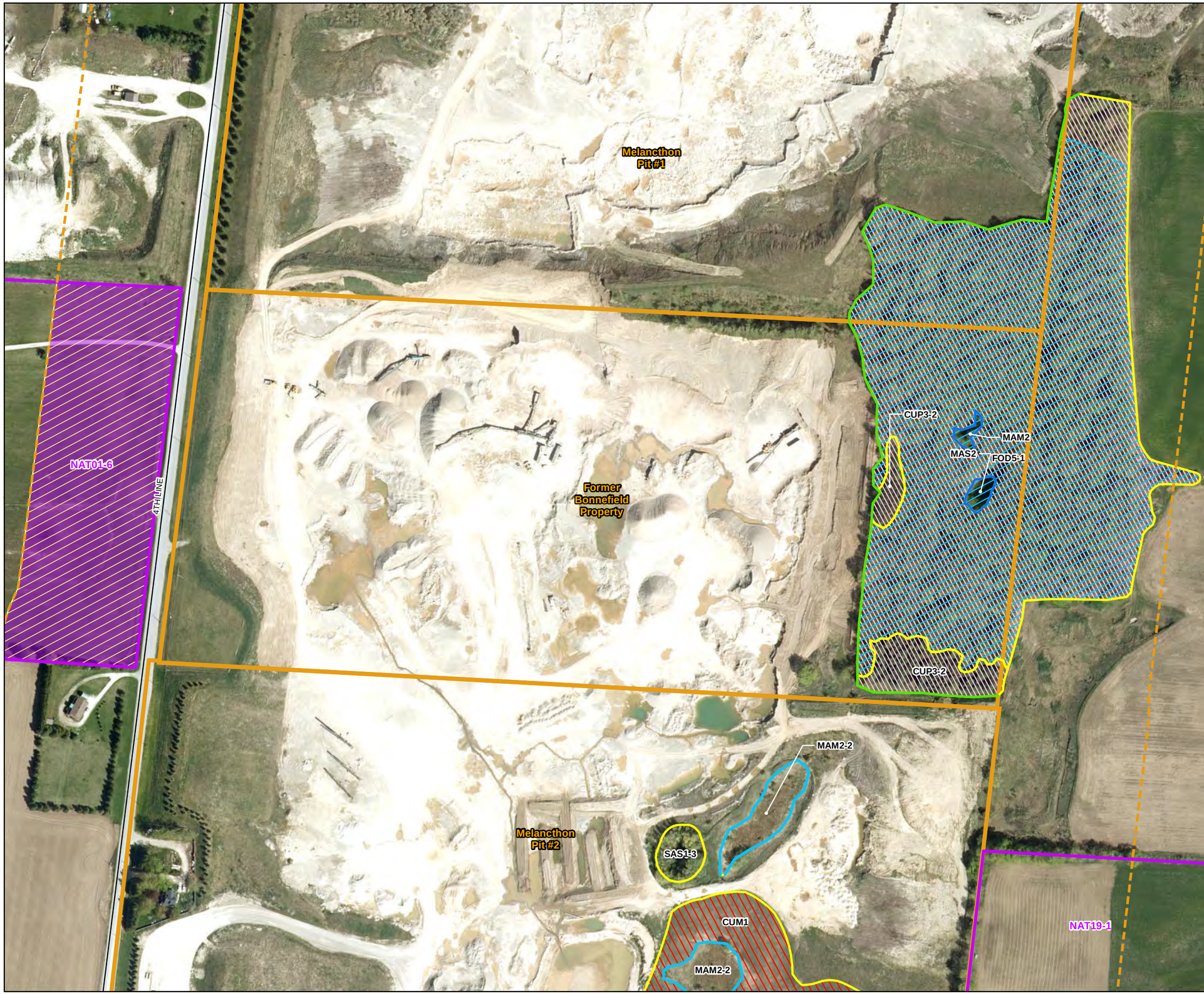
0 100 200 300 Meters

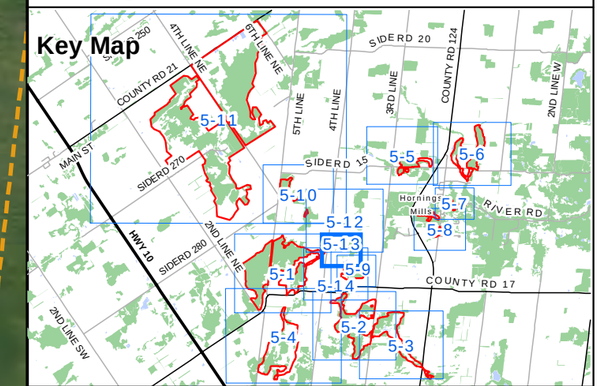
Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_SubjectProperty_2024_09_18_DNH.mxd

Map 5-13

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats





Legend

- Subject Lands
- 120m Limit
- Participating Property
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

Species at Risk Habitat

- Bobolink
- Eastern Meadowlark

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Eastern Wood-Pewee
- Grasshopper Sparrow
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

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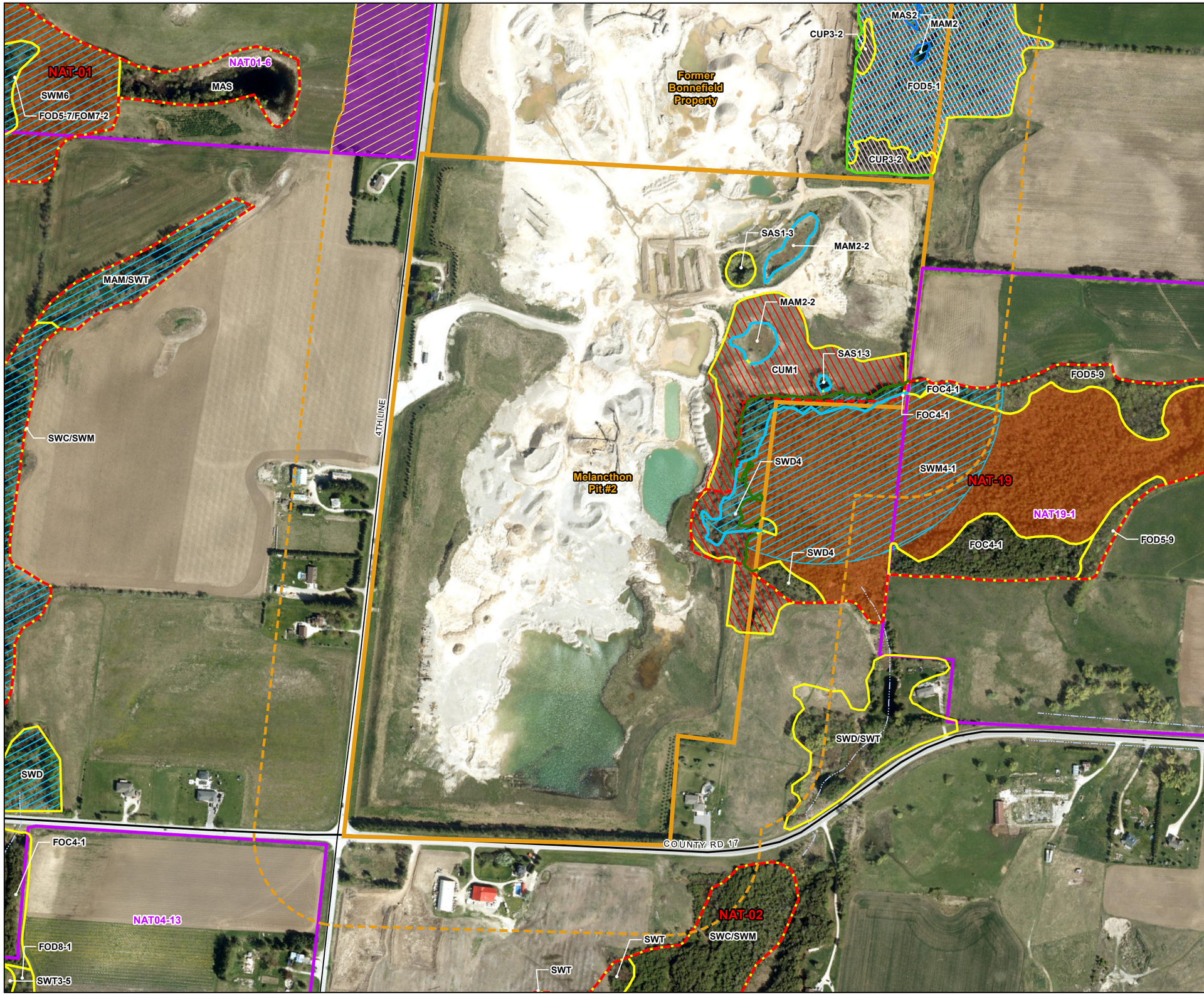
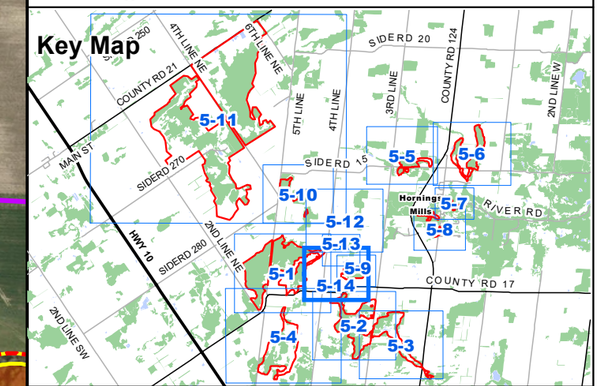
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_SAR_SigWildlifeHabitat_SubjectProperty_2024_09_18_DNH.mxd

Map 5-14

Strada Pit/Quarry Natural Environment Assessment

Confirmed Species at Risk and Significant Wildlife Habitats





Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Species at Risk Habitat

- Black Ash
- Bobolink
- Eastern Meadowlark

Significant Wildlife Habitat

- Amphibian Breeding Habitat (Woodland)
- Eastern Wood-Pewee
- Grasshopper Sparrow
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS) Shallow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWC) Coniferous Swamp

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWT) Thicket Swamp

(SWT3-5) Red-osier Organic Thicket Swamp Type

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Project: 2473A
Date: January 28, 2025

NAD83 - UTM Zone 17
Size: 11x17"
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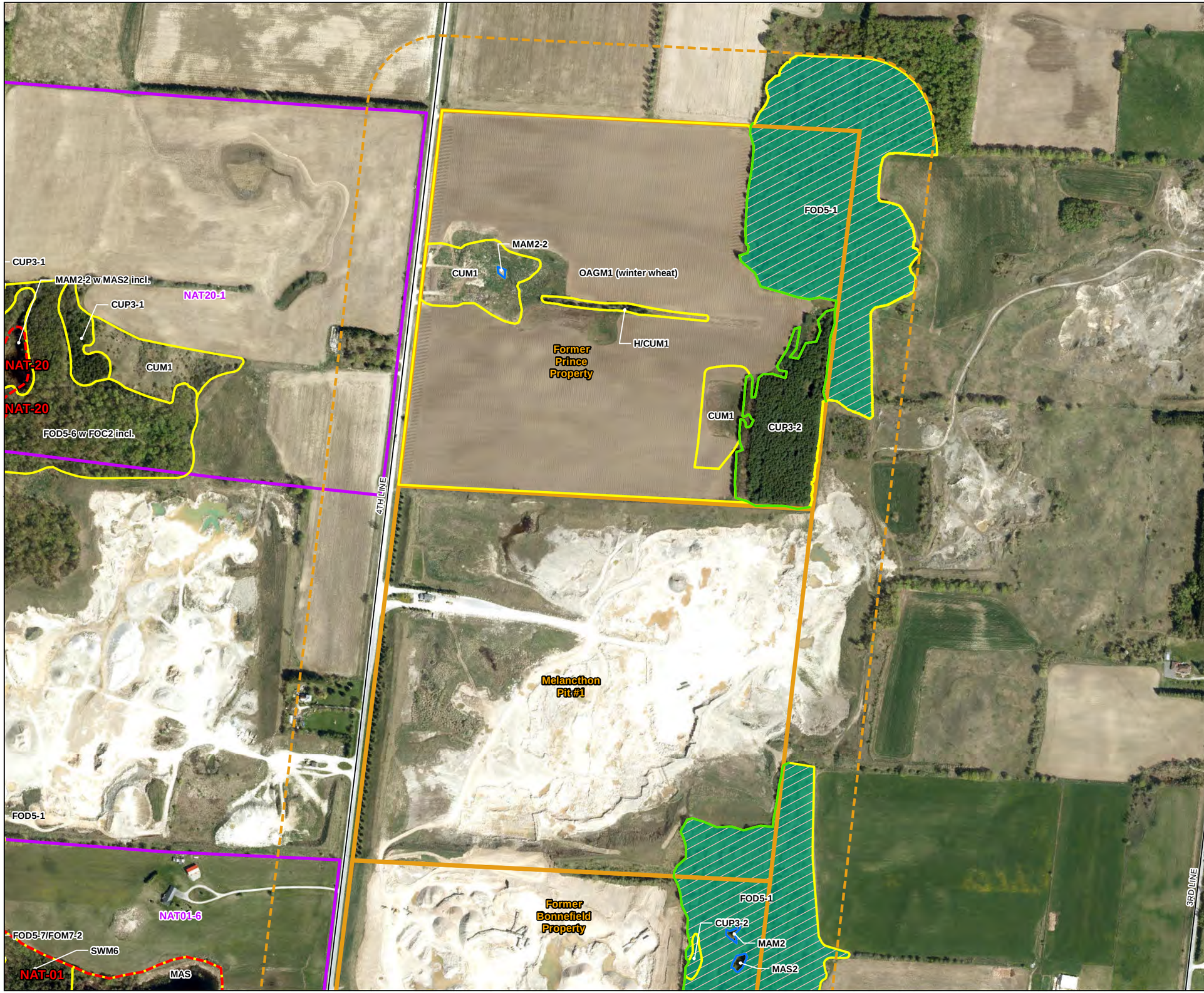
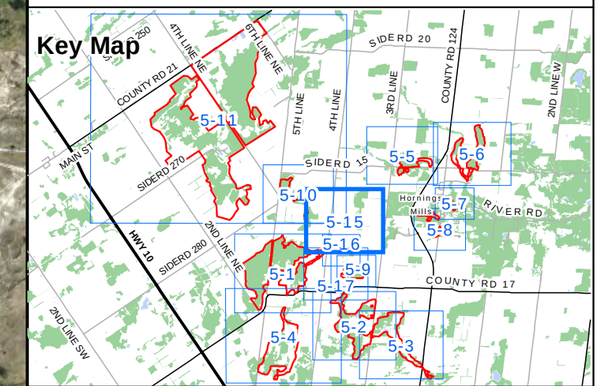
Map 5-15

Strada Pit/Quarry Natural Environment Assessment

Candidate Species at Risk and Significant Wildlife Habitats





Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Candidate Significant Wildlife Habitat

- Bat Maternity Colony and SCC Bat

Potential Species at Risk Habitat

- Potential Bat SAR Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-1) Red Pine Coniferous Plantation Type

(CUP3-2) White Pine Coniferous Plantation Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(H) Hedgerow

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS) Shallow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(OAG) Open Agriculture

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

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Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

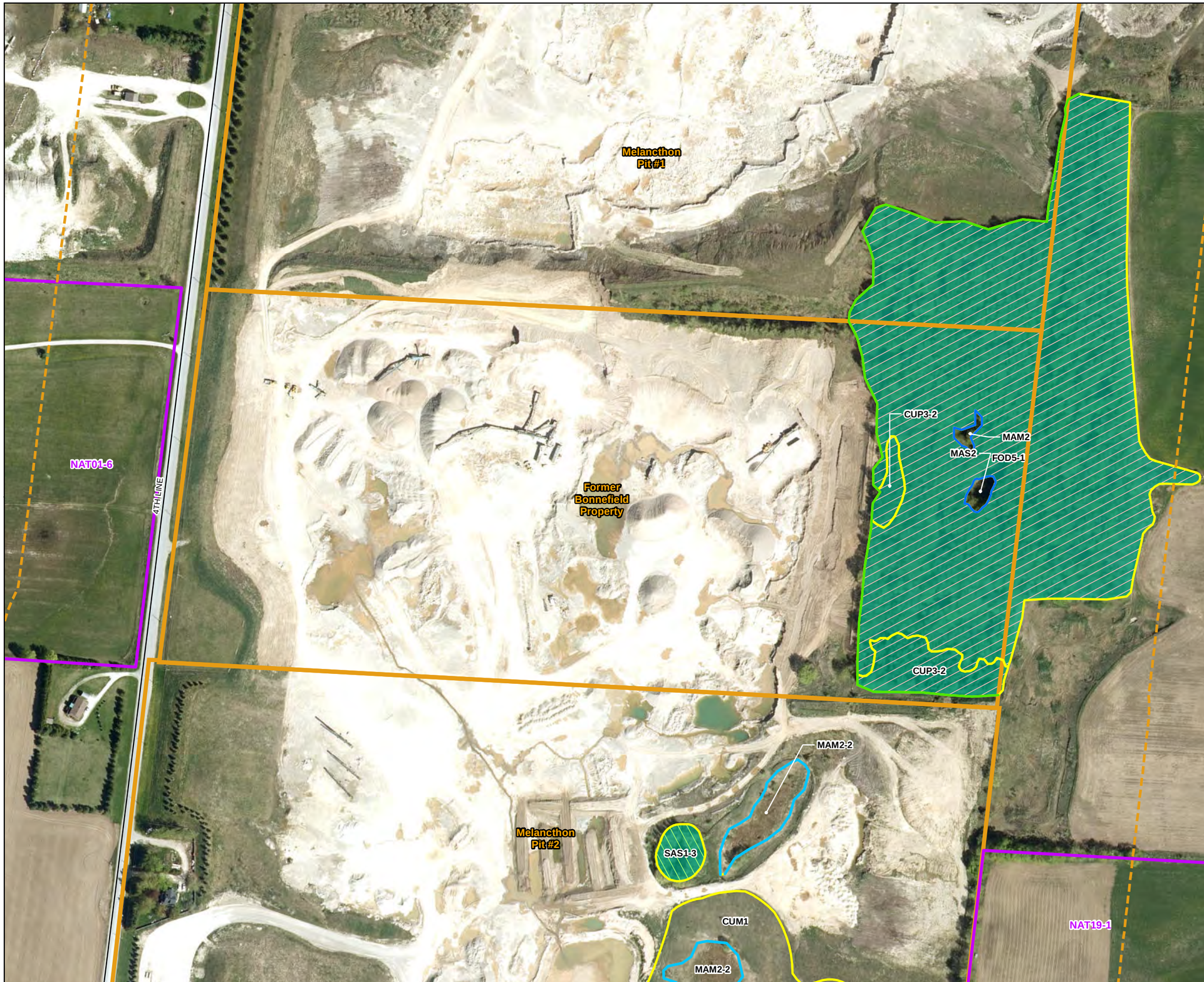
0 100 200 300 Meters

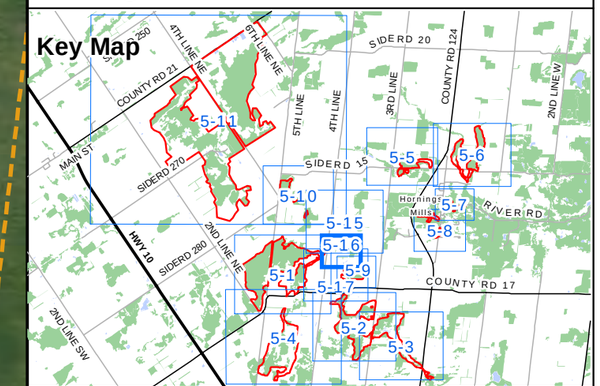
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map5_CandidateSAR_SigWildlifeHabitat_SubjectProperty_2024_09_18_DNH.mxd

Map 5-16

Strada Pit/Quarry Natural Environment Assessment

Candidate Species at Risk and Significant Wildlife Habitats





Legend

- Subject Lands
- 120m Limit
- Participating Property
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Candidate Significant Wildlife Habitat

- Amphibian Breeding Habitat (Wetland)
- Bat Maternity Colony and SCC Bat

Potential Species at Risk Habitat

- Potential Bat SAR Habitat
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-2) White Pine Coniferous Plantation Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAS2) Mineral Shallow Marsh Ecosite

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

0 100 Meters

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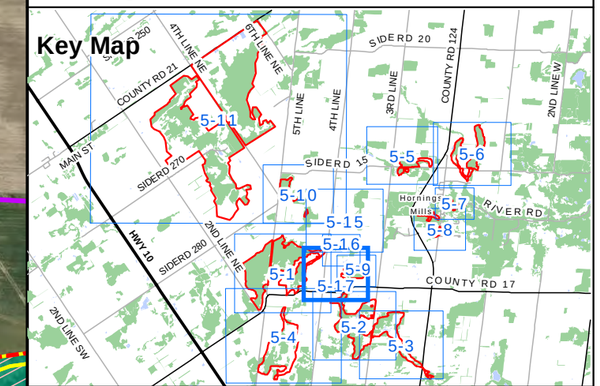
Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map5_CandidateSAR_SigWildlifeHabitat_SubjectProperty_2024_09_18_DNH.mxd

Map 5-17

Strada Pit/Quarry Natural Environment Assessment

Candidate Species at Risk and Significant Wildlife Habitats



Legend

- Subject Lands
- 120m Limit
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)

Candidate Significant Wildlife Habitat

- Amphibian Breeding Habitat (Wetland)
- Bat Maternity Colony and SCC Bat

Potential Species at Risk Habitat

- Potential Bat SAR Habitat

- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
- (MAM) Meadow Marsh
- (MAM2) Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (MAS) Shallow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (OA) Open Water
- (SAS1-3) Stonewort Submerged Shallow Aquatic Type
- (SWC) Coniferous Swamp
- (SWC3-1) White Cedar Organic Coniferous Swamp Type
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp
- (SWT3-5) Red-osier Organic Thicket Swamp Type

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Project: 2473A
Date: September 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,000

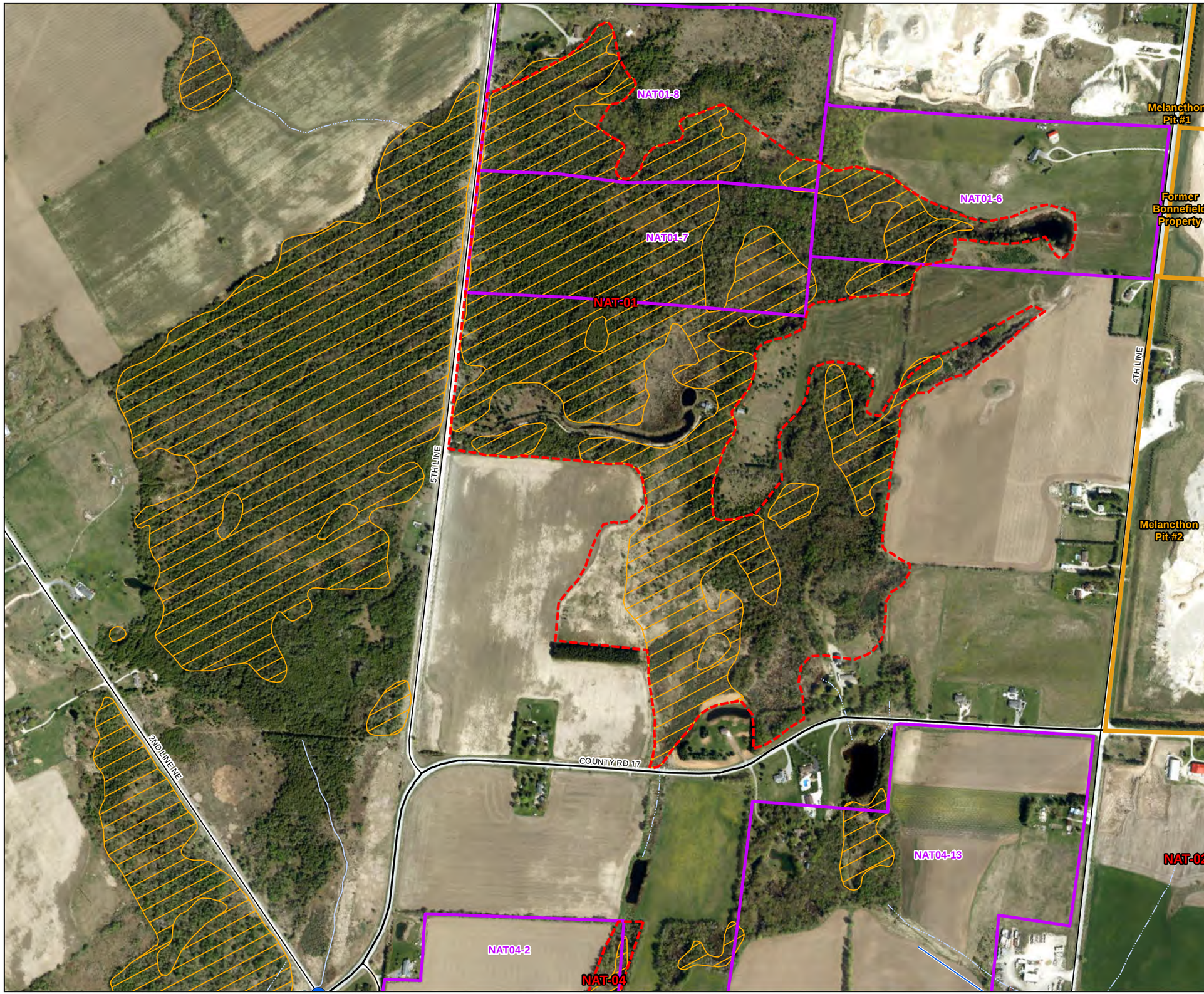
0 100 200 300 Meters

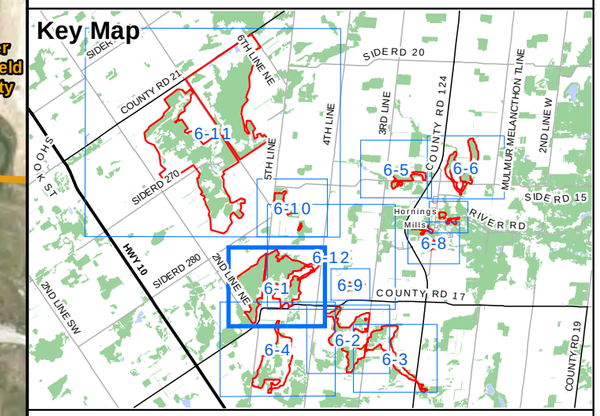
Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map5_CandidateSAR_SigWildlifeHabitat_SubjectProperty_2024_09_18_DNH.mxd

Map 6-1

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators





Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:7,500

0 100 200 300 400 500 Meters

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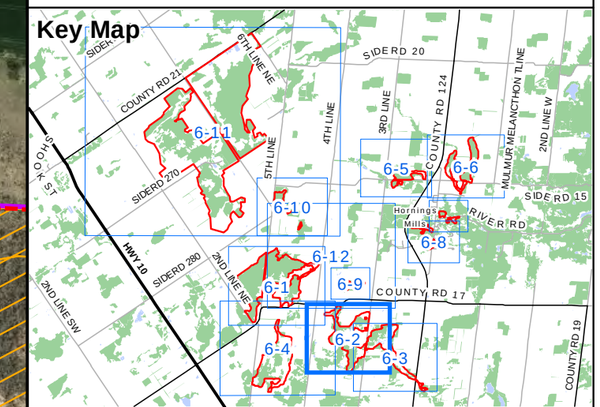
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-2

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators

Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,500

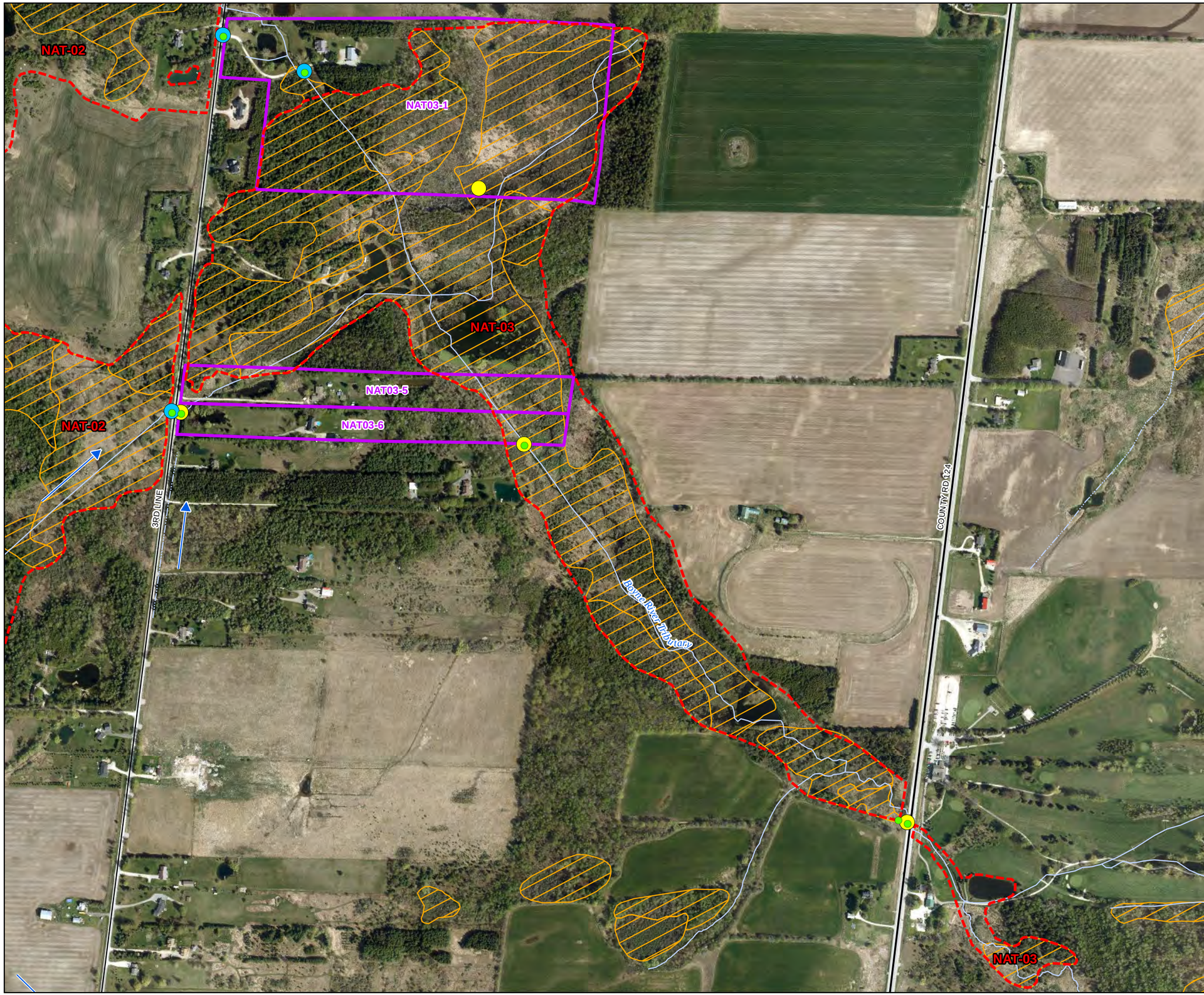
0 100 200 300 400 Meters

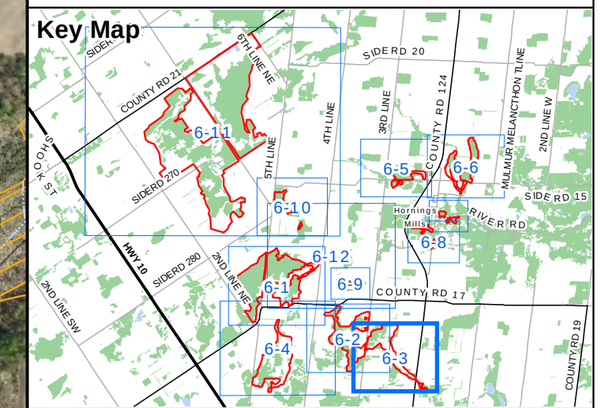
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-3

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators





Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,500

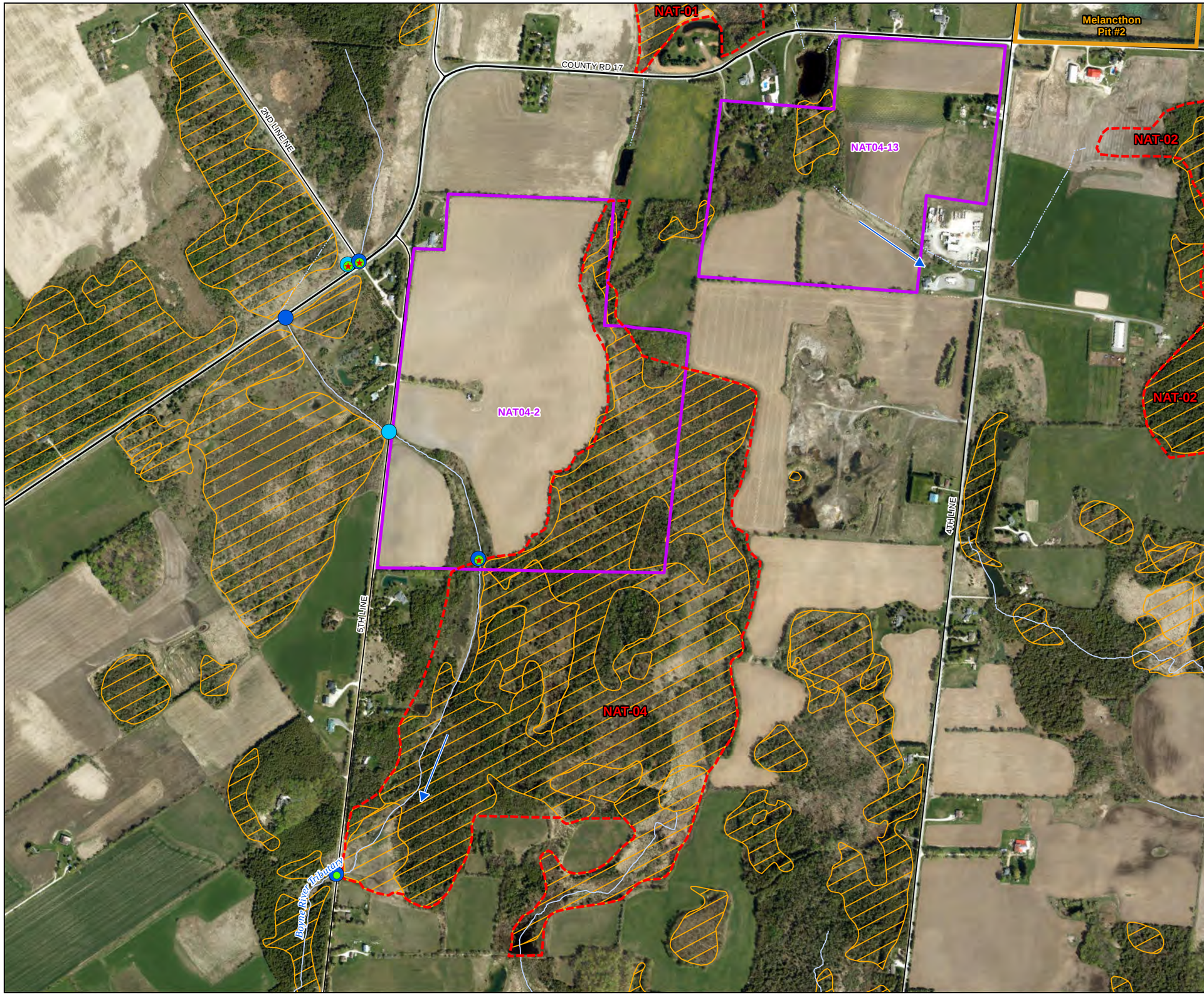
0 100 200 300 400 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

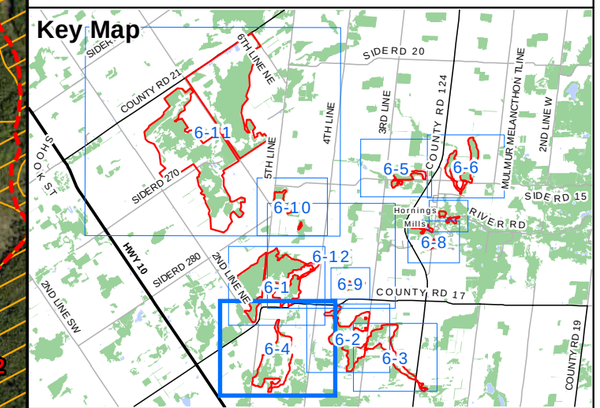
Map 6-4

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:9,000

0 100 200 300 400 500 600 Meters

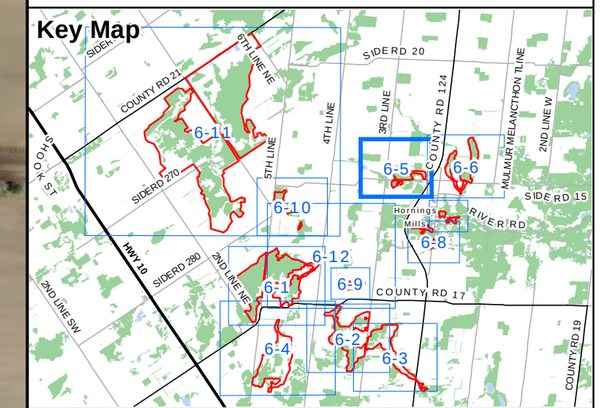
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-5

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators

Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,500

0 100 200 300 Meters

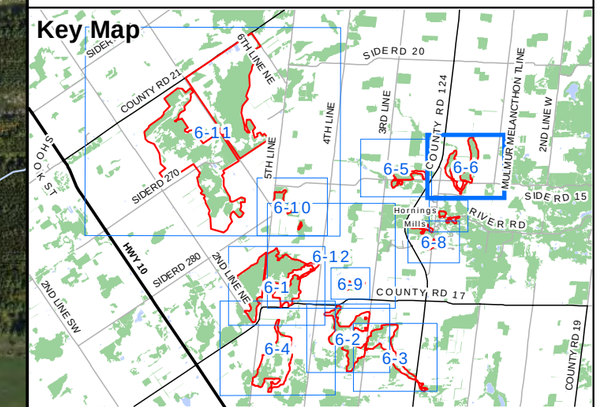
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-6

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators

Key Map



Legend

- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

0 100 200 300 400 Meters

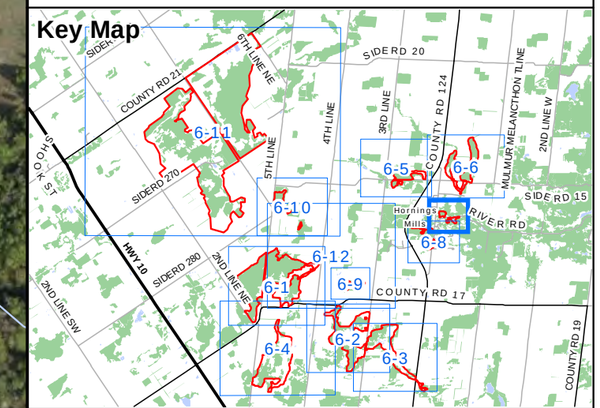
N

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-7

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Legend

- Priority Natural Feature (NAT)
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

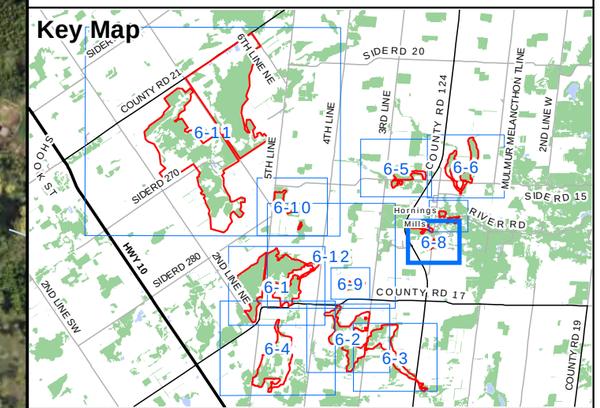
0 100 200 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-8

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:4,000

0 100 200 Meters

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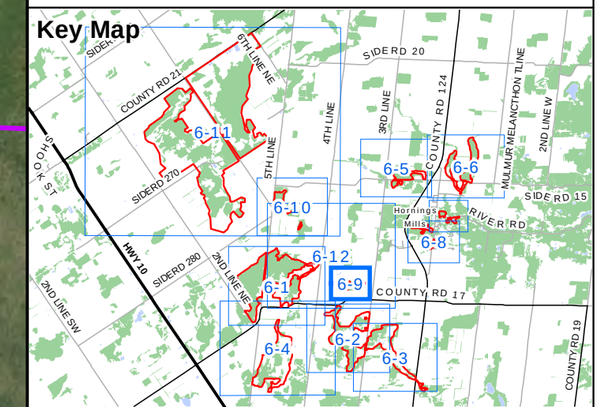
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-9

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

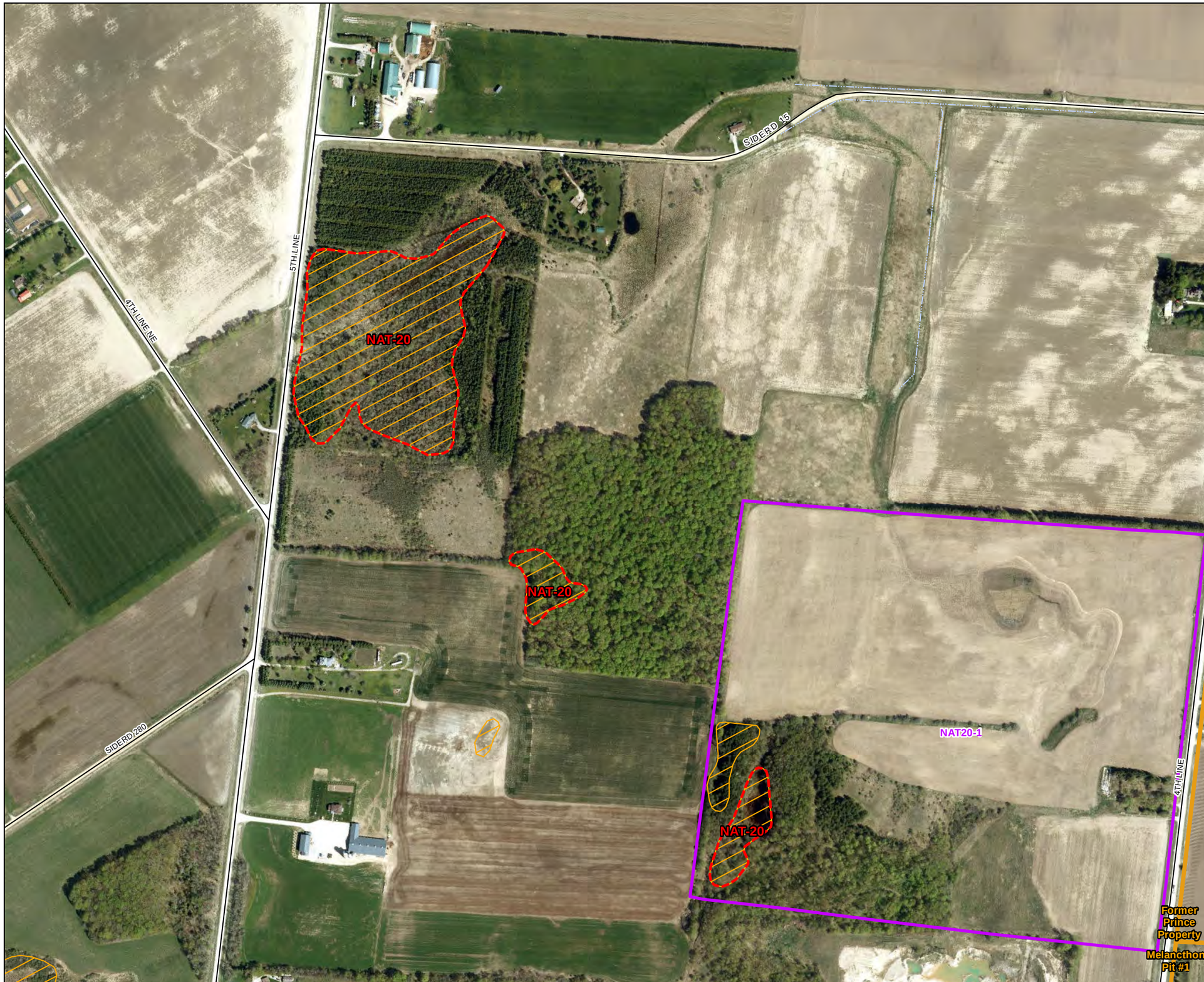
0 100 200 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

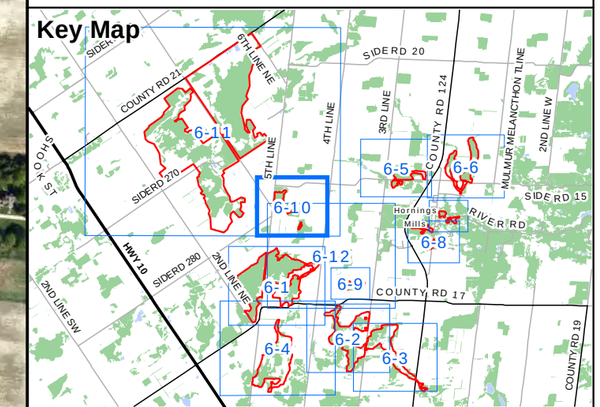
Map 6-10

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,500

0 100 200 300 Meters

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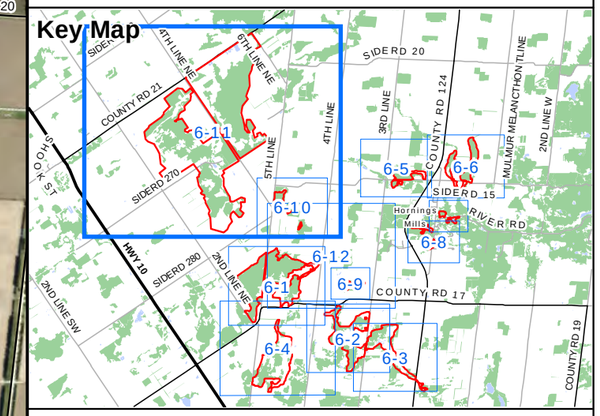
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-11

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Flow Direction
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Provincially Significant Wetland (PSW)
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473 Date: September 17, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:20,000**

0 200 400 600 800 1,000 1,200 Meters

N

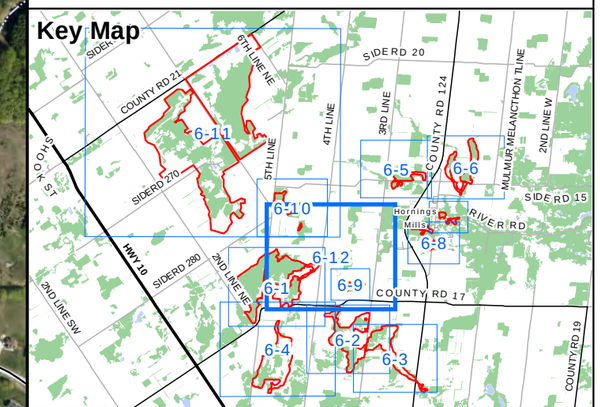
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

Map 6-12

Strada Pit/Quarry Natural Environment Assessment

Aquatic Thermal Regime and Groundwater Indicators

Key Map



Legend

- Subject Lands
- Participating Property
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Flow Direction
- Headwater, Ephemeral or Intermittent Drainage Feature
- Unevaluated Wetland
- Groundwater Indicator
- Brook Trout
- Rainbow Trout

Thermal Regime

- Cold
- Cool
- Warm

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Project: 2473
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:10,000

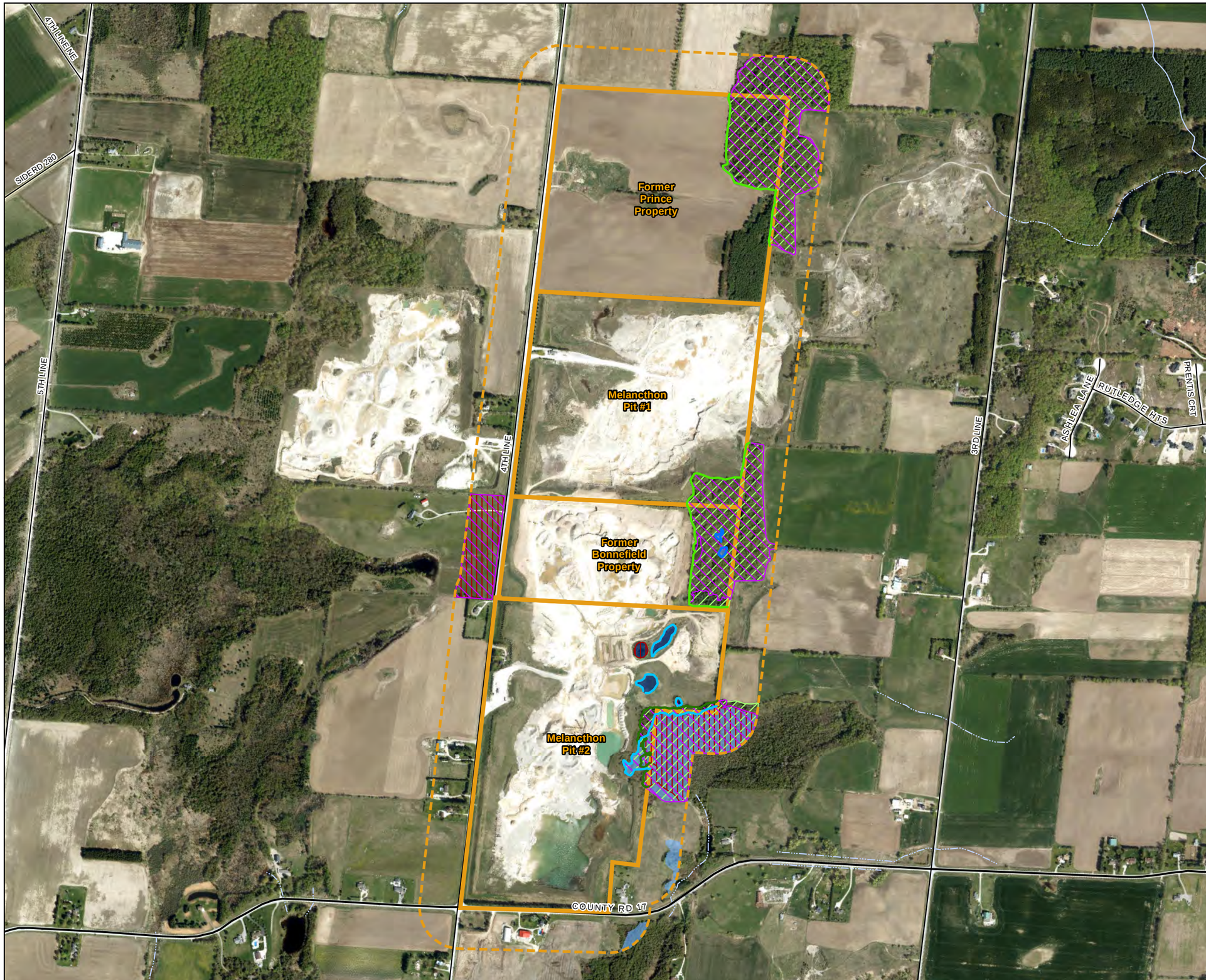
0 100 200 300 400 500 600 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map6_ThermalRegime_2024_09_17_DNH.mxd

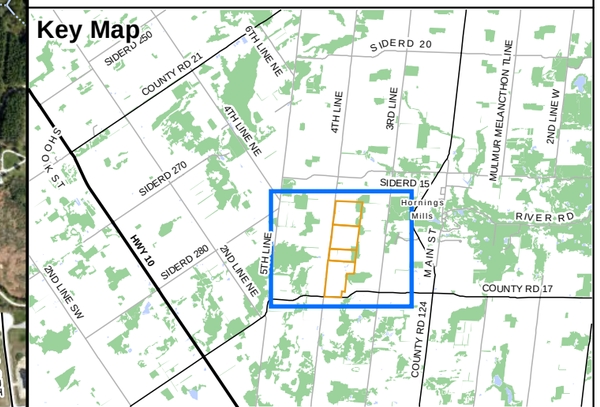
Map 7

Strada Pit/Quarry Natural Environment Assessment

Significant Natural Features Subject Lands and Surrounding 120m



Key Map



Legend

- Subject Lands
- 120m Limit
- Primary Road
- Secondary Road
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Significant Wildlife Habitat
- Significant Woodland
- Species at Risk Habitat
- Wetland
- Non-Provincially Significant Wetland

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Project: 2473A
Date: September 17, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:11,000

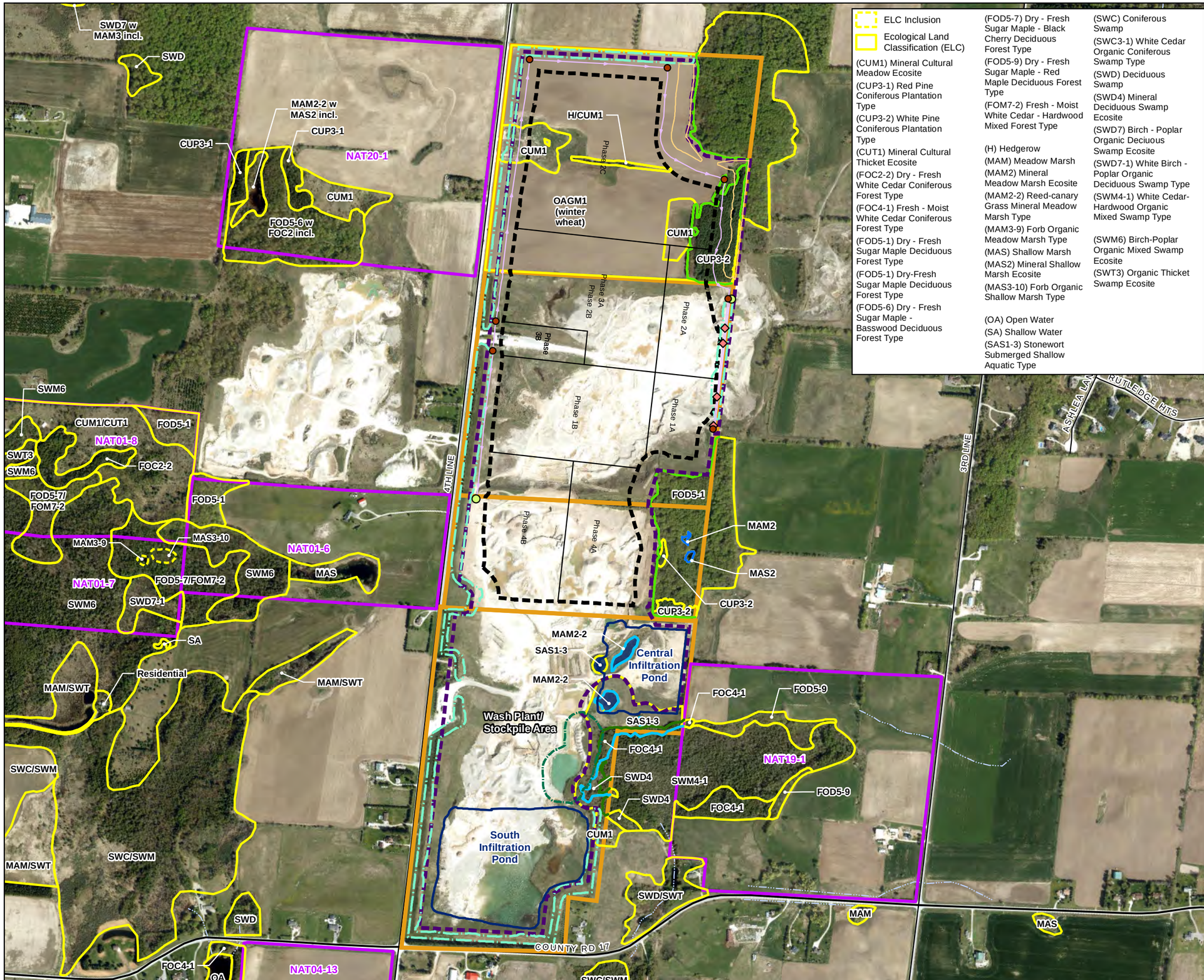
0 100 200 300 400 500 600 700 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map7_SigNatFeatures_SubjectLands_2024_09_17_DNH.mxd

Map 8-1

Strada Pit/Quarry Natural Environment Assessment

Proposed Quarry Site Plan



ELC Inclusion

Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(CUP3-1) Red Pine Coniferous Plantation Type

(CUP3-2) White Pine Coniferous Plantation Type

(CUT1) Mineral Cultural Thicket Ecosite

(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type

(FOD5-1) Dry-Fresh Sugar Maple Deciduous Forest Type

(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type

(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type

(H) Hedgerow

(MAM) Meadow Marsh

(MAM2) Mineral Meadow Marsh Ecosite

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(MAM3-9) Forb Organic Meadow Marsh Type

(MAS) Shallow Marsh

(MAS2) Mineral Shallow Marsh Ecosite

(MAS3-10) Forb Organic Shallow Marsh Type

(OA) Open Water

(SA) Shallow Water

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWC) Coniferous Swamp

(SWC3-1) White Cedar Organic Coniferous Swamp Type

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite

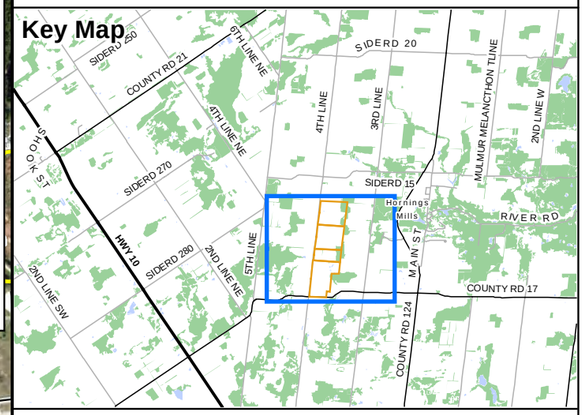
(SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

(SWM6) Birch-Poplar Organic Mixed Swamp Ecosite

(SWT3) Organic Thicket Swamp Ecosite

Key Map



Legend

- Subject Lands
- Participating Property
- Injection Well (MHBC)
- Inspection Port (MHBC)
- Pump Station (MHBC)
- Extraction Phase Boundary (MHBC)
- Proposed Infiltration Trench (MHBC)
- Proposed Berm (MHBC)
- Proposed Created Wetland (MHBC)
- Proposed Infiltration Pond (MHBC)
- Buried Tile Drain (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Non-Provincially Significant Wetland

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Project: 2473A
Date: January 28, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:10,000

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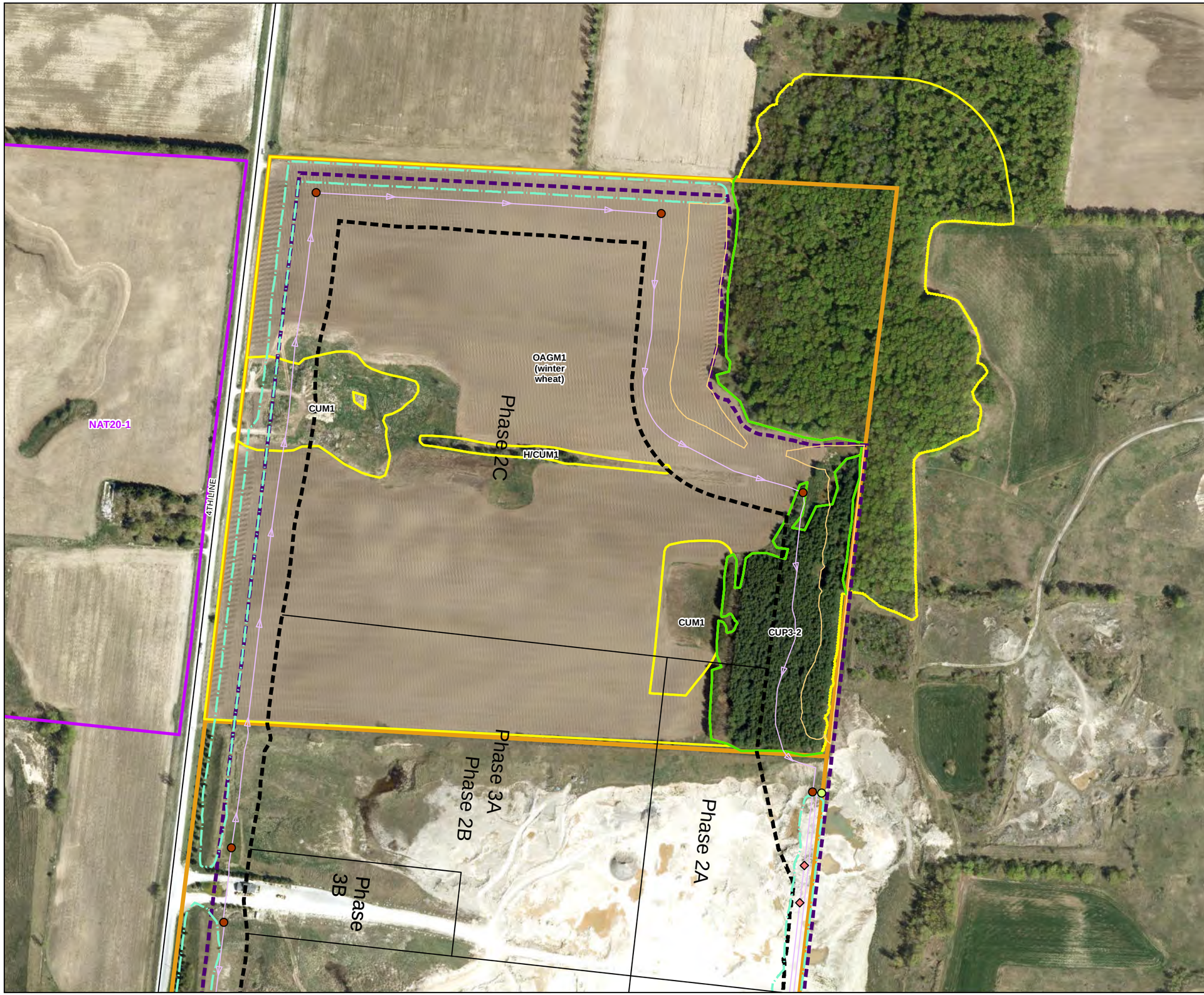
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map8a_ProposedQuarrySitePlan_2025_01_28_DNH.mxd

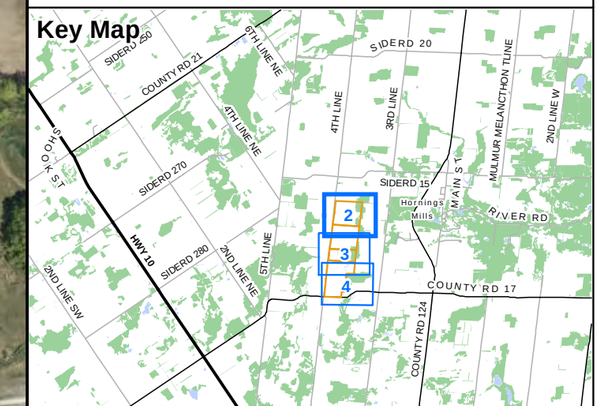
Map 8-2

Strada Pit/Quarry Natural Environment Assessment

Proposed Quarry Site Plan



Key Map



Legend

- Subject Lands
- Participating Property
- Injection Well (MHBC)
- Inspection Port (MHBC)
- Pump Station (MHBC)
- Extraction Phase Boundary (MHBC)
- Proposed Infiltration Trench (MHBC)
- Proposed Berm (MHBC)
- Buried Tile Drain (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(H) Hedgerow
(MAS2) Mineral Shallow Marsh Ecosite
(OAGM1) Open Agriculture

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Project: 2473A
Date: January 28, 2025

NAD83 - UTM Zone 17
Size: 11x17"
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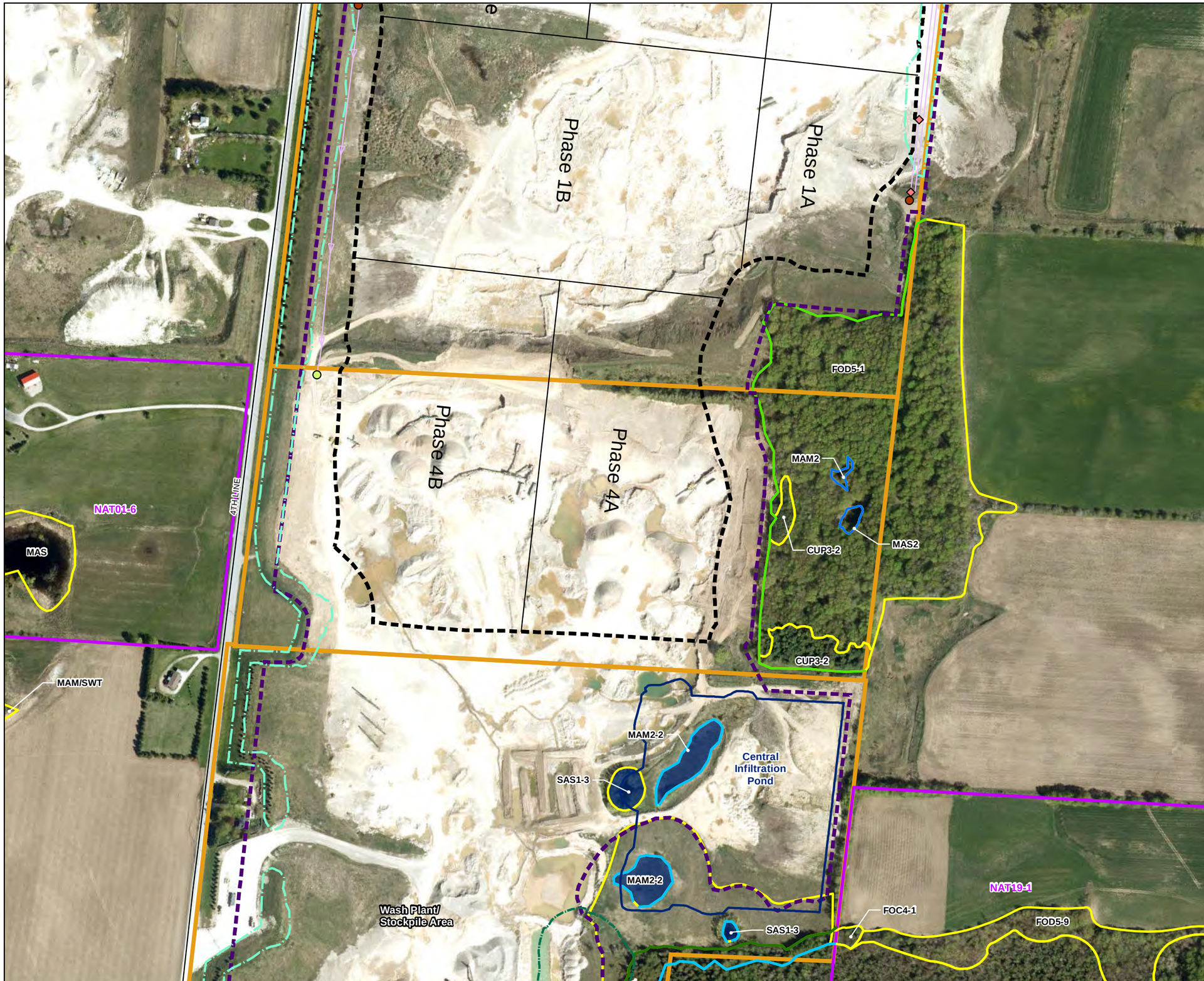
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map8b-d_ProposedQuarrySitePlan_2025_01_28_DNH.mxd

Map 8-3

Strada Pit/Quarry Natural Environment Assessment

Proposed Quarry Site Plan



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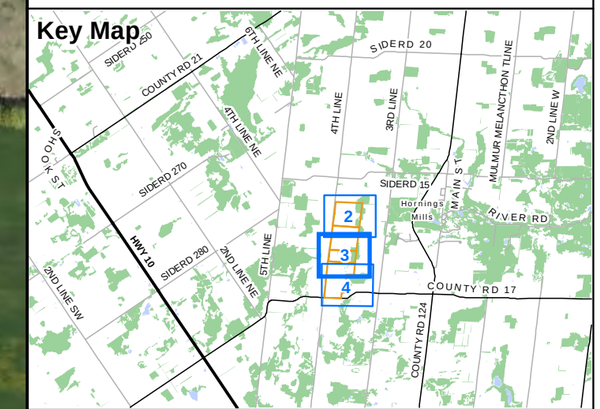

Legend

- Subject Lands
- Participating Property
- Injection Well (MHBC)
- Inspection Port (MHBC)
- Pump Station (MHBC)
- Extraction Phase Boundary (MHBC)
- Proposed Berm (MHBC)
- Proposed Created Wetland (MHBC)
- Proposed Infiltration Pond (MHBC)
- Buried Tile Drain (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Secondary Road
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Non-Provincially Significant Wetland
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (MAM) Meadow Marsh
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (MAS) Shallow Marsh
- (SAS1-3) Stonewort Submerged Shallow Aquatic Type
- (SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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Project: 2473A Date: January 28, 2025	NAD83 - UTM Zone 17 Size: 11x17" **1:4,000**

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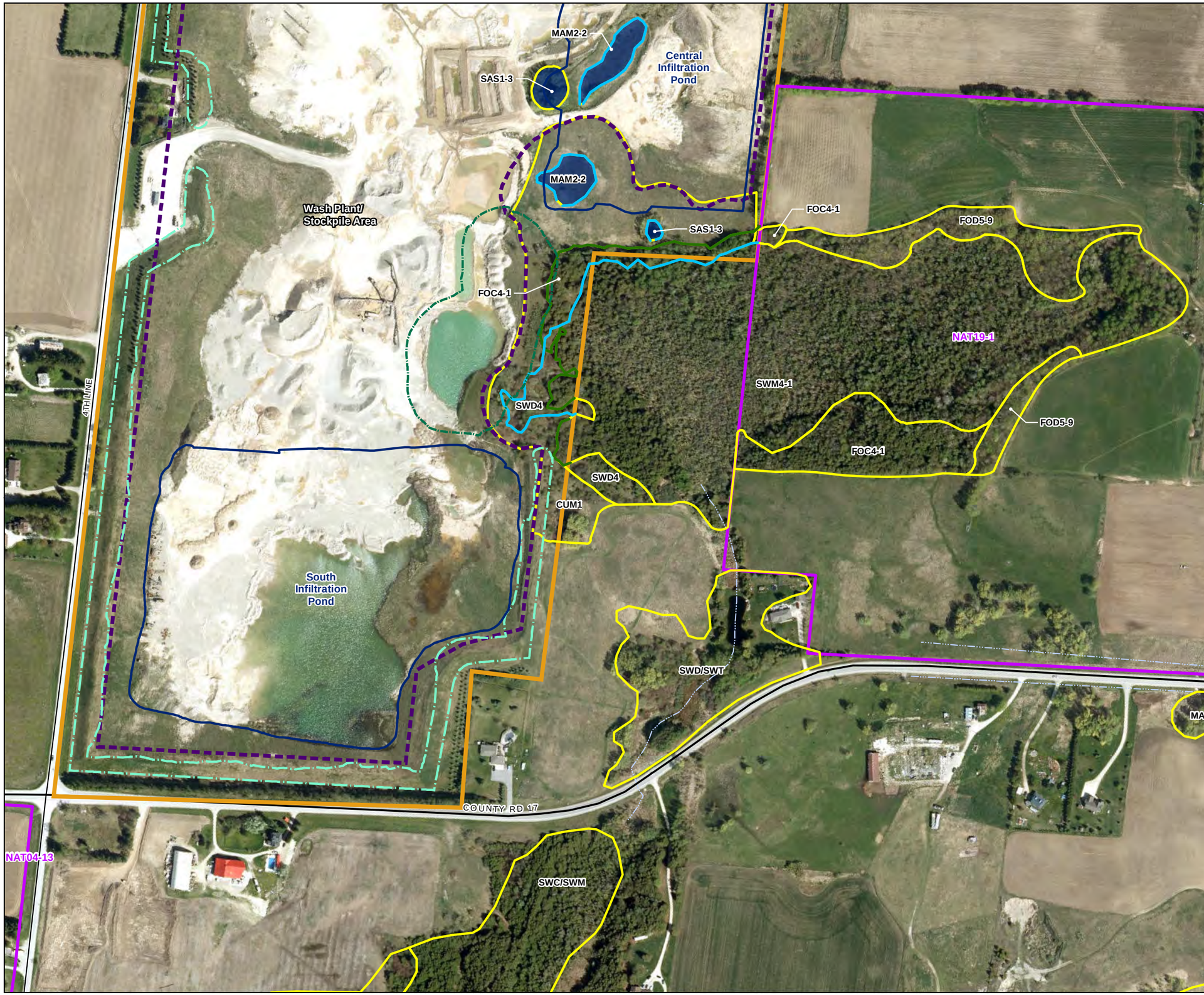
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map8b-d_ProposedQuarrySitePlan_2025_01_28_DNH.mxd

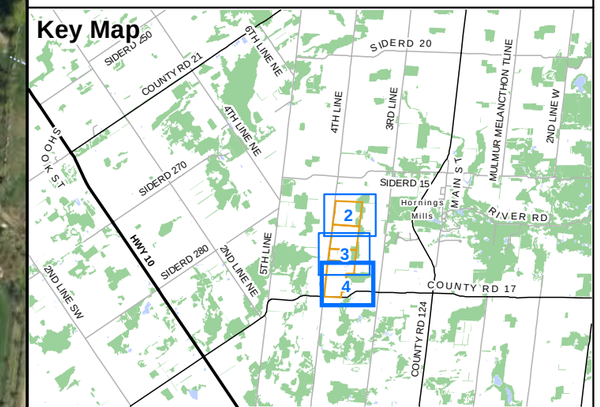
Map 8-4

Strada Pit/Quarry Natural Environment Assessment

Proposed Quarry Site Plan



Key Map



Legend

- Subject Lands
- Participating Property
- Proposed Berm (MHBC)
- Proposed Created Wetland (MHBC)
- Proposed Infiltration Pond (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Primary Road
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Non-Provincially Significant Wetland
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type

(MAM) Meadow Marsh

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(SAS1-3) Stonewort Submerged Shallow Aquatic Type

(SWC) Coniferous Swamp

(SWD) Deciduous Swamp

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

(SWT) Thicket Swamp

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Project: 2473A
Date: January 28, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:4,000

0 50 100 150 200 250 Meters

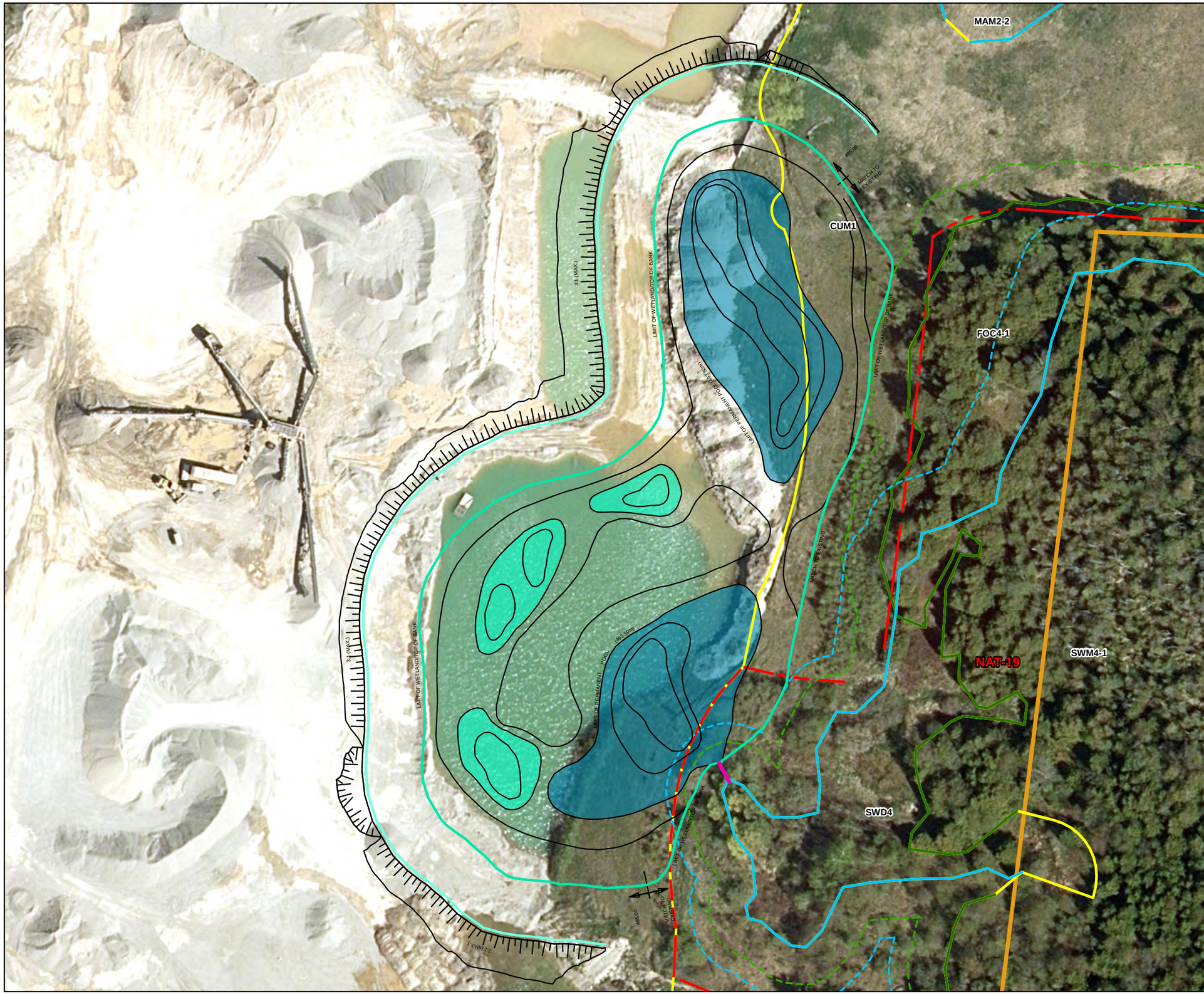
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map8b-d_ProposedQuarrySitePlan_2025_01_28_DNH.mxd

Map 9

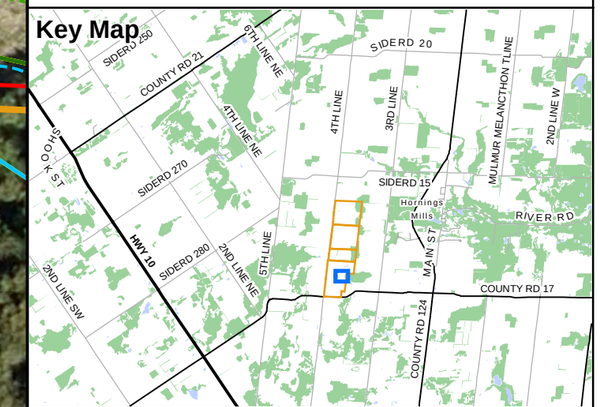
Strada Pit/Quarry

Natural Environment Assessment

Proposed Created Wetland



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Proposed Wetland
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Significant Woodland Buffer (10m)
- Wetland Buffer (15m)
- Ecological Land Classification (ELC)
- Created Wetland Boundary
- Permanent Pool
- Seasonally Flooded
- Created Wetland Buffer Limit (15m)
- Wetland Outlet

(CUM1) Mineral Cultural Meadow Ecosite

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type

(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type

(SWD4) Mineral Deciduous Swamp Ecosite

(SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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Project: 2473A Date: August 15, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:1,000**

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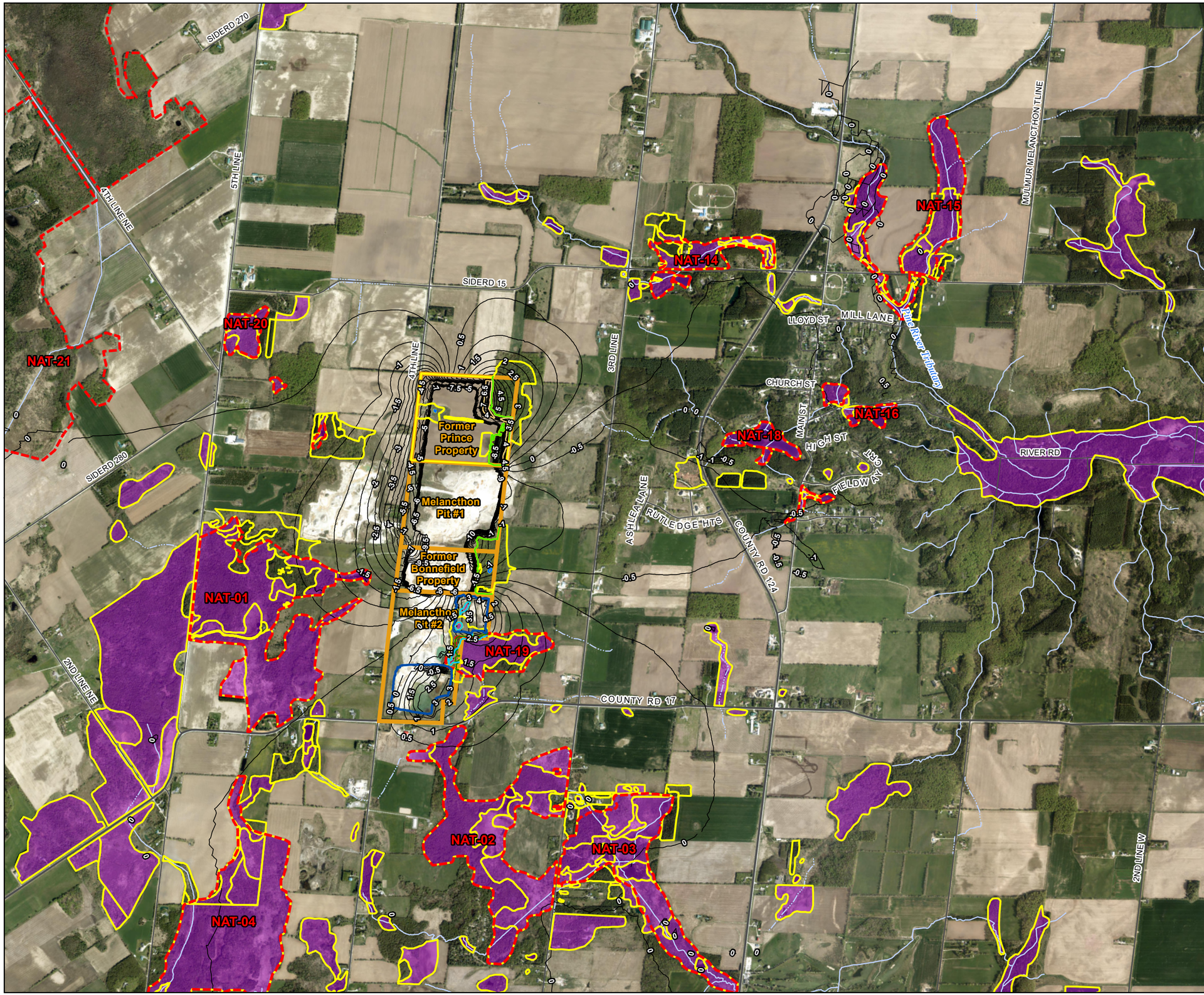
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map9_ProposedWetland_1K_2024_08_15_KB.mxd

Map 10-1

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence – L1, Phase 4A



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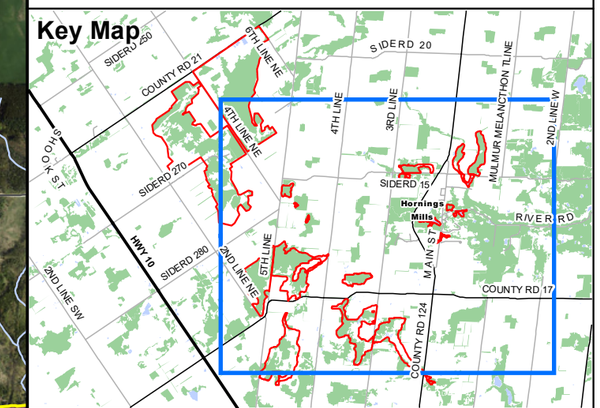

Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Trench (MHBC)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)
- ELC Inclusion

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:26,000

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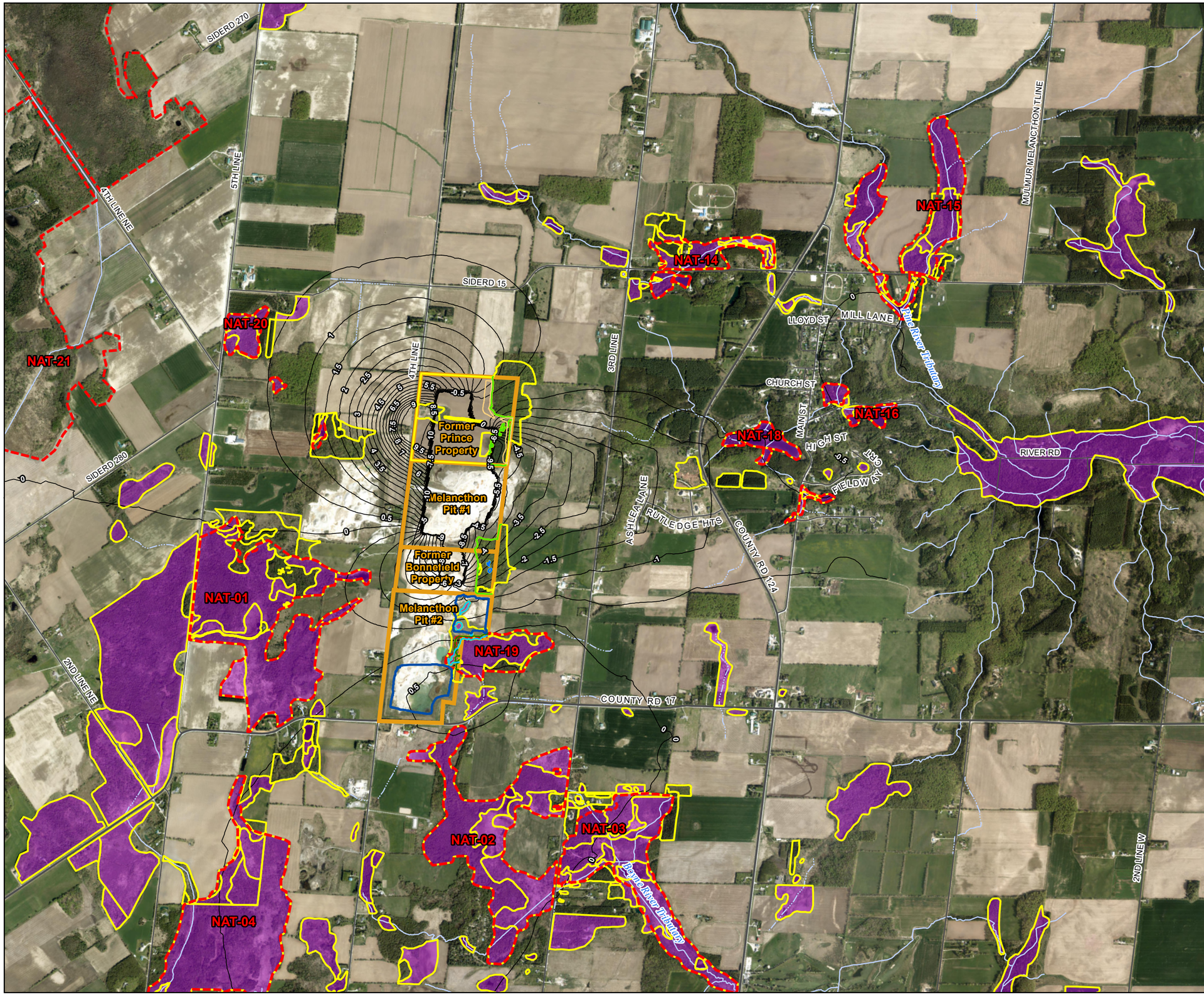
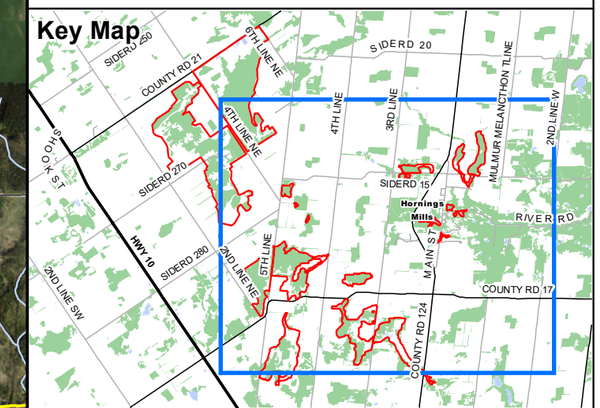
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10-1_PredictedGWZOI_L1_26K_2024_10_18_DNH.mxd

Map 10-2

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence – Gasport, Phase 4A





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Trench (MHBC)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)
- ELC Inclusion

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:26,000

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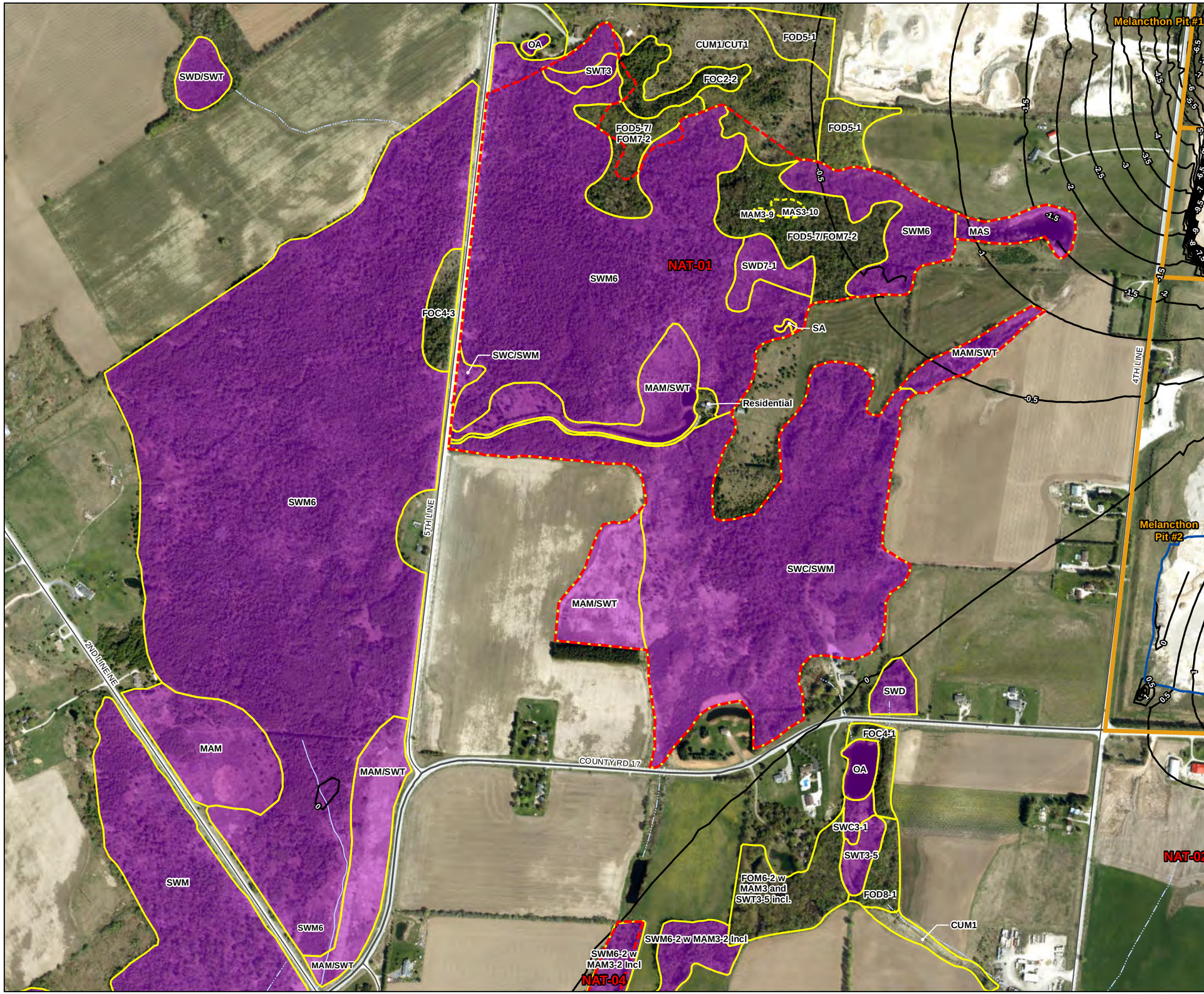
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10-2_PredictedGWZOI_L6_26K_2024_10_18_DNH.mxd

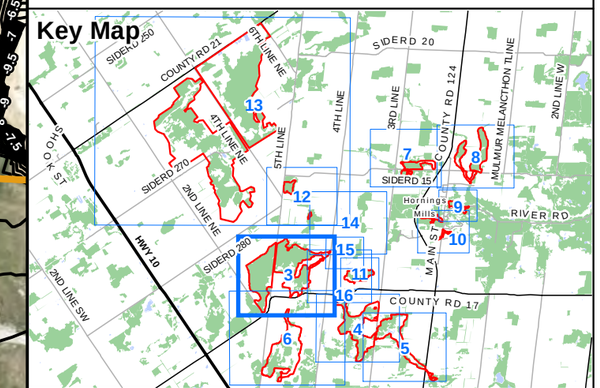
Map 10-3

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- ELC Inclusion
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUT1) Mineral Cultural Thicket Ecosite
- (FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOC4-3) Fresh - Moist White Cedar - Balsam Fir Coniferous Forest Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
- (FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
- (MAM) Meadow Marsh
- (MAM3-9) Forb Organic Meadow Marsh Type
- (MAS) Shallow Marsh
- (MAS3-10) Forb Organic Shallow Marsh Type
- (OA) Open Water
- (SA) Shallow Water
- (SWC) Coniferous Swamp
- (SWC3-1) White Cedar Organic Coniferous Swamp Type
- (SWD) Deciduous Swamp
- (SWD7-1) White Birch - Poplar Organic Deciduous Swamp Type
- (SWM) Mixed Swamp
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
- (SWT) Thicket Swamp
- (SWT3) Organic Thicket Swamp Ecosite
- (SWT3-5) Red-osier Organic Thicket Swamp Type

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
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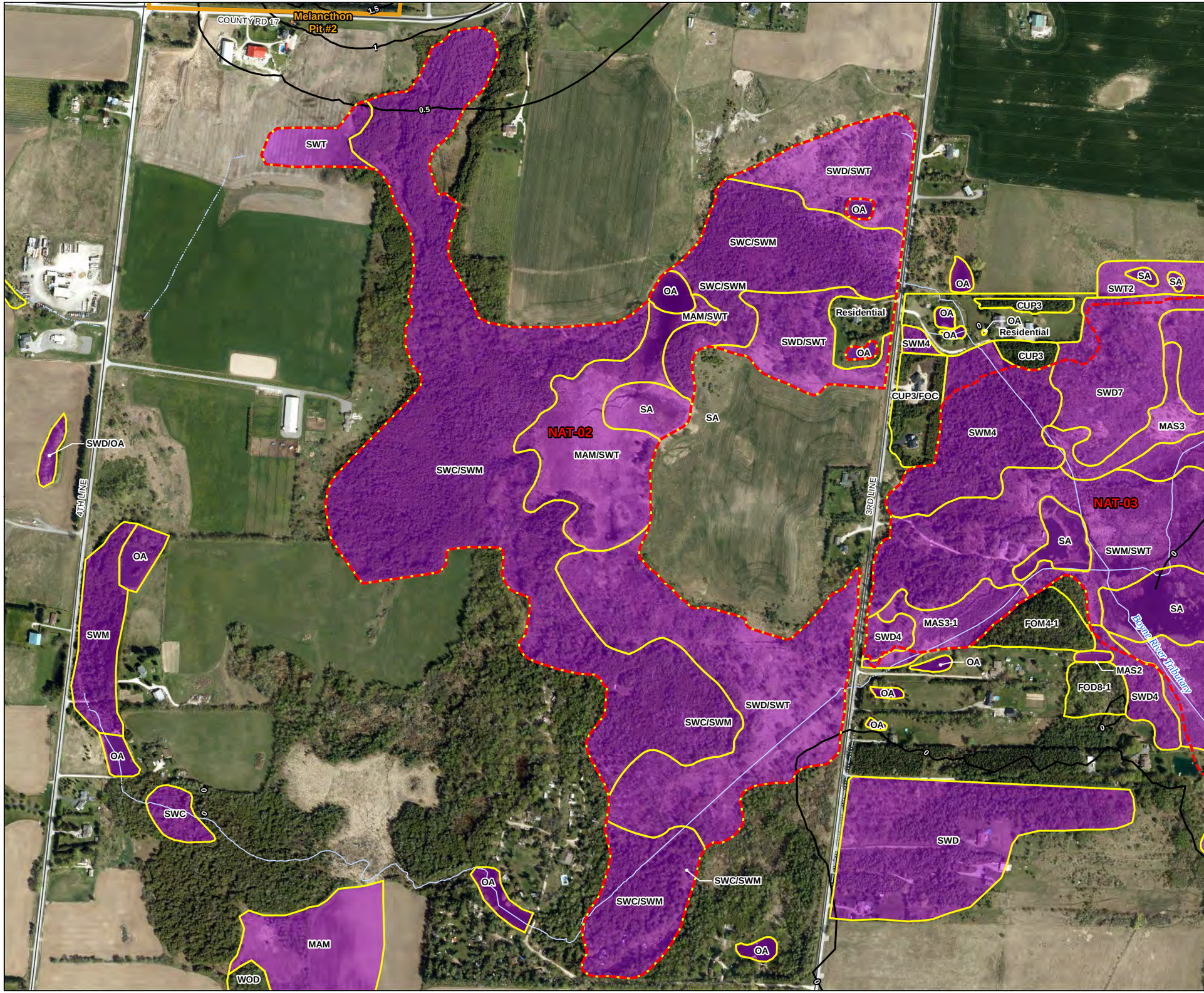
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

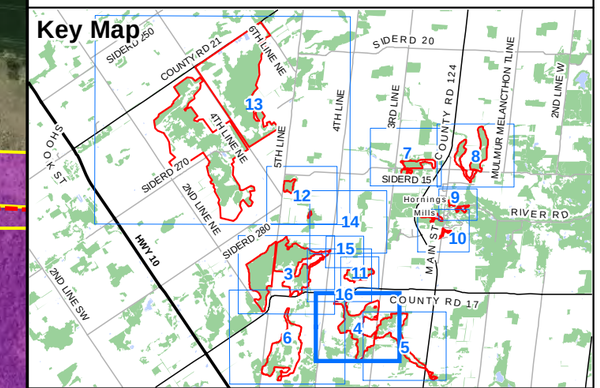
Map 10-4

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3) Coniferous Plantations
- (FOC) Coniferous Forest
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
- (MAM) Meadow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (MAS3) Organic Shallow Marsh Ecosite
- (MAS3-1) Cattail Organic Shallow Marsh Type
- (OA) Open Water
- (SA) Shallow Water
- (SWC) Coniferous Swamp
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
- (SWM) Mixed Swamp
- (SWM4) White Cedar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp
- (SWT2) Mineral Thicket Swamp Ecosite
- (SWT3-2) Willow Organic Thicket Swamp Type
- (WOD) Woodland

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,500

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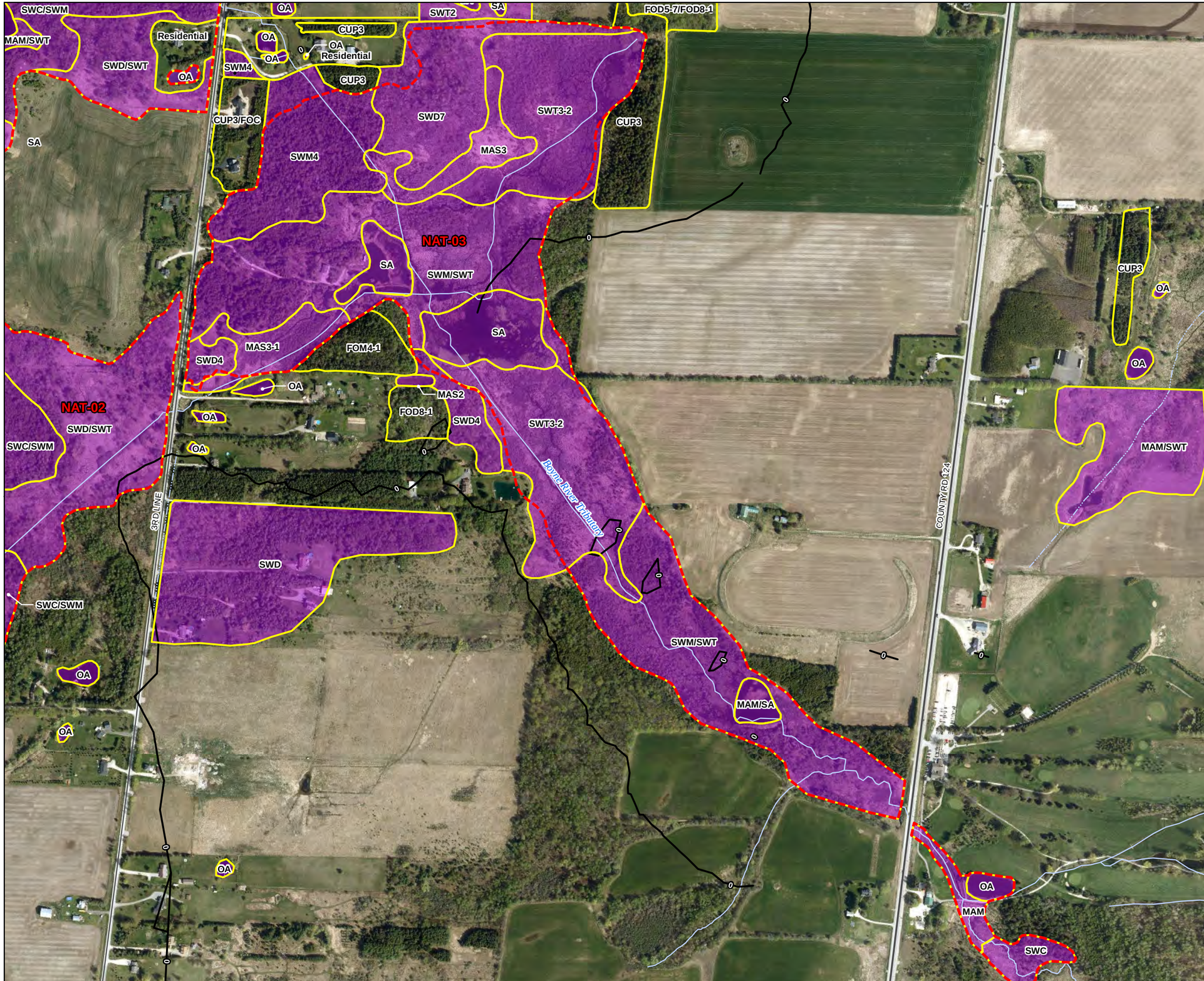
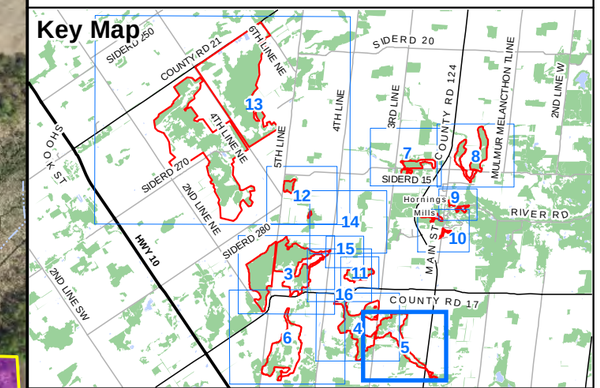
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

Map 10-5

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A





Legend

- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)

(CUP3) Coniferous Plantations
(FOC) Coniferous Forest
(FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(FOM4-1) Dry - Fresh White Cedar - White Birch Mixed Forest Type
(MAM) Meadow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(MAS3) Organic Shallow Marsh Ecosite
(MAS3-1) Cattail Organic Shallow Marsh Type
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM) Mixed Swamp
(SWM4) White Cedar Organic Mixed Swamp Ecosite
(SWT) Thicket Swamp
(SWT2) Mineral Thicket Swamp Ecosite
(SWT3-2) Willow Organic Thicket Swamp Type

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,500

0 100 200 300 400 Meters

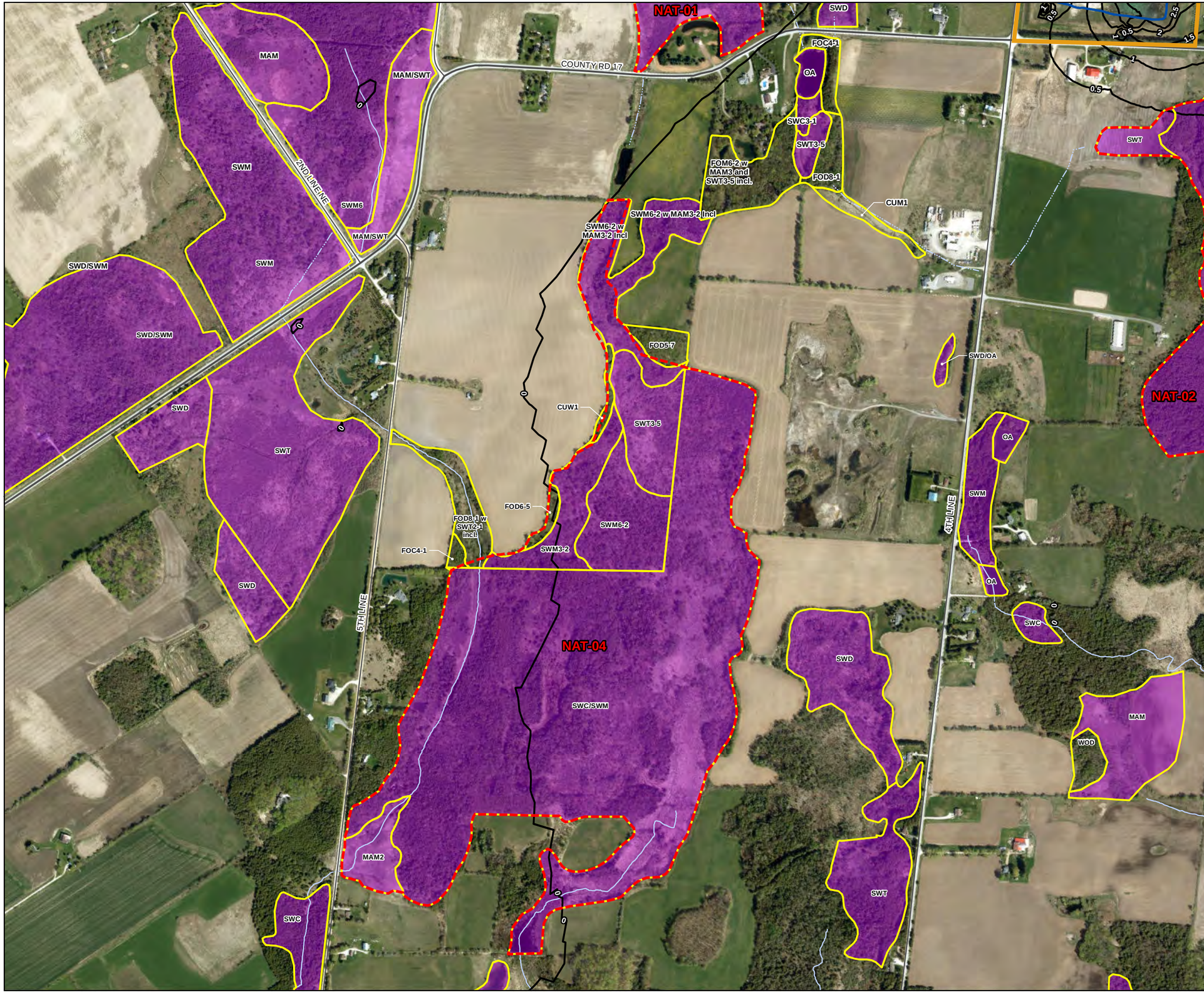
N

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

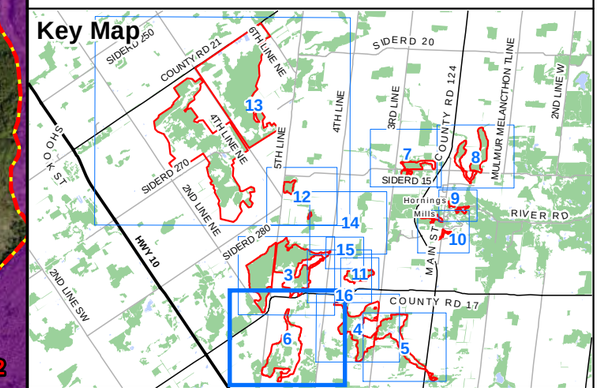
Map 10-6

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUW1) Mineral Cultural Woodland Ecosite
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-7) Dry - Fresh Sugar Maple - Black Cherry Deciduous Forest Type
- (FOD6-5) Fresh - Moist Sugar Maple - Hardwood Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM6-2) Fresh - Moist Hemlock - Hardwood Mixed Forest Type
- (MAM) Meadow Marsh
- (MAM2) Mineral Meadow Marsh Ecosite
- (OA) Open Water
- (SWC) Coniferous Swamp
- (SWC3-1) White Cedar Organic Coniferous Swamp Type
- (SWD) Deciduous Swamp
- (SWD/SWM) Deciduous Swamp/Mixed Swamp
- (SWM) Mixed Swamp
- (SWM3-2) Poplar - Conifer Mineral Mixed Swamp Type
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWM6-2) Poplar - Conifer Organic Mixed Swamp Type
- (SWT) Thicket Swamp
- (SWT3-5) Red-osier Organic Thicket Swamp Type
- (WOD) Woodland

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:9,000

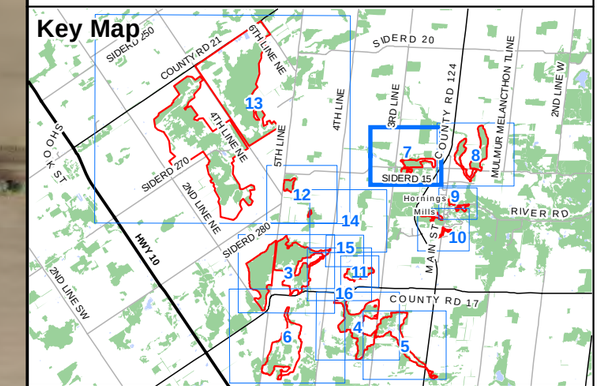
0 100 200 300 400 500 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

Map 10-7

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - Gasport Phase 4A



Legend

- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)

(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5) Dry - Fresh Sugar Maple Deciduous Forest Ecosite
(FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(MAS) Shallow Marsh
(OA) Open Water
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3) White Cedar Organic Coniferous Swamp Ecosite
(SWD) Deciduous Swamp
(SWD4) Mineral Deciduous Swamp Ecosite
(SWM) Mixed Swamp
(SWM6-2) Poplar - Conifer Organic Mixed Swamp Type

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,500

0 100 200 300 Meters

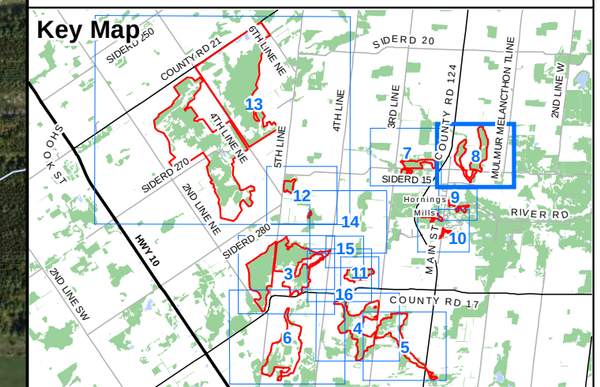
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

Map 10-8

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - Gasport Phase 4A

Key Map



Legend

- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- ELC Inclusion
- Ecological Land Classification (ELC)

(CUP3) Coniferous Plantations
(FOC2-2) Dry - Fresh White Cedar Coniferous Forest Type
(FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
(FOD5-10) Dry-Fresh Sugar Maple-White Birch-Poplar Deciduous Forest Type
(FOM4) Dry - Fresh White Cedar Mixed Forest Ecosite
(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
(MAM3-4) Fowl Manna Grass Organic Meadow Marsh Type
(MAS) Shallow Marsh
(SA) Shallow Water
(SWC) Coniferous Swamp
(SWC3-2) White Cedar - Conifer Organic Coniferous Swamp Type
(SWM) Mixed Swamp

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

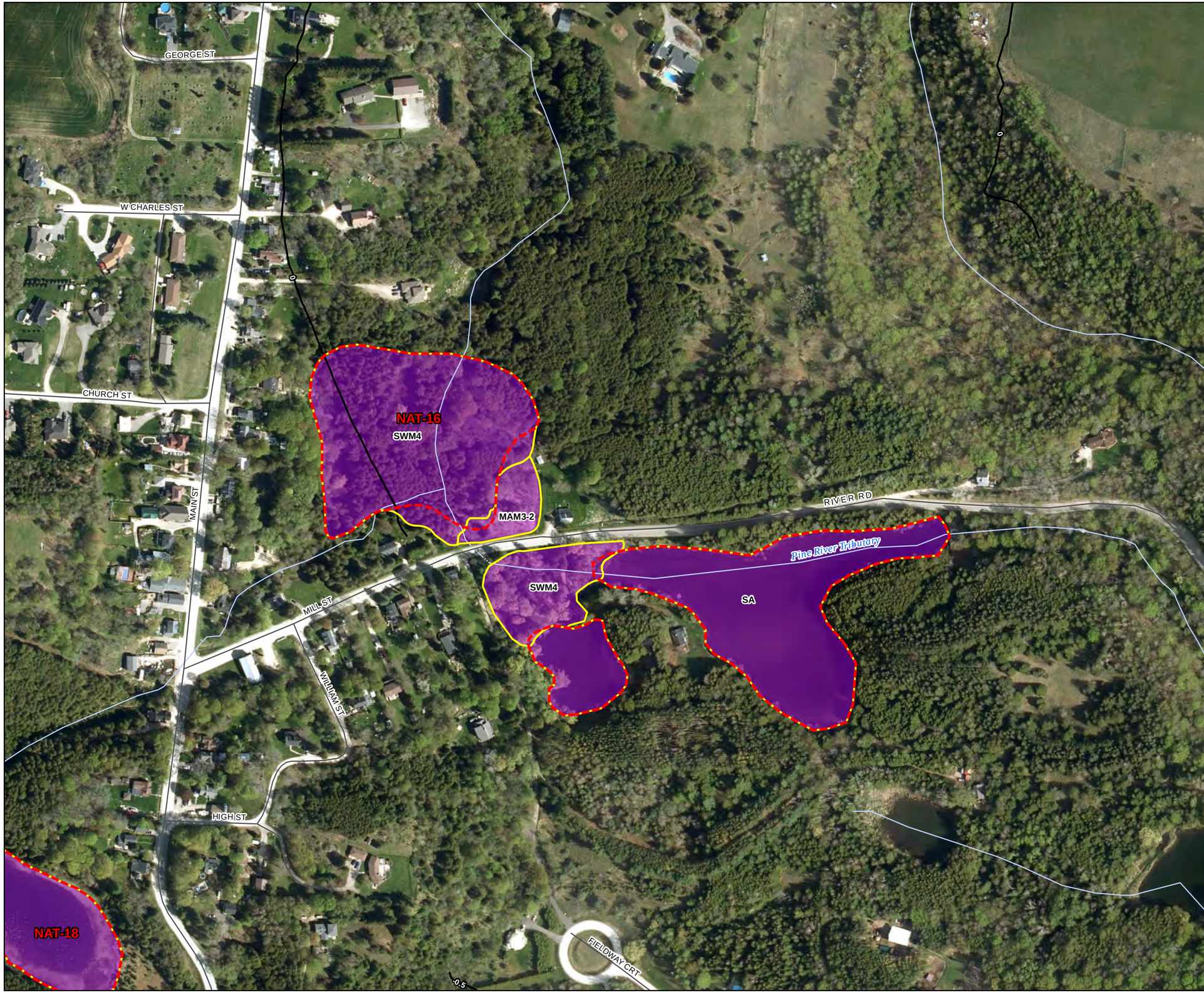
0 100 200 300 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

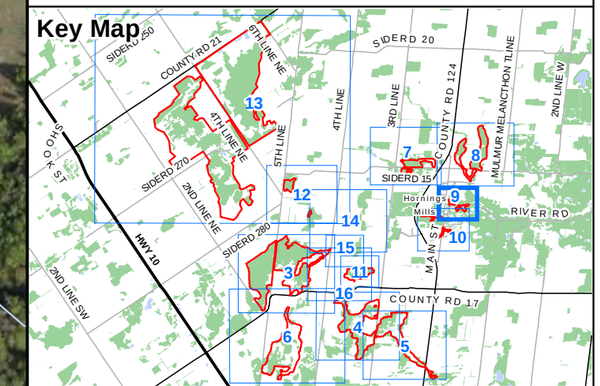
Map 10-9

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - Gasport Phase 4A



Key Map



Legend

- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)

(MAM3-2) Reed-canary Grass Organic Meadow Marsh Type
(SA) Shallow Water
(SWM4) White Cedar Organic Mixed Swamp Ecosite

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Project: 2473A Date: October 18, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:3,000**

0 100 Meters

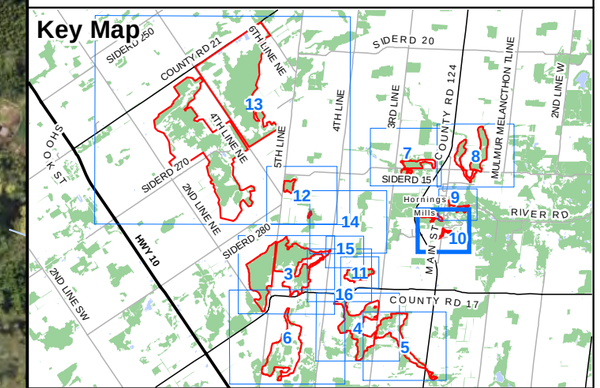
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

Map 10-10

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - Gasport Phase 4A

Key Map



Legend

- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)

(MAM) Meadow Marsh
(MAM3) Organic Meadow Marsh Ecosite
(OA) Open Water
(SA) Shallow Water
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWC) Coniferous Swamp
(SWM) Mixed Swamp
(SWT) Thicket Swamp

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:4,000

0 100 200 Meters

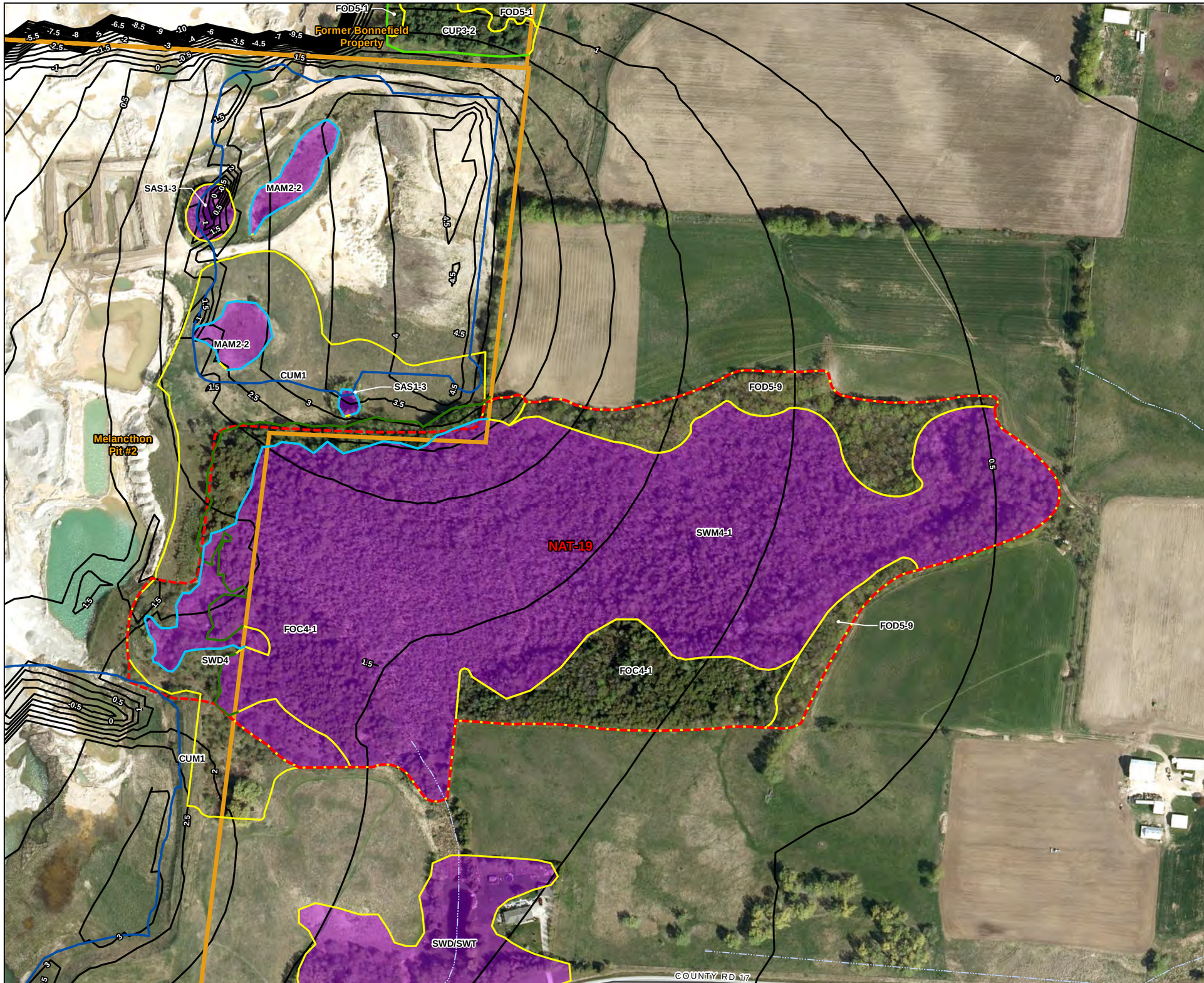
N

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

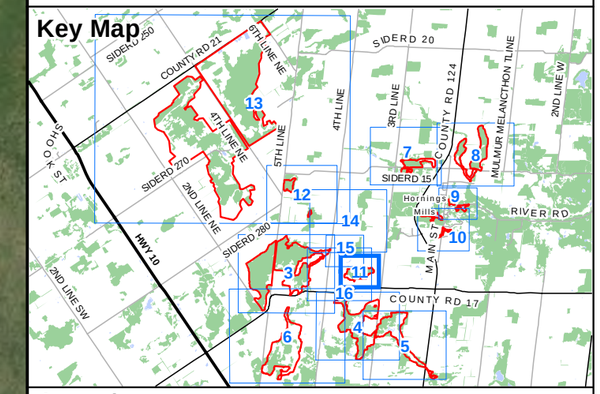
Map 10-11

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (SAS1-3) Stonewort Submerged Shallow Aquatic Type
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:3,000

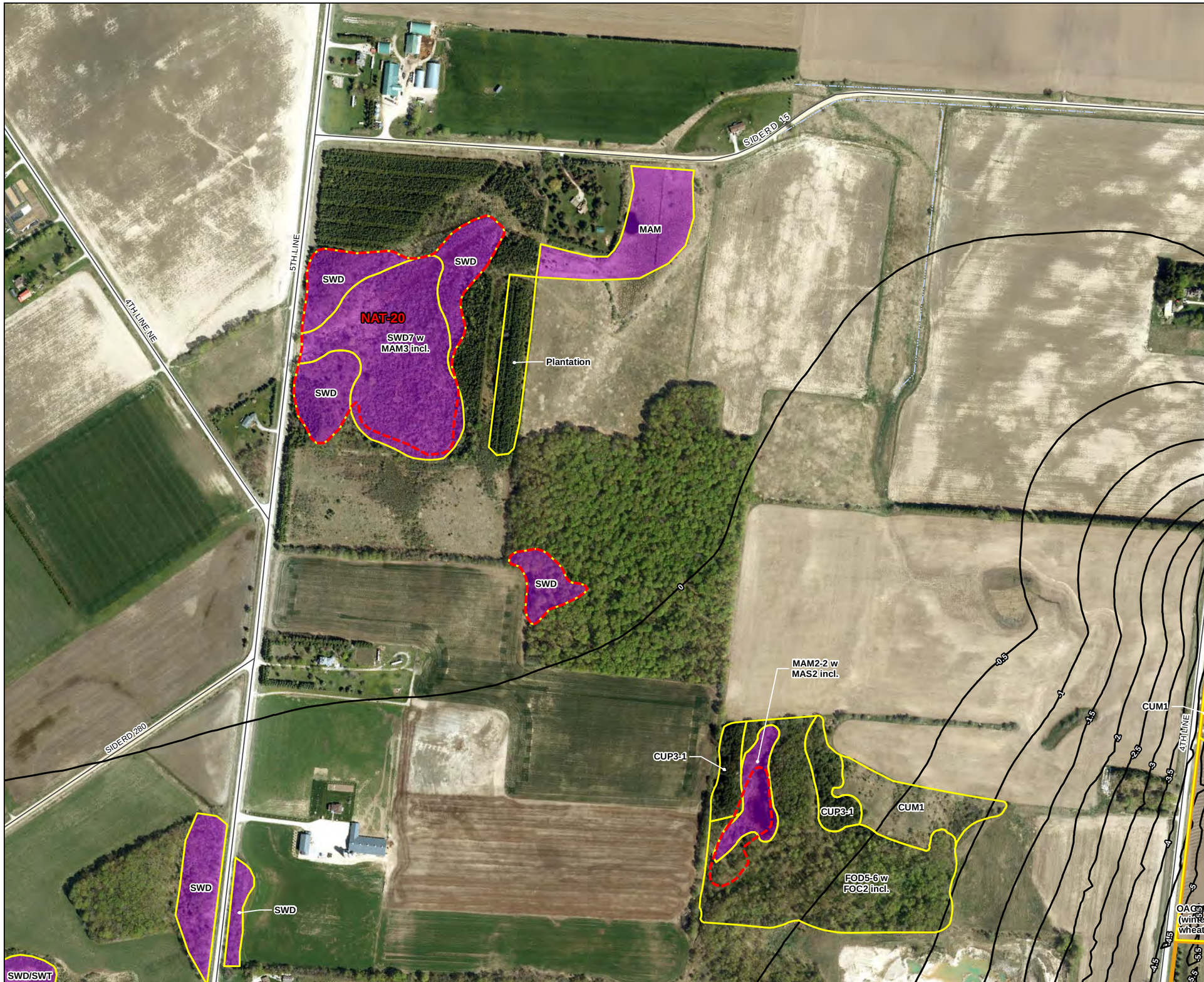
0 100 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

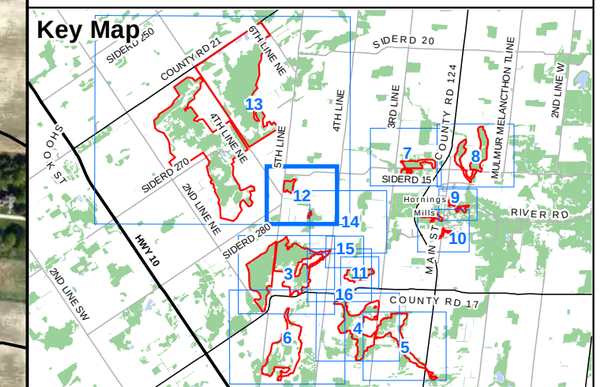
Map 10-12

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3) Coniferous Plantations
- (CUP3-1) Red Pine Coniferous Plantation Type
- (FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
- (MAM) Meadow Marsh
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (OAG) Open Agriculture
- (SWD) Deciduous Swamp
- (SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
- (SWT) Thicket Swamp

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Project: 2473A Date: October 18, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:5,500**

0 100 200 300 Meters

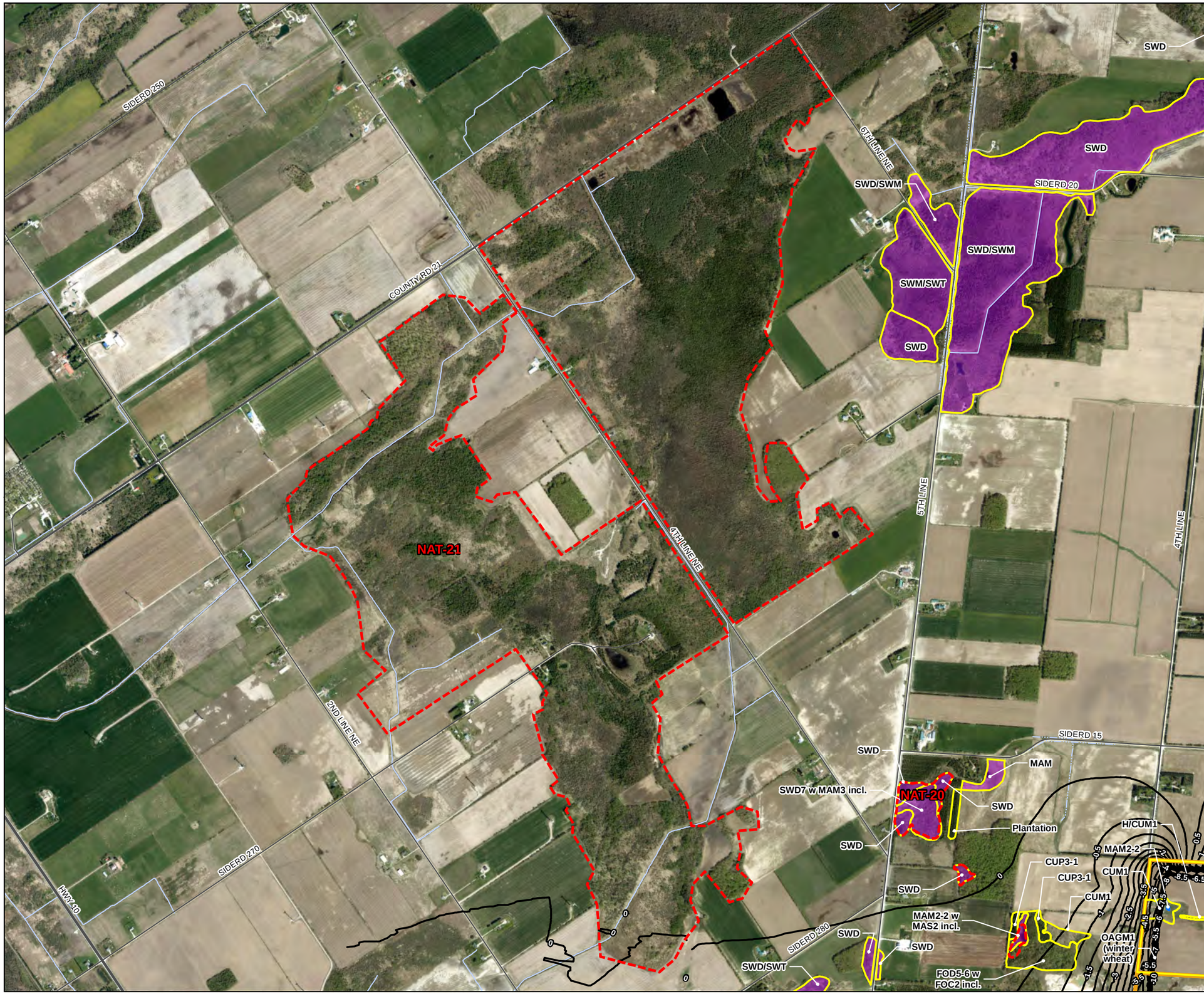
N

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

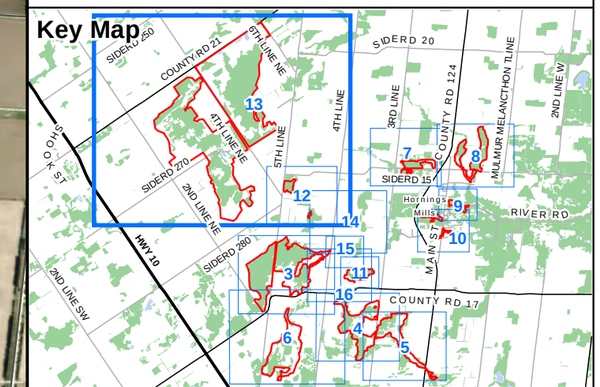
Map 10-13

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)

(CUM1) Mineral Cultural Meadow Ecosite
(CUP3) Coniferous Plantations
(CUP3-1) Red Pine Coniferous Plantation Type
(FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
(H) Hedgerow
(MAM) Meadow Marsh
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS2) Mineral Shallow Marsh Ecosite
(OAG) Open Agriculture
(SWD) Deciduous Swamp
(SWD/SWM) Deciduous Swamp/Mixed Swamp
(SWD7) Birch - Poplar Organic Deciuous Swamp Ecosite
(SWM/SWT) Mixed Swamp/Thicket Swamp
(SWT) Thicket Swamp

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:20,000

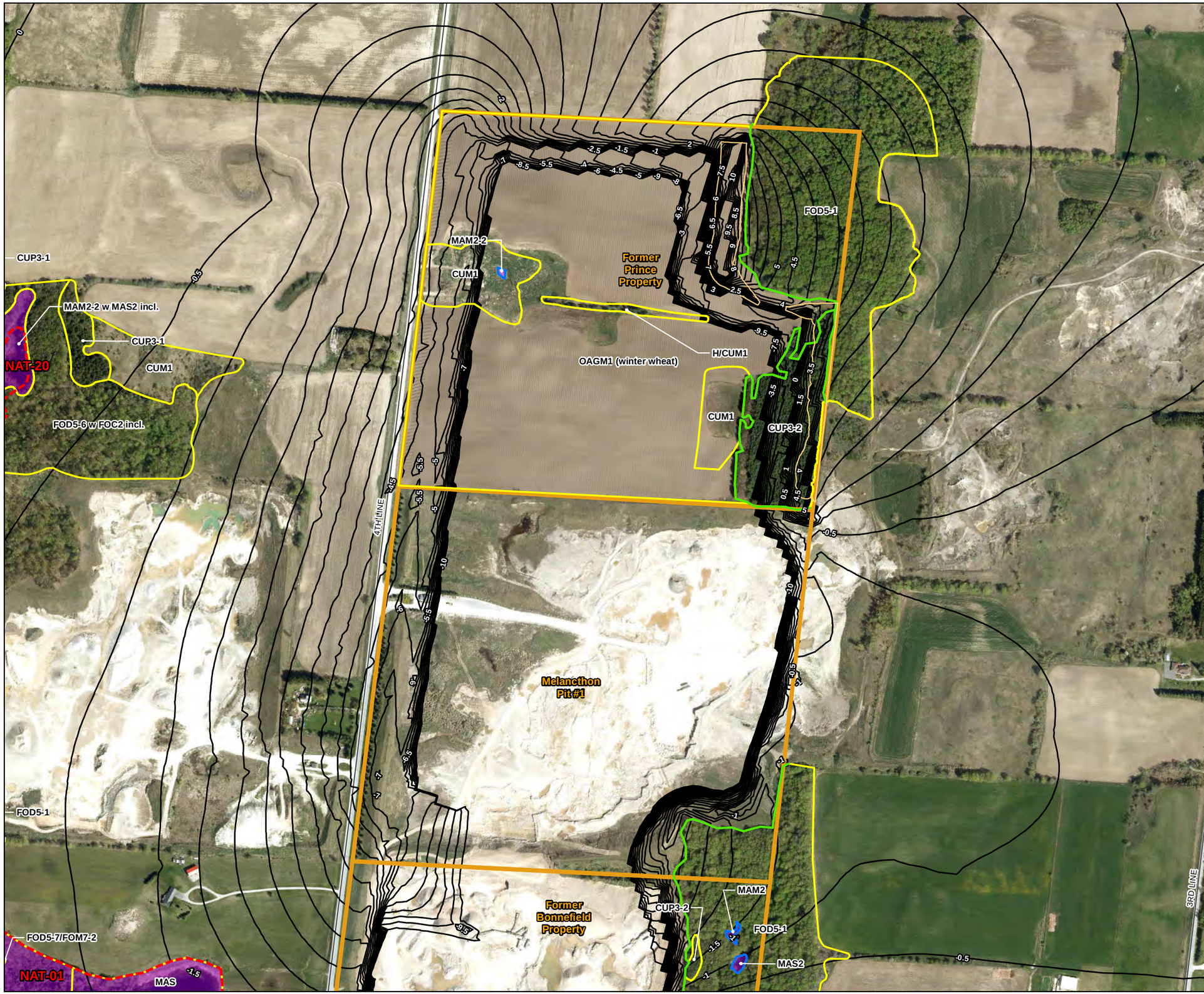
0 200 400 600 800 1,000 1,200 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_5K_2024_10_18_DNH.mxd

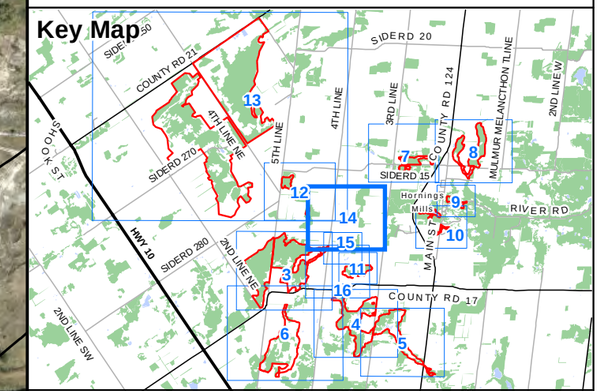
Map 10-14

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Property
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Trench (MHBC)
- Secondary Road
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM) Cultural Meadow
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-1) Red Pine Coniferous Plantation Type
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-6) Dry - Fresh Sugar Maple - Basswood Deciduous Forest Type
- (FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
- (H) Hedgerow
- (MAM2) Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (MAS) Shallow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (OAG) Open Agriculture
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

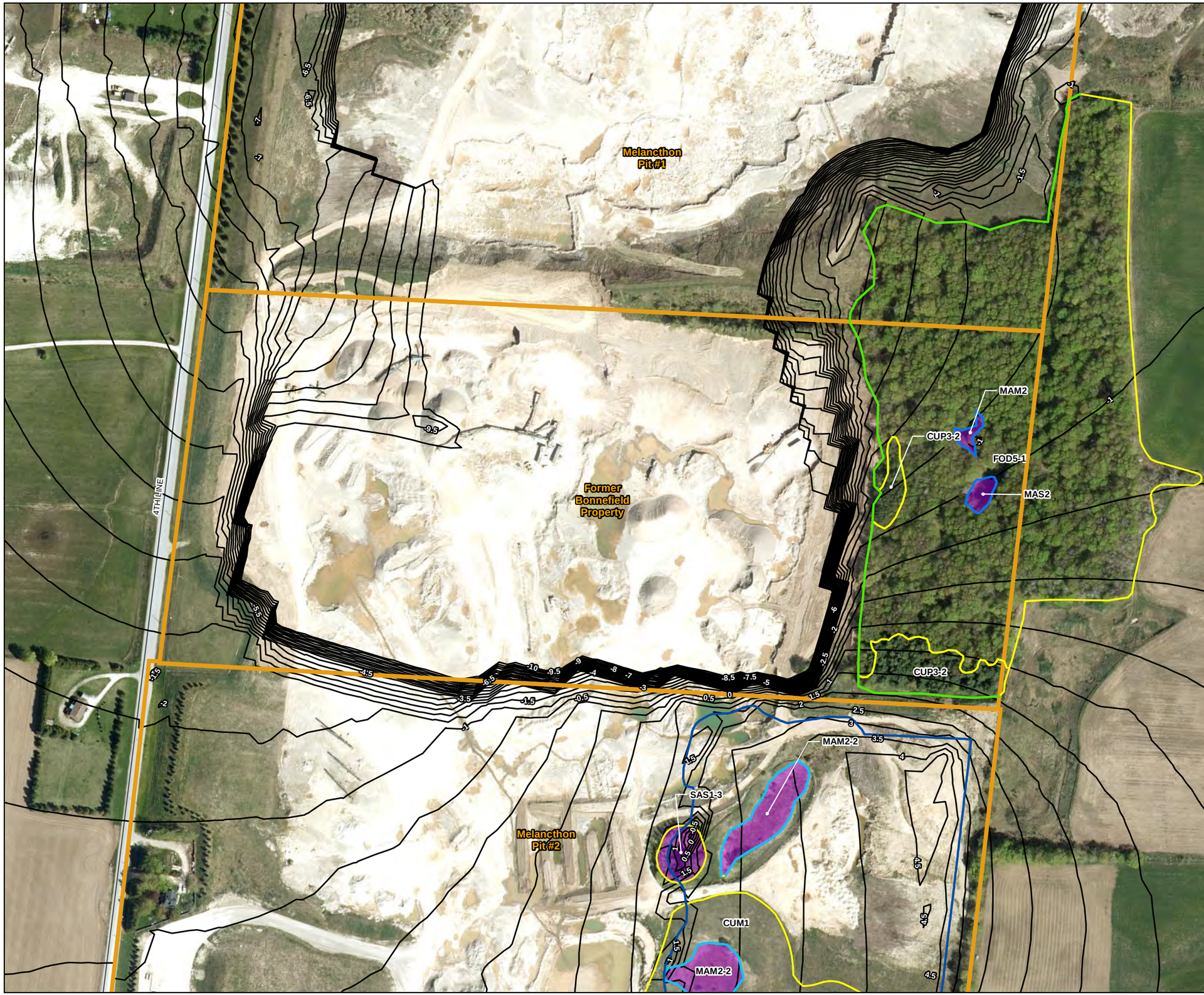
0 100 200 300 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_SubjectProperty_5K_2024_10_18_DNH.mxd

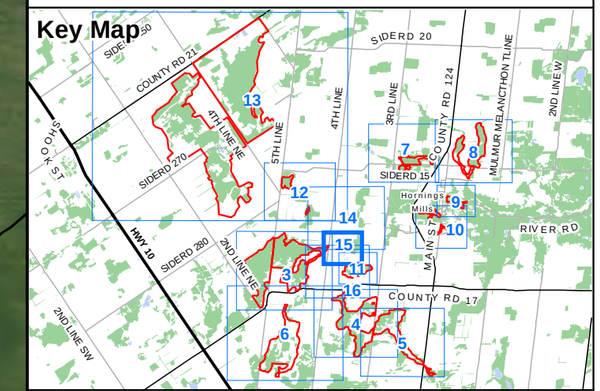
Map 10-15

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Property
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Pond (MHBC)
- Secondary Road
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)

(CUM) Cultural Meadow
(CUM1) Mineral Cultural Meadow Ecosite
(CUP3-2) White Pine Coniferous Plantation Type
(FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
(H) Hedgerow
(MAM) Meadow Marsh
(MAM2) Mineral Meadow Marsh Ecosite
(MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
(MAS) Shallow Marsh
(MAS2) Mineral Shallow Marsh Ecosite
(SAS1-3) Stonewort Submerged Shallow Aquatic Type
(SWT) Thicket Swamp

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Project: 2473A Date: October 18, 2024	NAD83 - UTM Zone 17 Size: 11x17" **1:3,000**

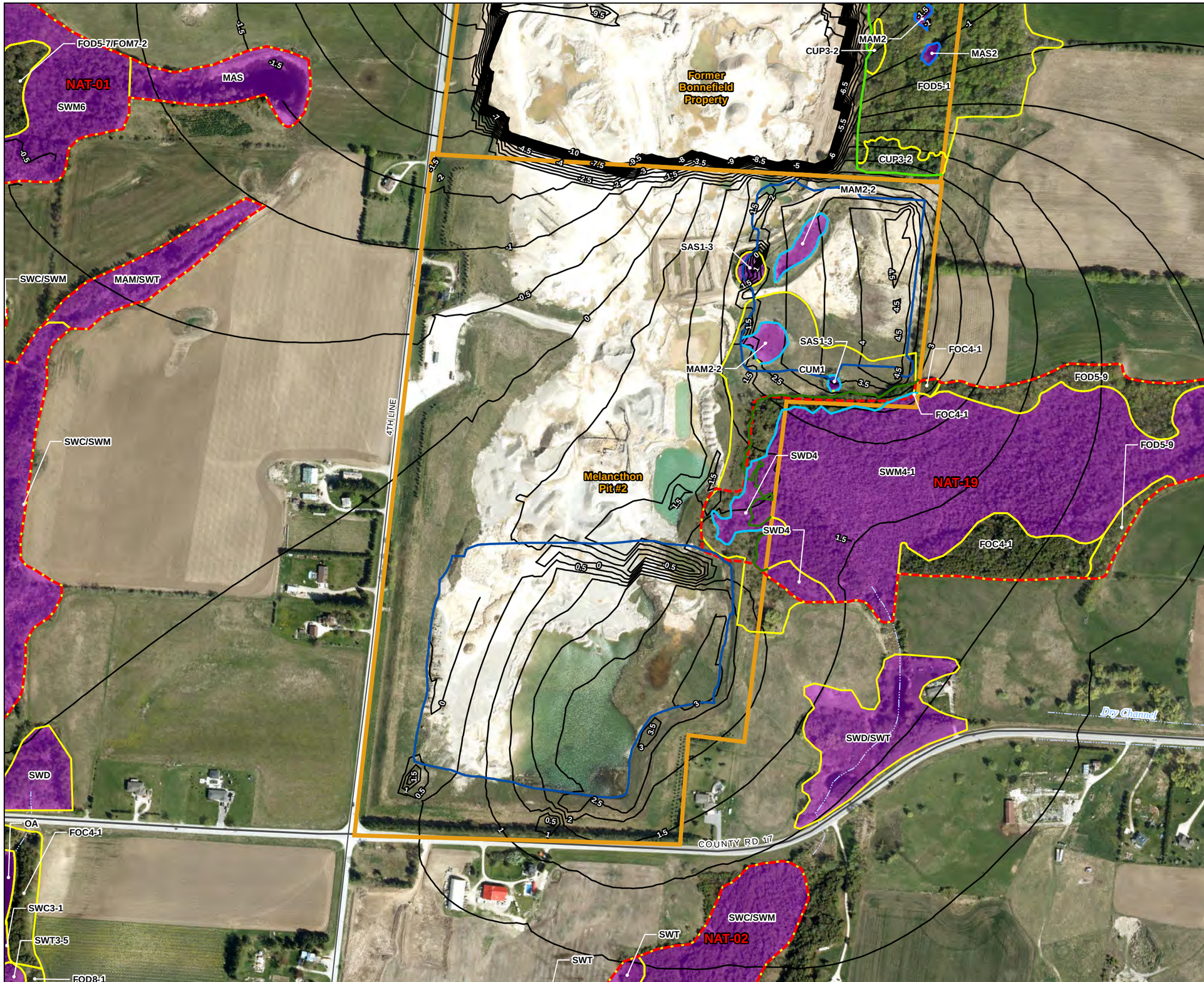
0 100 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map10_PredictedGWZOI_L1_SubjectProperty_5K_2024_10_18_DNH.mxd

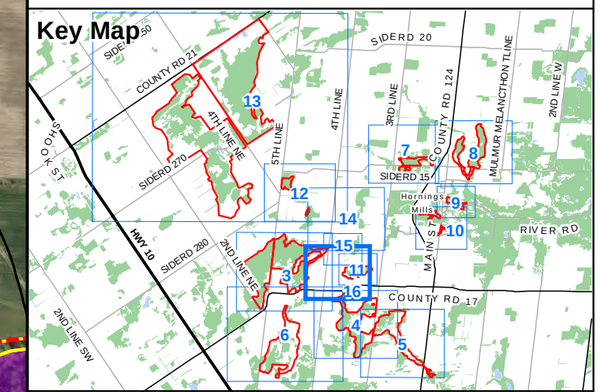
Map 10-16

Strada Pit/Quarry Natural Environment Assessment

Predicted Groundwater Zone of Influence - L1 Phase 4A



Key Map



Legend

- Subject Property
- Priority Natural Feature (NAT)
- Predicted Groundwater Level Change from Baseline (m)
- Proposed Infiltration Pond (MHBC)
- Primary Road
- Secondary Road
- Headwater, Ephemeral or Intermittent Drainage Feature
- Surveyed Dripline Boundary (NRSI 2024)
- Surveyed Wetland Boundary (NRSI 2024)
- Surveyed Woodland Boundary (NRSI 2022)
- Surveyed Wetland Boundary (NRSI 2022)
- Wetland ELC
- Ecological Land Classification (ELC)
- (CUM) Cultural Meadow
- (CUM1) Mineral Cultural Meadow Ecosite
- (CUP3-2) White Pine Coniferous Plantation Type
- (FOC4-1) Fresh - Moist White Cedar Coniferous Forest Type
- (FOD5-1) Dry - Fresh Sugar Maple Deciduous Forest Type
- (FOD5-9) Dry - Fresh Sugar Maple - Red Maple Deciduous Forest Type
- (FOD8-1) Fresh - Moist Poplar Deciduous Forest Type
- (FOM7-2) Fresh - Moist White Cedar - Hardwood Mixed Forest Type
- (H) Hedgerow
- (MAM) Meadow Marsh
- (MAM2) Mineral Meadow Marsh Ecosite
- (MAM2-2) Reed-canary Grass Mineral Meadow Marsh Type
- (MAS) Shallow Marsh
- (MAS2) Mineral Shallow Marsh Ecosite
- (OA) Open Water
- (SAS1-3) Stonewort Submerged Shallow Aquatic Type
- (SWC) Coniferous Swamp
- (SWC3-1) White Cedar Organic Coniferous Swamp Type
- (SWD) Deciduous Swamp
- (SWD4) Mineral Deciduous Swamp Ecosite
- (SWM4-1) White Cedar-Hardwood Organic Mixed Swamp Type
- (SWM6) Birch-Poplar Organic Mixed Swamp Ecosite
- (SWT) Thicket Swamp
- (SWT3-5) Red-osier Organic Thicket Swamp Type

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Project: 2473A
Date: October 18, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:5,000

0 100 200 300 Meters

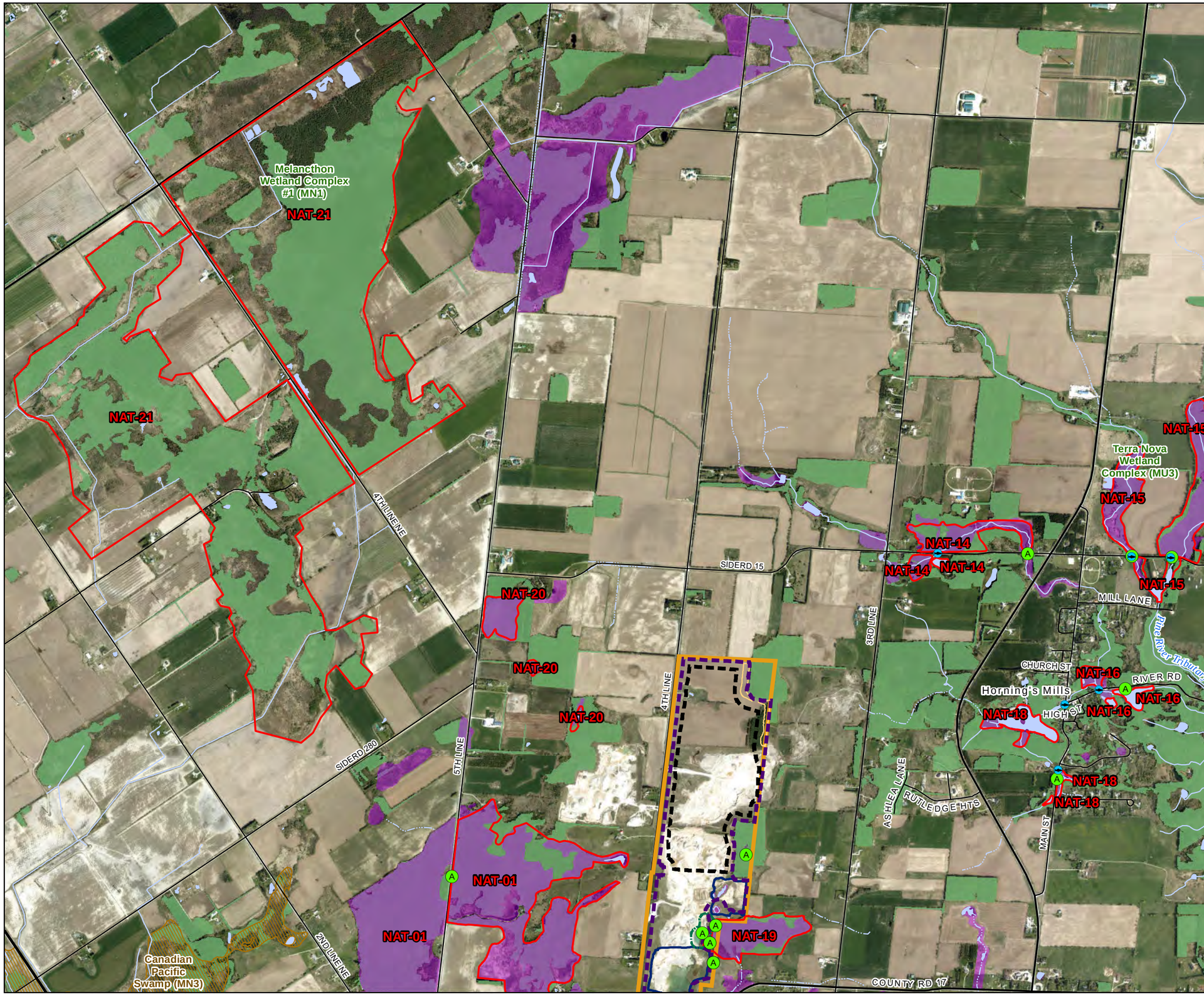
N

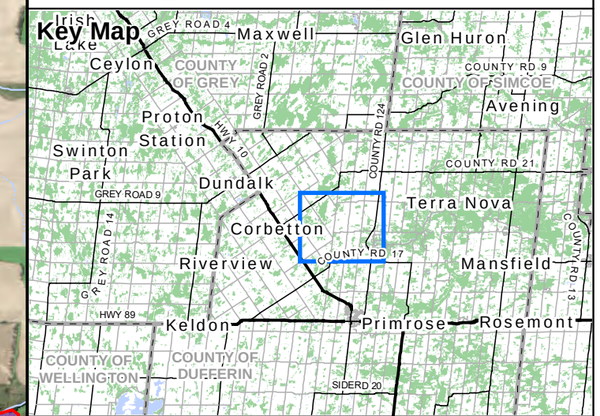
Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map10_PredictedGWZOI_L1_SubjectProperty_5K_2024_10_18_DNH.mxd

Map 11-1

Strada Pit/Quarry Natural Environment Assessment

Long-term Ecological Monitoring Locations





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Proposed Infiltration Trench (MHBC)
- Proposed Infiltration Pond (MHBC)
- Proposed Created Wetland (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Water Body
- Other Wetland (Non-PSW)
- Wooded Area
- Wetland ELC

Monitoring Stations

- Fish Community and Water Temperature Monitoring Location
- Anuran Monitoring Location

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Project: 2473A
Date: January 22, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:26,000

0 500 1,000 1,500 Meters

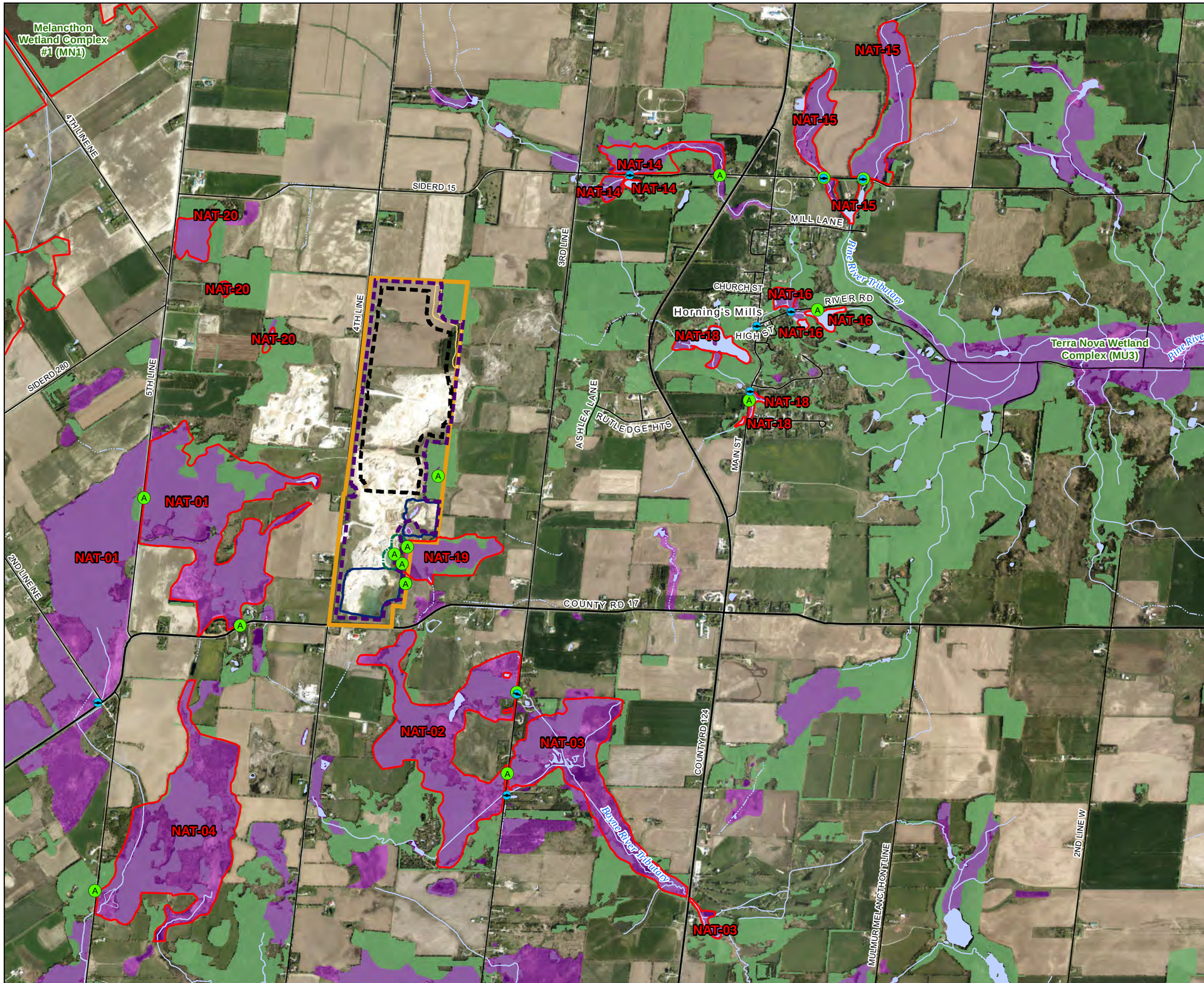
N

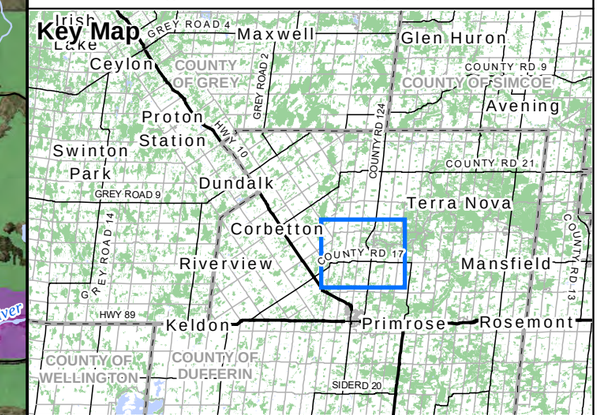
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map11_LongTermMonitoringLocations_26K_2025_01_22_DNH.mxd

Map 11-2

Strada Pit/Quarry Natural Environment Assessment

Long-term Ecological Monitoring Locations





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Proposed Infiltration Trench (MHBC)
- Proposed Infiltration Pond (MHBC)
- Proposed Created Wetland (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Water Body
- Wooded Area
- Wetland ELC

Monitoring Stations

- Fish Community and Water Temperature Monitoring Location
- Anuran Monitoring Location

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Project: 2473A
Date: January 22, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:26,000

0 500 1,000 1,500 Meters

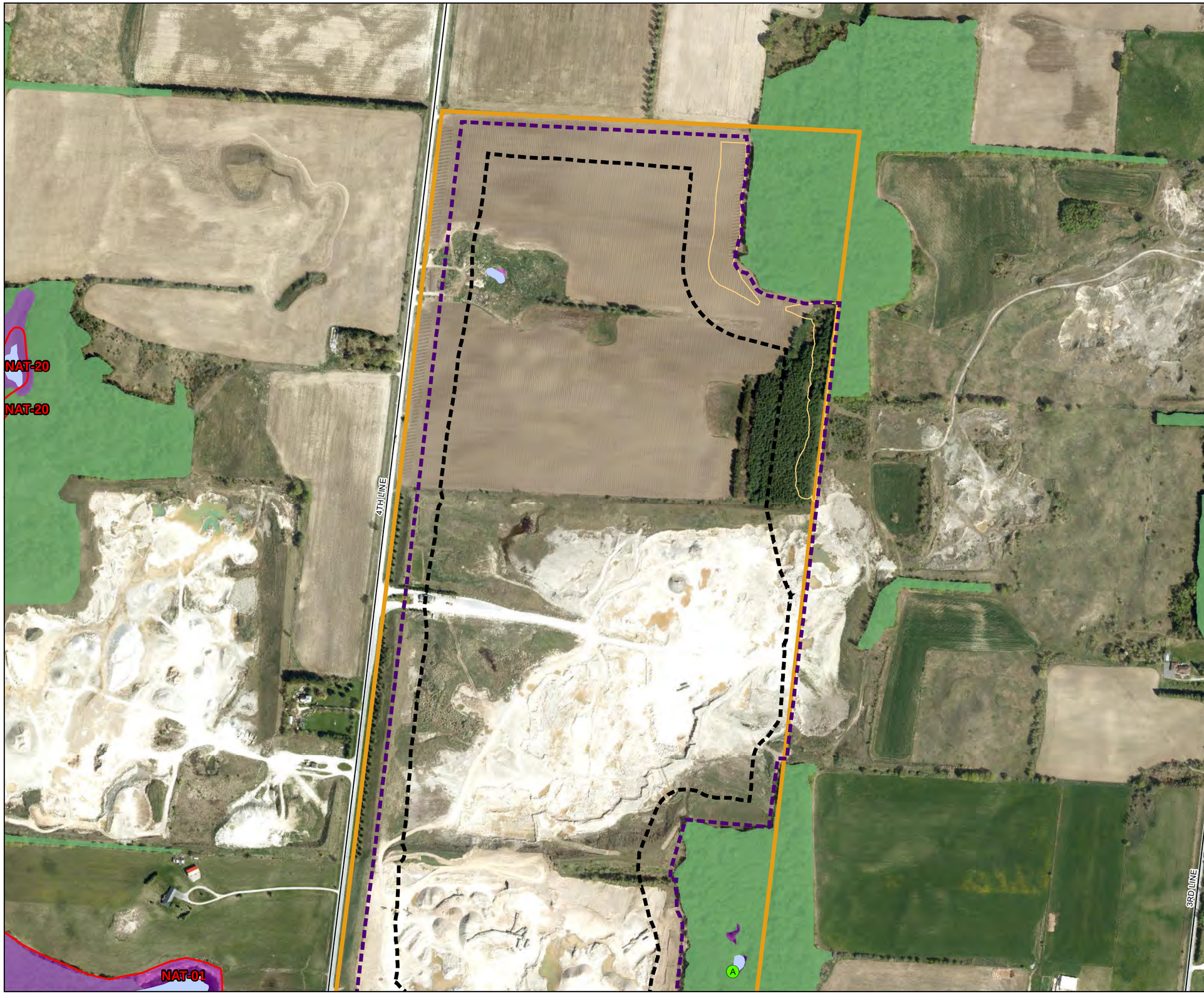
N

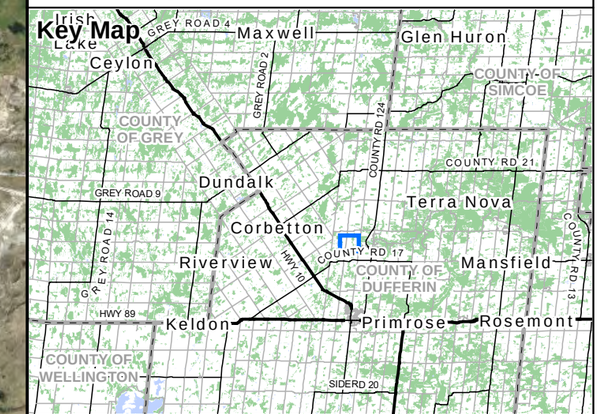
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map11_LongTermMonitoringLocations_26K_2025_01_22_DNH.mxd

Map 11-3

Strada Pit/Quarry Natural Environment Assessment

Long-term Ecological Monitoring Locations





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Secondary Road
- Proposed Infiltration Trench (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Water Body
- Wooded Area
- Wetland ELC
- Anuran Monitoring Location

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Project: 2473A
Date: January 22, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:6,000

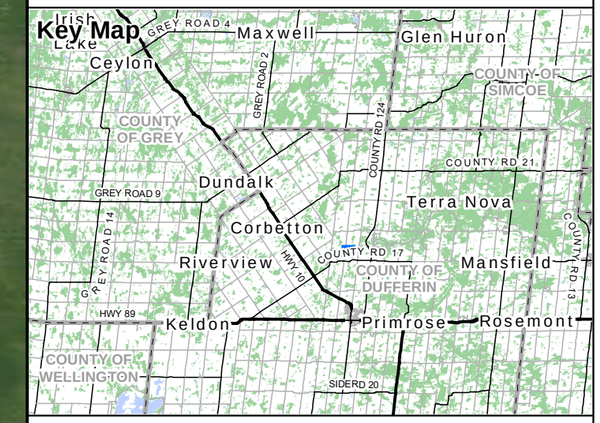
0 60 120 180 240 300 360 Meters

Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map11_LongTermMonitoringLocations_SubjectLands_26K_2025_01_22_DNH.mxd

Map 11-4

Strada Pit/Quarry Natural Environment Assessment

Long-term Ecological Monitoring Locations



Legend

- Subject Lands
- Secondary Road
- Proposed Infiltration Pond (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Water Body
- Wooded Area
- Wetland ELC
- Anuran Monitoring Location

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Project: 2473A Date: January 22, 2025	NAD83 - UTM Zone 17 Size: 11x17" **1:3,000**

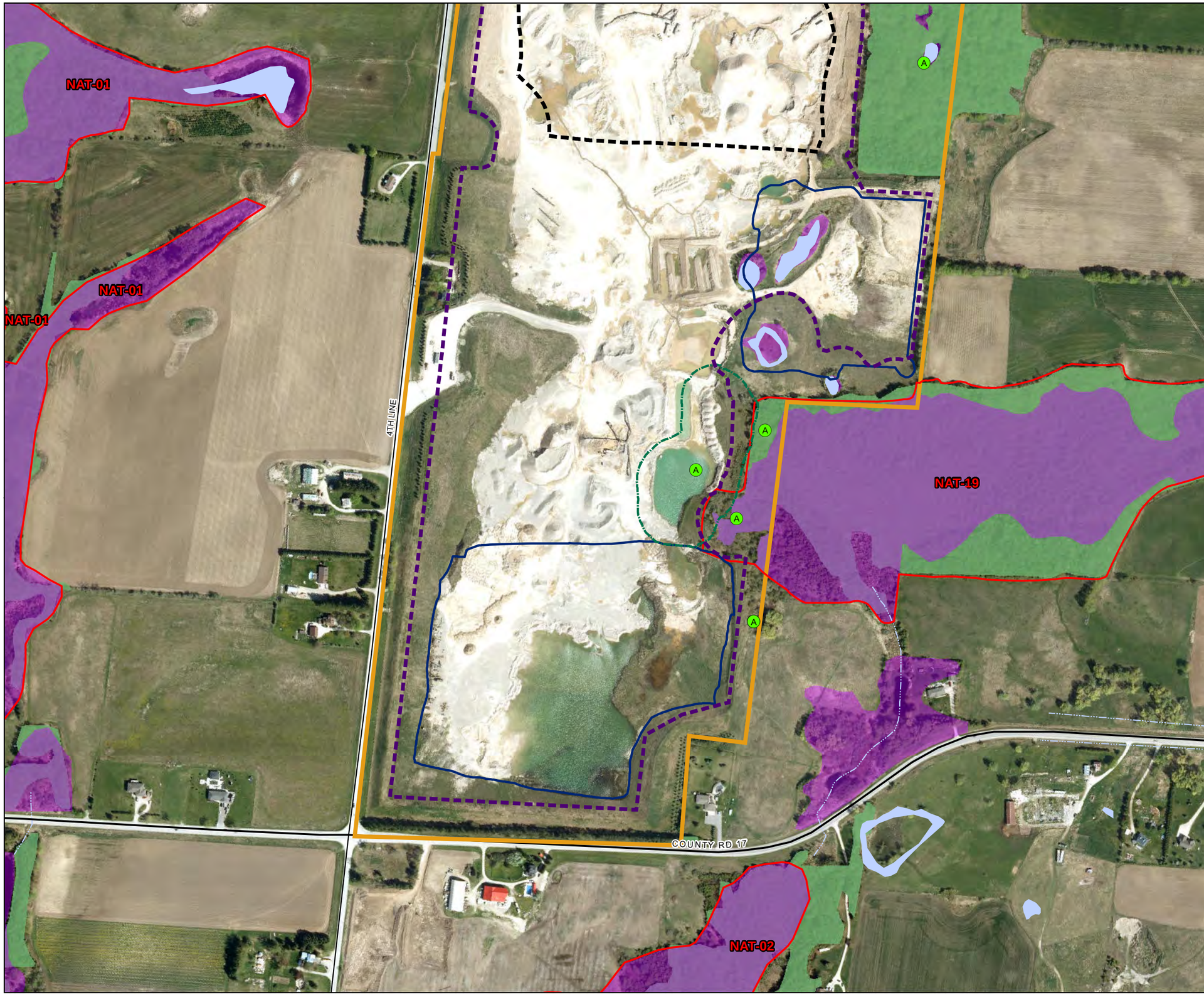
0 60 120 180 Meters

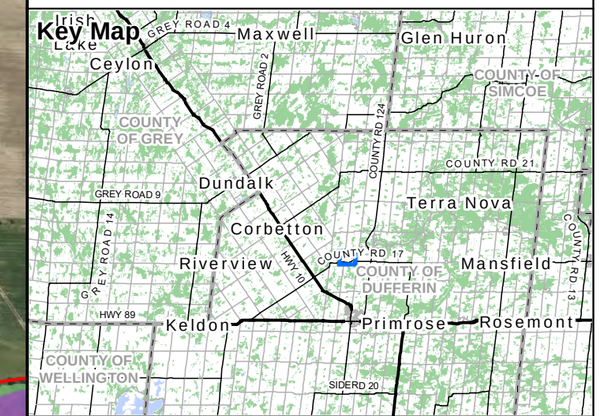
Path: X:\2473_ShelburneQuarryFeasiblity\NRSI_2473A_Map11_LongTermMonitoringLocations_SubjectLands_26K_2025_01_22_DNH.mxd

Map 11-5

Strada Pit/Quarry Natural Environment Assessment

Long-term Ecological Monitoring Locations





Legend

- Subject Lands
- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Proposed Infiltration Pond (MHBC)
- Proposed Created Wetland (MHBC)
- Above-Water Table Pit Limit of Extraction (MHBC)
- Quarry Limit of Extraction (MHBC)
- Headwater, Ephemeral or Intermittent Drainage Feature
- Water Body
- Wooded Area
- Wetland ELC
- Anuran Monitoring Location

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Project: 2473A
Date: January 22, 2025

NAD83 - UTM Zone 17
Size: 11x17"
1:5,000

0 60 120 180 240 300 Meters

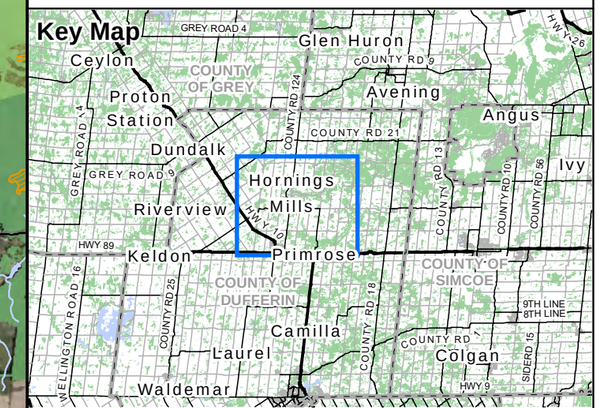
N

Appendix I
Original (2021) Study Area

Map 1

Shelburne Quarry Natural Environment Assessment

Original (2021) NEA Study Area



Legend

- Subject Property
- Priority Natural Feature (NAT)
- Watershed Boundary
- Regulation Limit
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Water Body
- Provincially Significant Wetland (PSW)
- Other Wetland (Non-PSW)
- Unevaluated Wetland
- Wooded Area
- Provincial Park
- ANSI, Earth Science
- ANSI, Life Science
- Overwintering

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Project: 2473A
Date: August 14, 2024

NAD83 - UTM Zone 17
Size: 11x17"
1:50,000

0 1 2 3 Kilometers

Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map1_StudyArea_50K_2024_08_14_DNH.mxd

Appendix II
Significant Wildlife Habitat and Species at Risk/Species of Conservation Concern
Habitat Screening

Significant Wildlife Habitat Assessment Tables

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Terrestrial)					
Rationale: Habitat important to migrating waterfowl.	American Black Duck Wood Duck Green-winged Teal Blue-winged Teal Mallard Northern Pintail Northern Shoveler American Wigeon Gadwall	CUM1 CUT1 - Plus evidence of annual spring flooding from melt water or run-off within these Ecosites.	Fields with sheet water during Spring (mid March to May). • Fields flooding during spring melt and run-off provide important invertebrate foraging habitat for migrating waterfowl. • Agricultural fields with waste grains are commonly used by waterfowl, these are not considered SWH unless they have spring sheet water available[cxlviii]. Information Sources • Anecdotal information from the landowner, adjacent landowners or local naturalist clubs may be good information in determining occurrence. • Reports and other information available from Conservation Authorities (CAs) • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Field Naturalist Clubs • Ducks Unlimited Canada • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of an annual concentration of any listed species, evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cxcxi] • Any mixed species aggregations of 100 or more individuals required. • The area of the flooded field ecosite habitat plus a 100-300m radius buffer dependent on local site conditions and adjacent land use is the significant wildlife habitat[cxlviii]. • Annual use of habitat is documented from information sources or field studies (annual use can be based on studies or determined by past surveys with species numbers and dates). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	Suitable habitat may be present within the focused study area. **Cadidate SWH.**
Wildlife Habitat: Waterfowl Stopover and Staging Areas (Aquatic)					
Rationale: Important for local and migrant waterfowl populations during the spring or fall migration or both periods combined. Sites identified are usually only one of a few in the eco-district.	Canada Goose Cackling Goose Snow Goose American Black Duck Northern Pintail Northern Shoveler American Wigeon Gadwall Green-winged Teal Blue-winged Teal Hooded Merganser Common Merganser Lesser Scaup Greater Scaup Long-tailed Duck Surf Scoter White-winged Scoter Black Scoter Ring-necked Duck Common Goldeneye Bufflehead Redhead Ruddy Duck Red-breasted Merganser Brant Canvasback	MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7	• Ponds, marshes, lakes, bays, coastal inlets, and watercourses used during migration. Sewage treatment ponds and storm water ponds do not qualify as a SWH, however a reservoir managed as a large wetland or pond/lake does qualify. • These habitats have an abundant food supply (mostly aquatic invertebrates and vegetation in shallow water). Information Sources • Environment Canada • Naturalist clubs often are aware of staging/stopover areas. • OMNRF Wetland Evaluations indicate presence of locally and regionally significant waterfowl staging. • Sites documented through waterfowl planning processes (eg. EHJV implementation plan) • Ducks Unlimited projects • Element occurrence specification by Nature Serve: http://www.natureserve.org • Natural Heritage Information Centre (NHIC) Waterfowl Concentration Area	Studies carried out and verified presence of: • Aggregations of 100[i] or more of listed species for 7 days[i], results in > 700 waterfowl use days. • Areas with annual staging of ruddy ducks, canvasbacks, and redheads are SWH[cxlix] • The combined area of the ELC ecosites and a 100m radius area is the SWH[cxlviii] • Wetland area and shorelines associated with sites identified within the SWHTG[cxlviii] Appendix K[cxlix] are significant wildlife habitat. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cxcxi] • Annual Use of Habitat is Documented from Information Sources or Field Studies (Annual can be based on completed studies or determined from past surveys with species numbers and dates recorded). • SWHMiST[cxlix] Index #7 provides development effects and mitigation measures.	Large deciduous swamps are present within the southwest portion of the focused study area. **Candidate SWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shorebird Migratory Stopover Area					
Rationale: High quality shorebird stopover habitat is extremely rare and typically has a long history of use.	Greater Yellowlegs Lesser Yellowlegs Marbled Godwit Hudsonian Godwit Black-bellied Plover American Golden-Plover Semipalmated Plover Solitary Sandpiper Spotted Sandpiper Semipalmated Sandpiper Pectoral Sandpiper White-rumped Sandpiper Baird's Sandpiper Least Sandpiper Purple Sandpiper Stilt Sandpiper Short-billed Dowitcher Red-necked Phalarope Whimbrel Ruddy Turnstone Sanderling Dunlin Whimbrel	BBO1 BBO2 BBS1 BBS2 BBT1 BBT2 SDO1 SDS2 SDT1 MAM1 MAM2 MAM3 MAM4 MAM5	Shorelines of lakes, rivers and wetlands, including beach areas, bars and seasonally flooded, muddy and un-vegetated shoreline habitats. Great Lakes coastal shorelines, including groynes and other forms of armour rock lakeshores, are extremely important for migratory shorebirds in May to mid-June and early July to October. Sewage treatment ponds and storm water ponds do not qualify as a SWH. Information Sources • Western hemisphere shorebird reserve network. • Canadian Wildlife Service (CWS) Ontario Shorebird Survey. • Bird Studies Canada • Ontario Nature • Local birders and naturalist clubs • Natural Heritage Information Center (NHIC) Shorebird Migratory Concentration Area	Studies confirming: • Presence of 3 or more of listed species and > 1000 shorebird use days during spring or fall migration period. (shorebird use days are the accumulated number of shorebirds counted per day over the course of the fall or spring migration period) • Whimbrel stop briefly (<24hrs) during spring migration, any site with >100 Whimbrel used for 3 years or more is significant. • The area of significant shorebird habitat includes the mapped ELC shoreline ecosites plus a 100m radius area[cxlviii] • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cccxi] • SWHMiST[cxlix] Index #8 provides development effects and mitigation measures.	Suitable habitat may be present within the focused study area. **Cadidate SWH.**
Wildlife Habitat: Raptor Wintering Area					
Rational: Sites used by multiple species, a high number of individuals and used annually are most significant	Rough-legged Hawk Red-tailed Hawk Northern Harrier American Kestrel Snowy Owl Special Concern: Short-eared Owl Bald Eagle	Hawks/Owls: Combination of ELC Community Series; need to have present one Community Series from each land class: Forest: FOD, FOM, FOC Upland: CUM, CUT, CUS, CUW	The habitat provides a combination of fields and woodlands that provide roosting, foraging and resting habitats for wintering raptors. Raptor wintering sites need to be > 20 ha[cxlviii, cxlix] with a combination of forest and upland.[xvi, xvii, xviii, xix, xx, xxi] Least disturbed sites, idle/fallow or lightly grazed field/meadow (>15ha) with adjacent woodlands[cxlix] Field area of the habitat is to be wind swept with limited snow depth or accumulation. Eagle sites have open water, large trees and snags available for roosting Information Sources • OMNRF Ecologist or Biologist • Field Natural Clubs • Natural Heritage Information Center (NHIC) Raptor Winter Concentration Area • Data from Bird Studies Canada • Reports and other information available from Conservation Authorities CAs.	Studies confirm the use of these habitats by: • One or more Short-eared Owls or; One or more Bald Eagles or; At least 10 individuals and two listed hawk/owl species • To be significant a site must be used regularly (3 in 5 years)[cxlix] for a minimum of 20 days by the above number of birds • The habitat area for an Eagle winter site is the shoreline forest ecosites directly adjacent to the prime hunting area • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cccxi] • SWHMiST[cxlix] Index #10 and #11 provides development effects and mitigation measures.	Suitable habitat may be present within the focused study area. **CandidateSWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Bat Hibernacula					
Rationale Bat hibernacula are rare habitats in Ontario landscapes.	Big Brown Bat Tri-coloured Bat	Bat Hibernacula may be found in these ecosites: CCR1 CCR2 CCA1 CCA2 (Note: buildings are not considered to be SWH)	• Hibernacula may be found in caves, mine shafts, underground foundations and Karsts. • Active mine sites should not be considered as SWH • The locations of bat hibernacula are relatively poorly known. Information Sources • OMNRF for possible locations and contact for local experts • Natural Heritage Information Center (NHIC) Bat Hibernaculum • Ministry of Northern Development and Mines for location of mine shafts. • Clubs that explore caves (eg. Sierra Club) • University Biology Departments with bat experts.	• All sites with confirmed hibernating bats are SWH. • The habitat area includes a 200m radius around the entrance of the hibernaculum[cxlviii, ccvii] for most. • Studies are to be conducted during the peak swarming period (Aug. – Sept.). Surveys should be conducted following methods outlined in the "Bats and Bat Habitats: Guidelines for Wind Power Projects"[ccv] • SWHMiST[cxlix] Index #1 provides development effects and mitigation measures.	Suitable habitat is not known occur within the focused study area. **Not SWH.**
Wildlife Habitat: Bat Maternity Colonies					
Rationale: Known locations of forested bat maternity colonies is extremely rare in all Ontario landscapes.	Big Brown Bat Silver-haired Bat	Maternity colonies considered SWH are found in forested Ecosites. All ELC Ecosites in ELC Community Series: FOD FOM SWD SWM	Maternity colonies can be found in tree cavities, vegetation and often in buildings[xxii, xxv, xxvi, xxvii, xxxi] (buildings are not considered to be SWH). • Maternity roosts are not found in caves and mines in Ontario[xxii] • Maternity colonies located in Mature deciduous or mixed forest stands[ccix, ccx] with >10/ha large diameter (>25cm dbh) wildlife trees[ccvii] • Female Bats prefer wildlife tree (snags) in early stages of decay, class 1-3[ccxiv] or class 1 or 2[ccxii] • Silver-haired Bats prefer older mixed or deciduous forest and form maternity colonies in tree cavities and small hollows. Older forest areas with at least 21 snags/ha are preferred[ccx] Information Sources • OMNRF for possible locations and contact for local experts • University Biology Departments with bat experts.	• Maternity Colonies with confirmed use by: • >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[ccv] • SWHMiS T[cxlix] Index #12 provides development effects and mitigation measures.	Large woodlands (>10ha diameter) are present within the focused study area. **Candidate SWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Turtle Wintering Area					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Snapping and Midland Painted Turtles - ELC Community Classes: SW, MA, OA and SA; ELC Community Series: FEO and BOO Northern Map Turtle - Open Water areas such as deeper rivers or streams and lakes with current can also be used as over-wintering habitat.	For most turtles, wintering areas are in the same general area as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates. • Over-wintering sites are permanent water bodies, large wetlands, and bogs or fens with adequate Dissolved Oxygen[cix, cx, cxi, cxviii]. • Man-made ponds such as sewage lagoons or storm water ponds should not be considered SWH. Information Sources • EIS studies carried out by Conservation Authorities. • Local field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. • OMNRF ecologist or biologist • Natural Heritage Information Center (NHIC)	• Presence of 5 over-wintering Midland Painted Turtles is significant. • One or more Northern Map Turtle or Snapping Turtle over-wintering within a wetland is significant. • The mapped ELC ecosite area with the over wintering turtles is the SWH. If the hibernation site is within a stream or river, the deep-water pool where the turtles are over wintering is the SWH. • Over wintering areas may be identified by searching for congregations (Basking Areas) of turtles on warm, sunny days during the fall (Sept. – Oct.) or spring (Mar. – May)[cvii] • Congregation of turtles is more common where wintering areas are limited and therefore significant[cix, cx, cxi, cxii]. • SWHMiST[cxdix] Index #28 provides development effects and mitigation measures for turtle wintering habitat.	Suitable habitat may be present within the wetland/open water features in the focused study area. **Candidate SWH.**
Wildlife Habitat: Snake Hibernaculum					
Rationale: Generally sites are the only known sites in the area. Sites with the highest number of individuals are most significant	Snakes: Eastern Gartersnake Northern Watersnake Northern Red-bellied Snake Northern Brownsnake Smooth Green Snake Northern Ring-necked Snake Special Concern: Milksnake Eastern Ribbonsnake Lizard: Special Concern (Southern Shield population): Five-lined Skink	For all snakes, habitat may be found in any ecosite other than very wet ones. Talus, Rock Barren, Crevice and Cave, and Alvar sites may be directly related to these habitats. Observations of congregations of snakes on sunny warm days in the spring or fall is a good indicator. For Five-lined Skink, ELC Community Series of FOD and FOM and Ecosites: FOC1 FOC3	• For snakes, hibernation takes place in sites located below frost lines in burrows, rock crevices and other natural locations. The existence of features that go below the frost line; such as rock piles or slopes, old stone fences, and abandoned crumbling foundations assist in identifying candidate SWH. • Areas of broken and fissured rock are particularly valuable since they provide access to subterranean sites below the frost line[xliv, l, li, lii, cxii.] • Wetlands can also be important over-wintering habitat in conifer or shrub swamps and swales, poor fens, or depressions in bedrock terrain with sparse trees or shrubs with sphagnum moss or sedge hummock ground cover. • Five-lined skink prefer mixed forests with rock outcrop openings providing cover rock overlaying granite bedrock with fissures cciii. Information Sources • In spring, local residents or landowners may have observed the emergence of snakes on their property (e.g. old dug wells). • Reports and other information from CAs. • Local Field naturalists and experts, as well as university herpetologists may also know where to find some of these sites. clubs • Natural Heritage Information Center (NHIC) • OMNRF ecologist or biologist may be aware of locations of wintering skinks	Studies confirming: • Presence of snake hibernacula used by a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. • Congregations of a minimum of five individuals of a snake sp. or; individuals of two or more snake spp. near potential hibernacula (eg. foundation or rocky slope) on sunny warm days in Spring (Apr/May) and Fall (Sept/Oct). • Note: If there are Special Concern Species present, then site is SWH • Note: Sites for hibernation possess specific habitat parameters (e.g. temperature, humidity, etc.) and consequently are used annually, often by many of the same individuals of a local population [i.e. strong hibernation site fidelity]. Other critical life processes (e.g. mating) often take place in close proximity to hibernacula. The feature in which the hibernacula is located plus a 30m buffer is the SWH[l] • SWHMiST[cxdix] Index #13 provides development effects and mitigation measures for snake hibernacula. • Presence of any active hibernaculum for skink is significant. • SWHMiST[cxdix] Index #37 provides development effects and mitigation measures for five-lined skink wintering habitat.	Suitable habitat may be present within the focused study area. **Candidate SWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Bank and Cliff)					
Rationale: Historical use and number of nests in a colony make this habitat significant. An identified colony can be very important to local populations. All swallow populations are declining in Ontario.	Cliff Swallow Northern Rough-winged Swallow (this species is not colonial but can be found in Cliff Swallow colonies)	Eroding banks, sandy hills, borrow pits, steep slopes, and sand piles Cliff faces, bridge abutments, silos, barns Habitat found in the following ecosites: CUM1 CUT1 CUS1 BLO1 BLS1 BLT1 CLO1 CLS1 CLT1	• Any site or areas with exposed soil banks, undisturbed or naturally eroding that is not a licensed/permitted aggregate area. • Does not include man-made structures (bridges or buildings) or recently (2 years) disturbed soil areas, such as berms, embankments, soil or aggregate stockpiles. • Does not include a licensed/permitted Mineral Aggregate Operation. Information Sources • Reports and other information available from CAs • Ontario Breeding Bird Atlas [ccv] • Bird Studies Canada; *NatureCounts* http://www.birdscanada.org/birdmon/ • Field Naturalist clubs	Studies confirming: • Presence of 1 or more nesting sites with 8[cxlvix] or more cliff swallow pairs and/or rough-winged swallow pairs during the breeding season. • A colony identified as SWH will include a 50m radius habitat area from the peripheral nests[ccvii] • Field surveys to observe and count swallow nests are to be completed during the breeding season Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[cccxi] • SWHMiST[Cxlix] Index #4 provides development effects and mitigation measures	Suitable habitat is not known to occur within the focused study area. **Not SWH.**
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Tree/Shrubs)					
Rationale: Large Colonies are important to local bird population, typically sites are only known colony in area and are used annually.	Great Blue Heron Black-crowned Night-heron Great Egret Green Heron	SWM2 SWM3 SWM5 SWM6 SWD1 SWD2 SWD3 SWD4 SWD5 SWD6 SWD7 FET1	• Nests in live or dead standing trees in wetlands, lakes, islands, and peninsulas. Shrubs and occasionally emergent vegetation may also be used. • Most nests in trees are 11 to 15m from ground, near the top of the tree. Information Sources • Ontario Breeding Bird Atlas[ccv], colonial nest records. • Ontario Heronry Inventory 1991 available from Bird Studies Canada or NHIC (OMNR). • NHIC Mixed Wader Nesting Colony • Aerial photographs can help identify large heronries • Reports and other information available from CAs • MNRF District Offices • Local naturalist clubs	Studies confirming: • Presence of 5[l] 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 [cc, ccvii] • 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 • SWHMiST[Cxlix] Index #5 provides development effects and mitigation measures.	Suitable habitat may be present within the focused study area. **Candidate SWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Colonially - Nesting Bird Breeding Habitat (Ground)					
Rationale: Colonies are important to local bird populations, typically sites are only known colony in area and are used annually.	Herring Gull Great Black-backed Gull Little Gull Ring-billed Gull Common Tern Caspian Tern Brewer's Blackbird	Any rocky island or peninsula (natural or artificial) within a lake or large river (two-lined on a 1:50,000 NTS map). Close proximity to watercourses in open fields or pastures with scattered trees or shrubs (Brewer's Blackbird) MAM1 – 6 MAS1 – 3 CUM CUT CUS	• Nesting colonies of gulls and terns are on islands or peninsulas associated with open water or in marshy areas. • Brewers Blackbird colonies are found loosely on the ground in or in low bushes in close proximity to streams and irrigation ditches within farmlands. Information Sources • Ontario Breeding Bird Atlas[ccv], rare/colonial species records. • Canadian Wildlife Service • Reports and other information available from CAs • Natural Heritage Information Center (NHIC) Colonial Waterbird Nesting Area • MNRF District Offices • Field naturalist clubs	Studies confirming: • Presence of >25 active nests for Herring Gulls or Ring-billed Gulls, >5 active nests for Common Tern or >2 active nests for Caspian Tern[l]. • Presence of 5 or more pairs for Brewer's Blackbird. • Any active nesting colony of one or more Little Gull, and Great Black-backed Gull is significant. • The edge of the colony and a minimum 150m area of habitat, or the extent of the ELC ecosites containing the colony or any island <3.0ha with a colony is the SWH[cc, ccvii] • Studies would be done during May/June when actively nesting. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #6 provides development effects and mitigation measures.	Suitable habitat is not known to occur within the focused study area. **Not SWH.**
Wildlife Habitat: Migratory Butterfly Stopover Areas					
Rationale: Butterfly stopovers areas are extremely rare habitats and are biologically important for butterfly species that migrate south for the winter.	Painted Lady Red Admiral Special Concern: Monarch	Combination of ELC Community Series: Need to have present one Community Series from each landclass: Field: CUM CUS CUT Forest: FOC FOM FOD CUP Anecdotally, a candidate sight for butterfly stopover will have a history of butterflies being observed.	A butterfly stopover area will be a minimum of 10 ha in size with a combination of field and forest habitat present, and will be located within 5 km of Lake Ontario[cxlix]. • The habitat is typically a combination of field and forest, and provides the butterflies with a location to rest prior to their long migration south[xxxii, xxxiii, xxxiv, xxxv, xxxvi]. • The habitat should not be disturbed, fields/meadows with an abundance of preferred nectar plants and woodland edge providing shelter are requirements for this habitat cxlviii, cxlix. • Staging areas usually provide protection from the elements and are often spits of land or areas with the shortest distance to cross the Great Lakes[xxxvii, xxxviii, xxxix, xl, xli]. Information Sources • OMNRF (NHIC) • Agriculture Canada in Ottawa may have list of butterfly experts. • Field Naturalist Clubs • Toronto Entomologists Association • Conservation Authorities	Studies confirm: • The presence of Monarch Use Days (MUD) during fall migration (Aug/Oct)[xliii]. MUD is based on the number of days a site is used by Monarchs, multiplied by the number of individuals using the site. Numbers of butterflies can range from 100-500/day[xxxvii], significant variation can occur between years and multiple years of sampling should occur [xl, xlii]. • Observational studies are to be completed and need to be done frequently during the migration period to estimate MUD • MUD of >5000 or >3000 with the presence of Painted Ladies or Red Admiral's is to be considered significant. • SWHMiST[cxlix] Index #16 provides development effects and mitigation measures.	The focused study area is not within 5 km of Lake Ontario. **Not SWH.**

Table 1. Characteristics of Seasonal Concentration Areas for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Landbird Migratory Stopover Areas					
Rationale: Sites with a high diversity of species as well as high number are most significant	All migratory songbirds. Canadian Wildlife Service Ontario website: http://www.on.ec.gc.ca/wildlife_e.html All migrant raptors species: Ontario Ministry of Natural Resources: Fish and Wildlife Conservation Act, 1997. Schedule 7: Specially Protected Birds (Raptors)	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	Woodlots need to be >10 ha[i] in size and within 5km [iv, v, vi, vii, viii, ix, x, xi, xii, xiii, xiv, xv] of Lake Ontario. • If multiple woodlands are located along the shoreline, those woodlands <2km from Lake Ontario are more significant[cxlix] • Sites have a variety of habitats; forest, grassland and wetland complexes[cxlix]. • The largest sites are more significant[cxlix] • Woodlots and forest fragments are important habitats to migrating birds[ccxviii], these features located along the shore and located within 5km of Lake Ontario are Candidate SWH[cxlviii]. Information Sources • Bird Studies Canada • Ontario Nature • Local birders and naturalist club • Ontario Important Bird Areas (IBA) Program	Studies confirm: • Use of the woodlot by >200 birds/day and with >35 spp. with at least 10 bird spp. recorded on at least 5 different survey dates. This abundance and diversity of migrant bird species is considered above average and significant. • Studies should be completed during spring (Apr/May) and fall (Aug/Oct) migration using standardized assessment techniques. Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #9 provides development effects and mitigation measures.	The focused study area is not within 5 km of Lake Ontario. **Not SWH.**
Wildlife Habitat: Deer Yarding Areas					
Rationale: Winter habitat for deer is considered to be the main factor for northern deer populations. In winter, deer congregate in "yards" to survive severe winter conditions. Deer yards typically have a long history of annual use by deer, yards typically represent 10-15% of an areas summer range.	White-tailed Deer	Note: OMNRF to determine this habitat. ELC Community Series providing a thermal cover component for a deer yard would include: FOM, FOC, SWM and SWC. Or these ELC Ecosites: CUP2 CUP3 FOD3 CUT	• Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of winter snow and cold. This is a behavioural response and deer will establish traditional use areas. The yard is composed of two areas referred to as Stratum I and Stratum II. Stratum II covers the entire winter yard area and is usually a mixed or deciduous forest with plenty of browse available for food. Agricultural lands can also be included in this area. Deer move to these areas in early winter and generally, when snow depths reach 20cm, most of the deer will have moved here. If the snow is light and fluffy, deer may continue to use this area until 30cm snow depth. In mild winters, deer may remain in the Stratum II area the entire winter. • The Core of a deer yard (Stratum I) is located within the Stratum II area and is critical for deer survival in areas where winters become severe. It is primarily composed of coniferous trees (pine, hemlock, cedar, spruce) with a canopy cover of more than 60%[cxciv]. • OMNRF determines deer yards following methods outlined in "Selected Wildlife and Habitat Features: Inventory Manual"[cxcv] • Woodlots with high densities of deer due to artificial feeding are not significant.	No Studies Required: • Snow depth and temperature are the greatest influence on deer use of winter yards. Snow depths > 40cm for more than 60 days in a typically winter are minimum criteria for a deer yard to be considered as SWH[lvi, lvii, lviii, lix, lx, i]. • Deer Yards are mapped by OMNRF District offices. Locations of Core or Stratum 1 and Stratum 2 Deer yards considered significant by OMNRF will be available at local MNRF offices or via Land Information Ontario (LIO). • Field investigations that record deer tracks in winter are done to confirm use (best done from an aircraft). Preferably, this is done over a series of winters to establish the boundary of the Stratum I and Stratum II yard in an "average" winter. MNRF will complete these field investigations[cxcv]. • If a SWH is determined for Deer Wintering Area or if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	Deer yarding has been idenitified in the focused study area (2021 and 2022 NAT complexes included: NAT-06, NAT-10, NAT-11, NAT-12, NAT-13, NAT-16, NAT-22) **Confirmed SWH.**
Wildlife Habitat: Deer Winter Congregation Areas					
Rationale: Deer movement during winter in the southern areas of Ecoregion 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands to reduce or avoid the impacts of winter conditions[cxlviii]	White-tailed Deer	All Forested Ecosites with these ELC Community Series: FOC FOM FOD SWC SWM SWD Conifer plantations much smaller than 50ha may also be used.	• Woodlots will typically be >100 ha in size. Woodlots <100ha may be considered as significant based on MNRF studies or assessment. • Deer movement during winter in the southern areas of Eco-region 6E are not constrained by snow depth, however deer will annually congregate in large numbers in suitable woodlands[cxlviii]. • If deer are constrained by snow depth refer to the Deer Yarding Area habitat within Table 1.1 of this Schedule. • Large woodlots > 100ha and up to 1500 ha are known to be used annually by densities of deer that range from 0.1-1.5 deer/ha[ccxxiv]. • Woodlots with high densities of deer due to artificial feeding are not significant. Information Sources • MNRF District Offices • LIO/NRVIS	Studies confirm: • Deer management is an MNRF responsibility, deer winter congregation areas considered significant will be mapped by MNRF[cxlviii]. • Use of the woodlot by white-tailed deer will be determined by MNRF, all woodlots exceeding the area criteria are significant, unless determined not to be significant by MNR[i]. • Studies should be completed during winter (Jan/Feb) when >20cm of snow is on the ground using aerial survey techniques[ccxxiv], ground or road surveys, or a pellet count deer density survey[ccxxv]. • If a SWH is determined for Deer Wintering Area of if a proposed development is within Stratum II yarding area then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #2 provides development effects and mitigation measures.	The focused study area has been mapped by the MNRF (2021 and 2022 NAT complexes included: NAT-06, NAT-10, NAT-11, NAT-12, NAT-13, NAT-16, NAT-22) **Confirmed SWH.**

Significant Wildlife Habitat Assessment Tables

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Cliff and Talus Slopes					
Rationale: Cliffs and Talus Slopes are extremely rare habitats in Ontario.	Any ELC Ecosite within Community Series: TAO CLO TAS CLS TAT CLT	A Cliff is vertical to near vertical bedrock >3m in height. A Talus Slope is rock rubble at the base of a cliff made up of coarse rocky debris.	Most cliff and talus slopes occur along the Niagara Escarpment. Information Sources • The Niagara Escarpment Commission has detailed information on location of these habitats. • OMNRF District • Natural Heritage Information Center (NHIC) has location information on their website • Local naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Cliffs or Talus Slopes[lxxviii] • SWHMiST[cxlix] Index #21 provides development effects and mitigation measures.	Cliff and talus slopes are not known to occur within the focused study area. **Not SWH.**
Sand Barrens					
Rationale: Sand barrens are rare in Ontario and support rare species. Most Sand Barrens have been lost due to cottage development and forestry.	ELC Ecosites: SBO1 SBS1 SBT1 Vegetation cover varies from patchy and barren to continuous meadow (SBO1), thicket-like (SBS1), or more closed and treed (SBT1). Tree cover always <60%.	Sand Barrens typically are exposed sand, generally sparsely vegetated and caused by lack of moisture, periodic fires and erosion. They have little or no soil and the underlying rock protrudes through the surface. Usually located within other types of natural habitat such as forest or savannah. Vegetation can vary from patchy and barren to tree covered but less than 60%.	Any sand barren area, >0.5ha in size. Information Sources • OMNRF Districts. • Natural Heritage Information Center (NHIC) has location information on their website • Field naturalist clubs • Conservation Authorities	• Confirm any ELC Vegetation Type for Sand Barrens[lxxviii] • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics)[l]. • SWHMiST[cxlix] Index #20 provides development effects and mitigation measures.	Sand barrens are not known to occur within the focused study area. **Not SWH.**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Alvar					
Rationale: Alvars are extremely rare habitats in Ecoregion 6E. Most alvars in Ontario are in Ecoregion 6E and 7E. Alvars in 6E are small and highly localized just north of the Palaeozoic-Precambrian contact.	ALO1 ALS1 ALT1 FOC1 FOC2 CUM2 CUS2 CUT2-1 CUW2 Five Alvar Indicator Species: 1) Carex crawei 2) Panicum philadelphicum 3) Eleochairs compressa 4) Scutellaria parvula 5) Trichostema branchiatum These indicator species are very specific to Alvars within Ecoregion 6E	An alvar is typically a level, mostly unfractured calcareous bedrock feature with a mosaic of rock pavements and bedrock overlain by a thin veneer of soil. The hydrology of alvars is complex, with alternating periods of inundation and drought. Vegetation cover varies from sparse lichen-moss associations to grasslands and shrublands and comprising a number of characteristic or indicator plant. Undisturbed alvars can be phyto- and zoo geographically diverse, supporting many uncommon or are relict plant and animals species. Vegetation cover varies from patchy to barren with a less than 60% tree cover[lxxviii].	An Alvar site > 0.5 ha in size[lxxv]. Information Sources • Alvars of Ontario (2000), Federation of Ontario Naturalists[lxxvi]. • Ontario Nature – Conserving Great Lakes Alvars[ccviii]. • Natural Heritage Information Center (NHIC) has location information on their website • Field Naturalist clubs • Conservation Authorities	Field studies identify four of the five Alvar indicator species[lxxv, cxlix] at a Candidate Alvar site is Significant. • Site must not be dominated by exotic or introduced species (<50% vegetative cover are exotics sp.). • The alvar must be in excellent condition and fit in with surrounding landscape with few conflicting land uses[lxxv]. • SWHMiST[cxlix] Index #17 provides development effects and mitigation measures.	Alvars are not known to occur within the focused study area. **Not SWH.**
Old Growth Forest					
Rationale: Due to historic logging practices, extensive old growth forest is rare in the Ecoregion. Interior habitat provided by old growth forests is required by many wildlife species.	Forest Community Series: FOD FOC FOM SWD SWC SWM	Old Growth forests are characterized by heavy mortality or turnover of over-storey trees resulting in a mosaic of gaps that encourage development of a multi-layered canopy and an abundance of snags and downed woody debris.	Woodland Stands areas 30ha or greater in size or with at least 10 ha interior habitat assuming 100m buffer at edge of forest Í. Information Sources • OMNRF Forest Resource Inventory mapping • OMNRF Forester, Ecologist or Biologist • Field Local naturalist clubs • Conservation Authorities • Sustainable Forestry License (SFL) companies will possibly know locations through field operations. • Municipal forestry departments	Field Studies will determine: • If dominant trees species of the ecosite are >140 years old, then stand is Significant Wildlife Habitat[cxlviii] • The stand will have experienced no recognizable forestry activities[cxlviii] • The area of Forest Ecosites combined to make up the stand is the SWH. • Determine ELC Vegetation Type for forest stand[lxxviii] • SWHDSS[cxlix] Index #23 provides development effects and mitigation measures.	Old growth forests are not known to occur within the focused study area. **Not SWH.**

Table 2. Characteristics of Rare Vegetation Communities for Ecoregion 6E.

Rare Vegetation Community[1]	Candidate SWH			Confirmed SWH	Study Area
	ELC Ecosite Codes[1]	Habitat Description[1]	Detailed Information and Sources[1]	Defining Criteria[1]	Assessment Details
Savannah					
Rationale: Savannahs are extremely rare habitats in Ontario.	TPS1 TPS2 TPW1 TPW2 CUS2	A Savannah is a tallgrass prairie habitat that has tree cover between 25 – 60%.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • Natural Heritage Information Center (NHIC) has location information on their website • OMNRF Ecologists • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Savannah indicator species listed in[lxxv] Appendix N should be present. Note: Savannah plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH. • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics sp.). • SWHMiST[cxlix] Index #18 provides development effects and mitigation measures.	Savannahs are not known to occur within the focused study area. **Not SWH.**
Tallgrass Prairie					
Rationale: Tallgrass Prairies are extremely rare habitats in Ontario.	TPO1 TPO2	A Tallgrass Prairie has ground cover dominated by prairie grasses. An open Tallgrass Prairie habitat has < 25% tree cover.	• No minimum size to site Site must be restored or a natural site. Remnant sites such as railway right of ways are not considered to be SWH. Information Sources • OMNR Districts • Natural Heritage Information Center (NHIC) has location information available on their website • Field naturalists clubs • Conservation Authorities	Field studies confirm one or more of the Prairie indicator species listed in[lxxv] Appendix N should be present. Note: Prairie plant spp. list from Ecoregion 6E should be used[cxlviii]. • Area of the ELC Ecosite is the SWH • Site must not be dominated by exotic or introduced species (<50% vegetative cover exotics). • SWHMiST[cxlix] Index #19 provides development effects and mitigation measures.	Tallgrass prairies are not known to occur within the focused study area. **Not SWH.**
Other Rare Vegetation Communities					
Rationale: Plant communities that often contain rare species which depend on the habitat for survival.	Provincially Rare S1, S2 and S3 vegetation communities are listed in Appendix M of the SWHTG[cxlviii]. Any ELC Ecosite Code that has a possible ELC Vegetation Type that is Provincially Rare is Candidate SWH.	Rare Vegetation Communities may include beaches, fens, forest, marsh, barrens, dunes and swamps.	ELC Ecosite codes that have the potential to be a rare ELC Vegetation Type as outlined in appendix M[cxlviii] The OMNR/NHIC will have up to date listing for rare vegetation communities. Information Sources • Natural Heritage Information Center (NHIC) has location information available on their website • OMNRF Districts • Field naturalists clubs • Conservation Authorities	Field studies should confirm if an ELC Vegetation Type is a rare vegetation community based on listing within Appendix M of SWHTG[cxlviii]. • Area of the ELC Vegetation Type polygon is the SWH. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	Other rare vegetation communities are not known to occur within the focused study area. **Not SWH.**

Significant Wildlife Habitat Assessment Tables

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Waterfowl Nesting Area					
Rationale: Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 Note: includes adjacency to Provincially Significant Wetlands	A waterfowl nesting area extends 120m[cxlix] from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120m of each individual wetland where waterfowl nesting is known to occur[cxlix]. • Upland areas should be at least 120m wide so that predators such as raccoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from CAs	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120m[cxlviii] from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST[cxlix] Index #25 provides development effects and mitigation measures.	Upland habitat with an adjacent wetland (>0.5 ha) is present within the focused study area. **Candidate SWH.**
Wildlife Habitat: Bald Eagle and Osprey Nesting, Foraging and Perching Habitat					
Rationale: Nest sites are fairly uncommon in Eco-region 6E are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey Special Concern: Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	• Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts • Sustainable Forestry License (SFL) companies will identify additional nesting locations through field operations. • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented • Reports and other information available from CAs. • Field naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area[cxlviii]. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300m radius around the nest or the contiguous woodland stand is the SWHccvii, maintaining undisturbed shorelines with large trees within this area is important[cxlviii]. • For a Bald Eagle the active nest and a 400-800m radius around the nest is the SWH[cvi], ccvii. Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat[cvi]. • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for >3 years or suspected of not being used for >5 years before being considered not significant[ccvii] • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #26 provides development effects and mitigation measures	Forest communities with adjacent wetlands are present within the focused study area. **Candidate SWH.**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Woodland Raptor Nesting Habitat					
Rationale: Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Northern Goshawk Cooper's Hawk Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD and CUP3.	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat[lxxxviiii, lxxxix, xc, xci, xciii, xciv, xcv, xcvi, cxxxiii]. Interior habitat determined with a 200m buffer[cxlviii]. • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Cooper's hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF • Check the Ontario Breeding Bird Atlas[ccv] or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada • Reports and other information available from CAs	Studies confirm: • Presence of 1 or more active nests from species list is considered significant[cxlviii]. • Red-shouldered Hawk and Northern Goshawk – a 400m radius around the nest or 28ha area of habitat is the SWH[ccvii]. • Barred Owl – a 200m radius around the nest is the SWH[ccvii]. • Broad-winged Hawk and Coopers Hawk – a 100m radius around the nest is the SWH[ccvii]. • Sharp-shinned Hawk – a 50m radius around the nest is the SWH[ccvii]. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHMiST[cxlix] Index #27 provides development effects and mitigation measures.	Natural woodland stands >30ha are present within the focused study area. **Candidate SWH.**
Wildlife Habitat: Turtle Nesting Area					
Rationale: These habitats are rare and when identified will often be the only breeding site for local populations of turtles	Midland Painted Turtle Special Concern: Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m)[cxlviii] or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Information Sources • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs and landowners	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH[i] • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependent on slope, riparian vegetation and adjacent land use is the SWH[cxlviii]. • Travel routes from wetland to nesting area are to be considered within the SWH[cxlix]. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWHMiST[cxlix] Index #28 provides development effects and mitigation measures for turtle nesting habitat.	Exposed mineral soil (i.e., sand or gravel) areas may be present within shallow marshes in the focused study area. **Candidate SWH.**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Seeps and Springs					
Rationale: Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system[cxvii, cxlix]. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species[cxix, cxx, cxxi, cxxii, cxiii, cxiv] Information Sources • Topographical Map • Thermography • Hydrological surveys conducted by CAs and MOE • Field naturalists clubs and landowners • Municipalities and Conservation Authorities may have drainage maps and headwater areas mapped.	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat[cxlviii] • SWHMiST[cxlix] Index #30 provides development effects and mitigation measures	Suitable habitat may be present within the focused study area. **Candidate SWH.**
Wildlife Habitat: Amphibian Breeding Habitat (Woodland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians.	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m^2 (about 25m diameter) [ccvii] within or adjacent (within 120m) to a woodland (no minimum size)[cbxxxii, lxiii, lxv, lxvi, lxvii, lxviii, lxix, lxx] Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat[cxlviii] Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District • OMNRF wetland evaluations • Field naturalist clubs • Canadian Wildlife Service Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm: • 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)[lxxi] or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys[cviii] 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 woodland area plus a 230m radius of woodland area[lxiii,lxv, lxvi, lxvii, lxviii, lxix, lxx, lxxi] If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is the be included in the habitat. • SWHMiST[cxlix] Index #14 provides development effects and mitigation measures.	Suitable breeding pools may be present within the focused study area (e.g., within the northwestern portion). **Candidate SWH.**

Table 3. Characteristics of Specialized Wildlife Habitat for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Breeding Habitat (Wetland)					
Rationale: These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Tree frog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands >500m2 (about 25m diameter)[ccvii] supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats[cbxxxiv]. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations • Reports and other information available from CAs.	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species and with at least 20 individuals (adults or eggs masses)[bxi, bxiii], or 2 or more of the listed frog/toad species with Call Level Codes of 3. or; Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys[cviii] will be required during spring March to June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST[cxlix] Index #15 provides development effects and mitigation measures.	Wetlands >120m from woodlands are present within the focused study area (e.g., the northern portion). **Candidate SWH.**
Woodland Area-Sensitive Bird Breeding Habitat					
Rationale: Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are important habitats for area sensitive interior forest song birds.	Yellow-Bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird Scarlet Tanager Winter Wren Special Concern: Cerulean Warbler Canada Warbler	All Ecosites associated with these ELC Community Series: FOC FOM FOD SWC SWM SWD	• Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha.[cv, cxxxi, cxxxii, cxxxiii, cxxxiv, cxxv, cxxvi, cxxxvii, cxxxviii, cxxxix, cxl, cxli, cxlii, cxliii, cxliv, cxlv, cxlvi, cl, cli, clii, cliii, cliv, clv, clvii, clviii, clix] • Interior forest habitats are at least 200m from forest edge habitat. Information Sources • Local bird clubs • Canadian Wildlife Service (CWS) for the location of forest bird monitoring. • Bird studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to greatest value to interior species • Reports and other information available from CAs.	• Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #34 provides development effects and mitigation measures.	Large forests (>30 ha) are present within the focused study area. **Candidate SWH.**

Significant Wildlife Habitat Assessment Tables

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Marsh Bird Breeding Habitat					
Rationale: Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Gallinule American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan Special Concern: Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present[cxxiv]. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • Contact OMNRF, wetland evaluations are a good source of information. • Field naturalist clubs • Natural Heritage Information Center (NHIC) Records • Reports and other information available from CAs. • Ontario Breeding Bird Atlas[ccv]	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or 1 pair of Sandhill Cranes; or breeding by any combination of 5 or more of the listed species[i]. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH[i]. • 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"[ccxi]. • SWHMiST[cxlix] Index #35 provides development effects and mitigation measures	Wetlands are present throughout the focused study area. Suitable habitat may be present. **Candidate SWH.**
Wildlife Habitat: Open Country Bird Breeding Habitat					
Rationale: This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow Special Concern: Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha [clx, clxi, clxii, clxiii, clxiv, clxv, clxvi, clxvii, clxviii, clxix]. Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)[i]. Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Ask local birders • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owl is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi]. • SWHMiST[cxlix] Index #32 provides development effects and mitigation measures.	Suitable grassland habitat may be present within the focused study area. **Candidate SWH.**

Table 4. Characteristics of Habitat for Species of Conservation Concern for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Shrub/Early Successional Bird Breeding Habitat					
Rationale: This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records cxcix.	Indicator spp.: Brown Thrasher Clay-coloured Sparrow Common spp.: Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher Special Concern: Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species.	Large field areas succeeding to shrub and thicket habitats>10ha[clxiv] in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years)[i]. Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species [clxxiii]. Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps Ministry of Agriculture Local bird clubs • Ontario Breeding Bird Atlas[ccv] • Reports and other information available from CAs	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species[i]. • A field with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects"[ccxi] • SWHMiST[cxlix] Index #33 provides development effects and mitigation measures.	Large field areas succeeding to shrub and thicket habitats (>10h ha) may be present within the focused study area. **Candidate SWH.**
Wildlife Habitat: Terrestrial Crayfish					
Rationale: Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare. [ccii]	Chimney or Digger Crayfish: (*Fallicambarus fodiens*) Devil Crawfish or Meadow Crayfish: (*Cambarus Diogenes*)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM	Wet meadow and edges of shallow marshes (no minimum size) identified should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. Information Sources • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable marsh meadow or terrestrial sites[cci] • 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 during in temporary or permanent water Note the presence of burrows or chemistry are often the only indicator of presence, observance or collection of individuals is very difficult[cci] • SWHMiST[cxlix] Index #36 provides development effects and mitigation measures.	Deciduous swamp, thicket swamp, and mixed swamps are present throughout the focused study area. **Candidate SWH.**
Wildlife Habitat: Special Concern and Rare Wildlife Species					
Rationale: These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy.	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites[bxxviii]. Information Sources • Natural Heritage Information Centre (NHIC) will have the Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website: "Get Information": http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas[ccv] • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs to be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST[cxlix] Index #37 provides development effects and mitigation measures.	Several SCC have potentially suitable habitat within the focused study area (see Significant Species Habitat Screening Table). **Candidate SWH**

Significant Wildlife Habitat Assessment Tables

Table 5. Characteristics of Animal Movement Corridors for Ecoregion 6E.

	Wildlife Species[1]	Candidate SWH		Confirmed SWH	Study Area
		ELC Ecosite Codes[1]	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
Wildlife Habitat: Amphibian Movement Corridors					
Rationale: Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1.	Movement corridors between breeding habitat and summer habitat [clxxiv, clxxv, clxxvi, clxxvii, clxxviii, clxxix, clxxx, clxxxi]. Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (Amphibian Breeding Habitat – Wetland) of this Schedule[í]. <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center NHIC • Reports and other information available from CAs • Field Naturalist Clubs	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. Cooridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant[cxlix]. • Corridors should have at least 15m of vegetation on both sides of waterway [cxlix] or be up to 200m wide[cxlix] of woodland habitat and with gaps <20m [cxlix]. • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat[cxlix]. • SWHMiST[cxlix] Index #40 provides development effects and mitigation measures.	Amphibian movement corridors may be present within the focused study area. **Candidate SWH.**
Wildlife Habitat: Deer Movement Corridors					
<u>Rationale:</u> Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when Deer Wintering Habitat is confirmed as SWH from Table 1.1 of this schedule[í]. • A deer wintering habitat identified by the OMNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion [clxxxii, clxxxiii, cxlix, cxciv]. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). <u>Information Sources</u> • MNRF District Office • Natural Heritage Information Center (NHIC) • Reports and other information available from CAs • Field Naturalist Clubs	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering yard should be unbroken by roads and residential areas. • Corridors should be at least 200m wide[cxlix] with gaps <20m[cxlix] and if following riparian area with at least 15m of vegetation on both sides of waterway[cxlix] . Shorter corridors are more significant than longer corridors[cxlix] • SWHMiST[cxlix] Index #39 provides development effects and mitigation measures.	Deer movement corridors may be present within the focused study area. **Candidate SWH.**

Significant Wildlife Habitat Assessment Tables

Table 6. Exceptions for Ecodistricts within Ecoregion 6E.

	Wildlife Habitat and Species	Candidate SWH			Confirmed SWH	Study Area
		Ecosites	Habitat Description	Habitat Criteria and Information Sources[1]	Defining Criteria[1]	Assessment Details
EcoDistrict: 6E-14						
Rationale: The Bruce Peninsula has an isolated and distinct population of black bears. Maintenance of large woodland tracks with mast producing tree species is important for bears. [cbxxxvi, ccxvii]	**Mast Producing Areas** Black Bear	All Forested habitat represented by ELC Community Series: FOM FOD	• Black bears require forested habitat that provides cover, winter hibernation sites, and mast producing tree species. [cbxxxv, cbxxxvii, cbxxxviii, cbxxxix, cxc, cxci, cxcii, cxciii, ccxvii] • Forested habitats need to be large enough to provide cover and protection for black bears [ccxvii.]	Woodland ecosites >30ha with mast-producing tree species, either soft (cherry) or hard (oak and beech), Information Sources Important forest habitat for black bears may be identified by OMNRF.	• All woodlands > 30 ha with a 50% composition of these ELC Vegetation Types are considered significant: FOM1-1 FOM2-1 FOM3-1 FOD1-1 FOD1-2 FOD2-1 FOD2-2 FOD2-3 FOD2-4 FOD4-1 FOD5-2 FOD5-3 FOD5-7 FOD6-5 • SWHMiST [cxlix] Index #3 provides development effects and mitigation measures.	Suitable habitat is not present within the focused study area. **Not SWH.**
EcoDistrict: 6E-17						
Rationale: Sharp-tailed grouse only occur on Manitoulin Island in Ecoregion 6E, Leks are an important habitat to maintain their population	**Lek** Sharp-tailed Grouse	CUM CUS CUT	• The lek or dancing ground consists of bare, grassy or sparse shrubland. There is often a hill or rise in topographyccxix. • Leks are typically a grassy field/meadow >15h with adjacent shrublands and >30ha with adjacent deciduous woodland. Conifer trees within 500m are not tolerated. ccxix	Grasslands (field/meadow) are to be >15ha when adjacent to shrubland and >30ha when adjacent to deciduous woodland[ccxix]. • Grasslands are to be undisturbed with low intensities of agriculture (light grazing or late haying) • Leks will be used annually if not destroyed by cultivation or invasion by woody plants or tree planting[ccxix] Information Sources • OMNRF district office • Bird watching clubs • Local landowners • Ontario Breeding Bird Atlas	Studies confirming lek habitat are to be completed from late March to June. • Any site confirmed with sharp-tailed grouse courtship activities is considered significant • The field/meadow ELC ecosites plus a 200 m radius area with shrub or deciduous woodland is the lek habitat • SWHMiST [cxlix] Index #32 provides development effects and mitigation measures	Suitable habitat is not present within the focused study area. **Not SWH.**

Scientific Name	Common Name	S-RANK[1]	SARO[2]	COSEWIC[3]	SARA[3]	SARA Schedule[3]	Background Source	Habitat Requirements	Suitable Habitats within Subject Lands	Suitable Habitats within Study Area External Lands
Birds										
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1	BSC et al. 2008; MNRF 2024	Well-drained grassland or prairie with low cover of grasses, taller weeds or sandy soil; hayfields or weedy fallow fields; uplands with ground vegetation of various densities. Requires perches for singing and tracts of grassland generally >5ha.[4]	No	Yes
Aquila chrysaetos	Golden Eagle	S1B, S4N	END	NAR	NAR	No Schedule	MECP 2022	Wild, arid plateaus, deeply cut by streams and canyons, or sparsely treed slopes and rock crags.[4]	No	No
Bartramia longicauda	Upland Sandpiper	S2B					BSC et al. 2008	Open pastures, fields of alfalfa, clover, hayfields; forest clearings; dry, old grassy fields with little to no shrubs or trees; requires tracts of grassland 25-50 ha.[4]	No	Yes
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1	BSC et al. 2008; MNRF 2024; iNaturalist 2024	Moist, mixed coniferous and deciduous forests with well-developed, dense shrub layer and closed canopy; wet bottomlands of cedar or alder; shrubby undergrowth in cool moist mature woodlands; riparian habitat. Most often found in large forest tracts.[4]	Yes	Yes
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1	BSC et al. 2008	Commonly found in urban areas near buildings; nests in chimneys, hollow trees,and crevices of rock cliffs. Feeds over open water.[4]	No	Yes
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1	BSC et al. 2008 MNRF 2024	Mid-canopy layer of forest clearings and edges of deciduous and mixed forest. Abundant in intermediate-age mature forest stands with little understory vegetation.[4]	Yes	Yes
Dolichonyx oryzivorus	Bobolink	S4B	THR	T	T	Schedule 1	BSC et al. 2008; MNRF 2024; iNaturalist 2024	Large (>10 ha), open expansive grasslands, pastures, hayfields, meadows or fallow fields with dense ground cover. Occassionally nest in large (>20 ha) fields of winter wheat and rye in southwestern Ontario.[4]	No	Yes
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1	BSC et al. 2008; MECP 2022	Farmlands, rural areas and other open or semi-open areas near body of water. Nests almost exclusively on human-made structures such as open barns, buildings, bridges and culverts.[4]	Yes	Yes
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1	BSC et al. 2008	Carolinian and Great Lakes-St. Lawrence forest zones. Undisturbed moist mature deciduous or mixed forest with deciduous sapling growth. Near pond or swamp. Must have some trees higher than 12 m.[4]	Yes	Yes
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1	MECP 2022; iNaturalist 2024	Open, deciduous forest with little understory; fields, parks or pasture lands with scattered large trees; wooded swamps; orchards, small woodlots or forest edges; groves of dead or dying trees. Requires cavity trees with at least 40 cm dbh.[4]	Yes	Yes
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1	BSC et al. 2008; MECP 2022; iNaturalist 2024	Usually steep, forested ravines with fast-flowing streams. Prefers running water, especially clear, coldwater streams, but also less frequently inhabits heavily wooded, deciduous swamps having large pools of open water.[4]	No	Yes

Scientific Name	Common Name	S-RANK[1]	SARO[2]	COSEWIC[3]	SARA[3]	SARA Schedule[3]	Background Source	Habitat Requirements	Suitable Habitats within Subject Lands	Suitable Habitats within Study Area External Lands
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1	BSC et al. 2008	Nests in burrows in natural and human-made settings with vertical faces in silt and sand deposits. Ususally on banks of river and lakes, but also found in sand and gravel pits.[4]	Yes	Yes
Spatula discors	Blue-winged Teal	S3B, S4M					BSC et al. 2008; MNRF 2024	Shallow open wetlands, ponds or lakes; margins of rivers; marshes near grasslands; hillside thickets[4]	No	Yes
Sturnella magna	Eastern Meadowlark	S4B, S3N	THR	T	T	Schedule 1	BSC et al. 2008; MNRF 2024	Open pastures, hayfields, grasslands or grassy meadows with elevated singing perches (small trees, shrubs or fence posts). Also weedy borders of croplands, roadsides, orchards, airports, shrubby overgrown fields or other open areas. Generally prefers larger tracts of habitat >10 ha, but will sometimes use smaller tracts.[4]	Yes	Yes
Herpetofauna										
Turtles										
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	Ontario Nature 2019; MNRF 2024; MECP 2022; iNaturalist 2024	Slow-flowing rivers and streams, lakes, and permanent or semi-permanent wetlands with soft substrates and vegetation. Key habitat requirements: open areas with structures for basking, open sand or gravel areas for nesting, shallow areas with soft substrates to bury in, soft banks or substrates for hibernation.[3]	Yes	Yes
Pseudacris triseriata	Western Chorus Frog (Great Lakes - St. Lawrence/Canadian Shield population)	S4	NAR	T	T	Schedule 1	MNRF 2024; Ontario Nature 2019	Moist forest, prairie, meadows, cultural meadows, or marshes. Breeds in shallow, temporary, fishless wetlands, including flooded ditches, marshes, flooded fields, pastures, temporary ponds, pools, and swamps. Hibernates in terrestrial habitats under rocks, logs, leaf litter, loose soil, or in animal burrows.[4]	Yes	Yes
Mammals										
Myotis leibii	Eastern Small-footed Myotis	S2S3	END				Dobbyn 1994; Humphrey 2017	Roosts in caves, mine shafts, crevices or buildings that are in or near woodland. Hibernates in cold dry caves or mines. Maternity colonies in caves or buildings. Hunts in forests.[4]	Yes	Yes
Myotis lucifungus	Little Brown Myotis	S3	END	E	E	Schedule 1	Dobbyn 1994; ECCC 2018	Uses caves, quarries, tunnels, hollow trees or buildings for roosting. Winters in humid caves. Maternity sites in dark warm areas such as attics and barns. Feeds primarily in wetlands and forest edges.[4]	Yes	Yes
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1	Dobbyn 1994; ECCC 2018	Roosts in houses and man-made structures but prefers hollow trees or under loose bark. Hibernates in mines or caves. Hunts within forest, below the canopy.[4]	Yes	Yes
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1	Dobbyn 1994; ECCC 2018	Roosts and maternity colonies in older forests and occassionally in barns or other sturctures. Forage over water and along streams in the forest. Hibernate in caves.[4]	Yes	Yes
Butterflies										
Danaus plexippus	Monarch	S2N, S4B	SC	END	SC	Schedule 1	Macnaughton et al. 2023; iNaturalist 2024	Adults found in a diversity of habitats with a variety of wildflowers. Caterpillars are confined to meadows and open areas where milkweeds grow (larval food plants).[3]	Yes	Yes
Odonates										

Scientific Name	Common Name	S-RANK[1]	SARO[2]	COSEWIC[3]	SARA[3]	SARA Schedule[3]	Background Source	Habitat Requirements	Suitable Habitats within Subject Lands	Suitable Habitats within Study Area External Lands
Ophiogomphus carolus	Riffle Snaketail	S3					MNRF 2024	Clear, cold, rocky streams that are fast-flowing with relatively few pools; bottom sediment made up of fine gravel or sand.[5]	No	Yes
Plants										
Juglans cinerea	Butternut	S2?	END	E	E	Schedule 1	MNRF 2024; MECP 2022	Stream banks and swamps, as well as upland beech-maple, oak-hickory, and mixed hardwood stands.[2,3]	Yes	Yes

Appendix III
Agency Background Information Responses

(no subject)

From Sydney Gilmour <sgilmour@nrsi.on.ca>
To Sydney Gilmour <sgilmour@nrsi.on.ca>
Date 2023-11-02 12:13

Re Background information request - proposed Strada quarry, Melancthon Township.eml (~8.7 MB) Melancthon1_DataRecord.pdf (~3.6 MB) Melancthon1_EvaluationRecord.pdf (~1.1 MB)
Terra Nova Swamp Complex Data.pdf (~652 KB) Terra Nova Swamp Complex Eval.pdf (~170 KB) Boyne River Swamp Data.pdf (~755 KB) Boyne River Swamp Eval.pdf (~208 KB)

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Sydney Gilmour M.Sc. (she/her)
Terrestrial and Wetland Biologist
Natural Resource Solutions Inc.
Proudly Indigenous-owned
415 Phillip Street, Unit C
Waterloo, ON N2L 3X2
(p) 519-725-2227 Ext. 446 (f) 519-725-2575
(m) 819-919-4030
(w) www.nrsi.on.ca (e) sgilmour@nrsi.on.ca
@nrsinews Natural Resource Solutions Inc.

From Gaudon, Justin (NDMNRF) <Justin.Gaudon@ontario.ca>
To rarcher@nrsi.on.ca <rarcher@nrsi.on.ca>
Date 2021-11-01 10:59

Good morning Ryan,

Please see attached for data / information I was able to pull together for your request. Note that some are quite old. I hope this helps. Please let me know if have any specific questions. I would be interested in seeing data you collect during your surveys if you would be willing to share this.

Best wishes,

Justin Gaudon, Ph.D.
Integrated Resource Management Technical Specialist
Ministry of Northern Development, Mines, Natural Resources and Forestry
Midhurst District - Owen Sound Field Office
Cell: 226-668-1299
E-mail: justin.gaudon@ontario.ca

Ontario

From: Gaudon, Justin (NDMNRF)
Sent: October 25, 2021 8:18 PM
To: rarcher@nrsi.on.ca
Subject: RE: Background information request - proposed Strada quarry, Melancthon Township

Hi Ryan,

I was forwarded your information request. Thank you very much. I will review soon and get back to you as soon as possible.

Best wishes,

Justin Gaudon, Ph.D.
Integrated Resource Management Technical Specialist
Ministry of Northern Development, Mines, Natural Resources and Forestry
Midhurst District - Owen Sound Field Office
Cell: 226-668-1299
E-mail: justin.gaudon@ontario.ca

Ontario

From: Ryan Archer <rarcher@nrsi.on.ca>
Sent: October 20, 2021 8:54 AM
To: MIDHURSTINFO (NDMNRF) <MIDHURSTINFO@ontario.ca>
Subject: Fwd: Background information request - proposed Strada quarry, Melancthon Township

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

Hello,

Please see the background information request below and attached.

Regards,

Ryan Archer M.Sc.
Senior Terrestrial and Wetland Biologist
Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON N2L 3X2
(p) 519-725-2227 Ext. 414 (f) 519-725-2575
(m) 519-580-0758
(w) www.nrsi.on.ca (e) rarcher@nrsi.on.ca
@nrsinews Natural Resource Solutions Inc.
Over 20 years of environmental consulting excellence

-------- Forwarded Message --------

Subject: Background information request - proposed Strada quarry, Melancthon Township
Date: Fri, 15 Oct 2021 14:28:05 -0400
From: Ryan Archer <rarcher@nrsi.on.ca>
Organization: Natural Resource Solutions Inc.
To:kim.benner@ontario.ca <kim.benner@ontario.ca>

Hello,

Please see the attached request for background natural heritage information to inform a natural heritage characterization study that is being initiated associated with a proposed quarry license that will be applied for by Strada Aggregates. To inform this study, we are requesting background informati a broad study area surrounding the Strada lands in order to understand upstream and downstream ecological sensitivities. Separate hydrological and hydrogeological studies are being undertaken by other members of the project team.

Please let me know if there are any questions or need for clarifications.

Our project team will be further engaging with MNRF in the near future to further discuss this planned application and the necessary studies.

Regards,

--

Ryan Archer M.Sc.
Senior Terrestrial and Wetland Biologist
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(m) 519-580-0758
(w) www.nrsi.on.ca (e) rarcher@nrsi.on.ca
@nrsinews Natural Resource Solutions Inc.
Over 20 years of environmental consulting excellence

(no subject)

From Sydney Gilmour <sgilmour@nrsi.on.ca>
To Sydney Gilmour <sgilmour@nrsi.on.ca>
Date 2023-11-02 12:42

Re Proposed Quarry, Melancthon Township - Strada Aggregates - SAR Screening.eml (~77 KB)

--

Sydney Gilmour M.Sc. (she/her)
Terrestrial and Wetland Biologist
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(w) www.nrsi.on.ca (e) sgilmour@nrsi.on.ca
@nrsinews Natural Resource Solutions Inc.

From Species at Risk (MECP) <SAROntario@ontario.ca>
To Ryan Archer <rarcher@nrsi.on.ca>
Date 2022-01-17 12:53

Hi Ryan,
The thank you for providing the coordinates, that was incredibly helpful.
It is really strange that your record search in Make a Map came up with Jefferson salamander/Unisexual Ambystoma, because our records have the closest observation at ~15km SE of this site. Due to this distance of observations, no habitat mapping has been done for salamanders at this site.

In addition to the species that you have listed, we have records for the following in proximity;

THR/END – butternut, barn swallow, Louisiana waterthrush, Golden Eagle

SC – snapping turtle, painted turtle, red-headed woodpecker

*red-headed woodpecker and black ash are to be uplisted in early 2022.
Lisa

Lisa McShane | Management Biologist | Permissions and Compliance Section, Species at Risk Branch | Ministry of Environment, Conservation and Parks | lisa.mcshane@ontario.ca | (226) 668-0527

From: Ryan Archer <rarcher@nrsi.on.ca>
Sent: Wednesday, January 5, 2022 9:32 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Subject: Re: Proposed Quarry, Melancthon Township - Strada Aggregates - SAR Screening

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

Hi Lisa,

For reference, the Strada Aggregates property, which is located within the broader study area and as outlined on the mapping, is located at 17T 56140 4887351.

Ryan Archer M.Sc.
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@nrsinews Natural Resource Solutions Inc.
Over 20 years of environmental consulting excellence

On 04/01/2022 10:09 a.m., Species at Risk (MECP) wrote:

Hi Ryan,
Could you provide the address or coordinates for this site? That will make it much easier for me to locate quickly.
Thank you,
Lisa

From: Ryan Archer <rarcher@nrsi.on.ca>
Sent: Wednesday, December 22, 2021 11:11 AM
To: Species at Risk (MECP) <SAROntario@ontario.ca>
Cc: Sydney Gilmour <sgilmour@nrsi.on.ca>
Subject: Proposed Quarry, Melancthon Township - Strada Aggregates - SAR Screening

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

Hello,

NRSI has been retained by Strada Aggregates to undertake a natural environment study to inform a planned application for a proposed quarry on lan owned by Strada in Melancthon Township, Dufferin County. NRSI is part of a larger team undertaking studies, which will include detailed hydrologica hydrogeological assessments. The proponent/study team members have initiated discussions with other agencies including the NDMNRF and Nottawasaga Valley Conservation Authority in regards to this planned application.

As part of background information reviews we completed a preliminary screening for Species at Risk known from the project study area or surroundi vicinity. The initial desktop review was supplemented by preliminary roadside field surveys undertaken in 2021 to characterize study area natural fea and wildlife habitats. These will be followed by a more comprehensive field survey program planned for 2022. Of particular relevance will be SAR tha could potentially be impacted by changes to the hydrological/hydrogeological regime of features including watercourses and wetlands, which will be focus for future impact assessment and mitigation planning. These include Jefferson Salamander and Unisexual Amybstoma salamanders that we understand to have records in the study area or vicinity.

We would like to request additional information on SAR records from the study area, including any more detail on Jefferson Salamander/Unisexual Ambystoma records or habitat mapping that would be relevant for our study. Please let me know if more information is required or if it would be beneficial to arrange a conference call/videoconference to discuss the proposed application further.

Regards,

--

Ryan Archer M.Sc.
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@nrsinews Natural Resource Solutions Inc.
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Appendix IV
Permits and Authorizations

Ministry of Northern Development, Mines, Natural Resources and Forestry

Midhurst District Office
2284 Nursery Road
Midhurst, ON, L9X 1N8
Tel: 705-725-7500
Fax: 705-725-7584

Ministère du Développement du Nord, des Mines, des Richesses naturelles et des Forêts

Bureau de district Midhurst
2284 rue Nursery
Midhurst, ON, L9X 1N8
Tél: 705-725-7500
Téléc: 705-725-7584

Ontario

March 8, 2022

Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON
N2L 3X2

SUBJECT: Wildlife Scientific Collector's Authorization #1100124

Dear Ryan:

Please find enclosed your Wildlife Scientific Collector's Authorization. Please sign and date the Authorization and the conditions pages immediately upon receipt.

Your signature acknowledges that you understand and agree to the terms and conditions of the authorization. You may submit the signed documents by fax to (705) 725-7584, or you may scan and email a copy to midhurstinfo@ontario.ca.

Authorizations are issued under Section 39 of the *Fish and Wildlife Conservation Act, 1997*, to allow the short-term possession, capture, or killing of fish or wildlife for educational, scientific, or "rescue" purposes. Approved Wildlife Scientific Collector's Authorizations are only valid for the locations and species if all appropriate approvals under all required agencies have been obtained.

Please note the reporting requirements specific to your authorization. A mandatory report must be submitted to MNRF Midhurst District Office by **January 31st, 2023**.

If you have any questions or concerns regarding your authorization, please do not hesitate to contact us.

Yours truly,

Shari Haak
Resources Clerk – Midhurst District

Ontario

Ministry of Natural Resources

Ministère des Richesses naturelles

Wildlife Scientific Collector's Authorization

Autorisation pour faire la collecte scientifique d'animaux sauvages

AuthorizationNo.. Nº d'autorisation	1100124
Local Reference No. Nº de référence local	MH2022-00077
Issuer Account No. Nº de compte du délivreur de permis.	10003100

This authorization is issued under Section 39 of the Fish and Wildlife Conservation Act, 1997 to:

Cette autorisation est délivrée en vertu de l'article 39 de la Loi sur la protection du poisson et de la faune de 1997 à:

Name of Authorization holder

Nom du titulaire de l'autorisation

Last Name / Nom de famille	First Name / Prénom	Middle Name / Second Prénom
Archer	Ryan	

Name of Business/Organization/Affiliation (if applicable)
Nom de l'entreprise/de l'organisme/de l'affiliation (le cas échéant)

Natural Resource Solutions Inc.

Mailing address of Authorization holder

Adresse postale du titulaire de l'autorisation

Street Name & No./PO Box/RR#/Gen. Del./ Nº rue/C.P./R.R./poste restante

415 Phillip Street, Unit C

City/Town/Municipality / Ville/village/municipalité	Province/State Province/État	Postal Code/Zip Code Code Postal/Zip
Waterloo	ON	N2L 3X2

This authorization permits the above-named person to:

Cette autorisation permet à la personne nommée ci-haut de:

[X] **Capture wildlife of the species and sex, in the numbers, and in the area set out be below.**

Capturer les espèces d'animaux sauvages selon le nombre et le sexe indiqués ci-dessous dans les lieux indiqués ci-dessous

and/or / et/ou

[ ] Keep game wildlife or specially protected wildlife in captivity for the purposes of education or science.
Garder des animaux sauvages spécialement protégés et du gibier sauvage en captivité à des fins éducatives et scientifiques

[X] Release the captured wildlife in the area of capture, if the captured wildlife is not to be removed from that area
Remettre en liberté les animaux sauvages capturés dans la zone de capture si les animaux captures ne doivent pas être enlevés de cette zone

OR / OU

[ ] **Capture and kill wildlife of the species and sex, in the numbers, and in the area set out be below.**
Capturer et tuer les espèces d'animaux sauvages selon le nombre et le sexe indiqués ci-dessous dans les lieux indiqués ci-dessous

Species / Especés	Sex Sexe	Numbers Nombre	Location / Endroit
Spotted Salamander		200	Shelburne, ON
Blue Spotted Salamander		50	Shelburne, ON
Jefferson Salamander		50	Shelburne, ON
Unisexual Ambystoma		50	Shelburne, ON
Red Spotted Newt		100	Shelburne, ON

Yes/Oui

[X] Additional list attached / Liste additionnelle ci-jointe

Authorization Dates Dates d'autorisation

Effective Date / Date d'entrée en vigueur (YYYY-MM-DD)	Expiry Date / Date d'expiration (YYYY-MM-DD)
2022-03-04	2022-11-01

Authorization conditions

Conditions de l'autorisation

This authorization is subject to the conditions contained in Schedule A if included./Cette autorisation doit respecter les conditions de l'annexe A si celle-ci est jointe.

Yes/Oui	No/Non	
[X]	[ ]	Schedule A included. / Annexe A ci-jointe

Authorized by (please print) Autorisé par (veuillez écrire en caractères d'imprimerie)	Signature of Authorizer / Signature de la personne chargée d'autoiser	Date of Issue/Date de délivrance (YYYY-MM-DD)
Julie Simard - A/Resources Operations Supervisor		2022-03-04

Signature of Authorization holder / Signature du titulaire de l'autorisation

Date 2022-03-08 (YYYY-MM-DD) ~~2022-03-04~~

Personal information contained on this form is collected under the authority of the Fish and Wildlife Conservation Act, 1997 and will be used for the purpose of licencing, identification, enforcement, resource management and customer service surveys. Please direct further inquiries to the District Manager of the MNR issuing district.

Les renseignements personnels dans ce formulaire sont recueillis conformément à la Loi sur la protection du poisson de la faune, 1997 , et ils seront utilisés aux fins de délivrance de permis, d'identification, d'application des règlements, de gestion des ressources et de sondage sur les services a la clientèle. Veuillez communiquer avec le chef du district du MRN qui délivré le permis si vous avez des questions.

FW2018 (04/00)

Wildlife Scientific Collector's Authorization

Additional Species List **Authorization No. 1100124**

Green Frog	100	Midhurst	Shelburne, ON
Spring Peeper	100	Midhurst	Shelburne, ON
Wood Frog	100	Midhurst	Shelburne, ON
Northern Leopard Frog	100	Midhurst	Shelburne, ON
American Toad	100	Midhurst	Shelburne, ON
Gray Treefrog	100	Midhurst	Shelburne, ON
American Bullfrog	100	Midhurst	Shelburne, ON
Western Chorus Frog (Gr Lakes/St.Lawrence pop)	100	Midhurst	Shelburne, ON
Pickerel Frog	100	Midhurst	Shelburne, ON
Mink Frog	100	Midhurst	Shelburne, ON

Wildlife Scientific Collector's Authorization
Schedule A – Authorization conditions

Authorization No. 1100124

This authorization is subject to conditions listed below.

GENERAL:

1. This authorization is only valid for the person(s), species, number(s), and date(s) indicated. Authorized activities are valid for the following sites(s):

   See table and map in Appendix I

2. The authorization holder may be assisted by: refer to Appendix II – List of Assistants. Any changes to assistants must be confirmed in writing (an email to midhurstinfo@ontario.ca is sufficient).

3. A signed copy of the original authorization shall be carried by the authorized person(s) and be on site at all times.

COLLECTION:

4. Authorized person(s) shall collect with the following gear: minnow traps.

5. Authorized person(s) shall keep authorized collection gear regularly maintained and in working order at all times while carrying out the activities permitted under this authorization.

6. All field/collection equipment must be de-contaminated prior to use on each site in order to prevent the spread of exotic/invasive species and disease pathogens.

7. Any collection gear and field equipment left unattended at the authorized site(s) shall be clearly marked with the authorization holder's contact information.

8. Authorized person(s) handling wildlife under the authorization:
   a. shall be trained in proper wildlife handling and procedures by qualified individuals;
   b. shall handle wildlife as little as possible and in a manner that minimizes stress;
   c. shall handle all turtles and amphibians in accordance with the *Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders*, available at: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_sar_hnd_mnl_en.pdf.

9. Subject to Condition 13 (re: species at risk) and Condition 12 (re: invasive species), all wildlife captured under this authorization shall be released alive:

   At the capture site

Signature of authorization holder _____ **Date** Mar. 8/22

When further examination of an animal is necessary in a laboratory, permission must be obtained as part of this authorization under section 40(2)(4) of the Fish and Wildlife Conservation Act.

10. This authorization is not valid in Provincial Parks, park reserves, National Parks, Conservation Areas, Crown game preserves or sanctuaries established under the Migratory Birds Convention Act without written permission from the authorized person in charge of the area concerned.

11. This authorization does not allow access to any property without permission of the landowner.

INVASIVE SPECIES

12. Any person, while acting under the authority of this licence, shall immediately **euthanize and not return to the water or the habitat area** any species listed as prohibited or restricted under the Prescribed Species Lists (Ontario Regulation 354/16) or any other invasive species, unless otherwise specified in an authorization issued under the *Invasive Species Act, 2015*. Any other non-native or invasive species captured shall be euthanized and not returned to the water or the habitat area. All euthanized specimens shall be disposed of appropriately so as to ensure they do not re-enter the natural environment.

SPECIES AT RISK

13. Unless specifically authorized by a separate *Endangered Species Act, 2007*, authorization (i.e. Registry or permit) and/or Federal *Species at Risk Act, 2002* permit, any species at risk that are incidentally captured must be photographed and immediately released alive per Condition 9. The photographs, including capture coordinates and date caught, must be forwarded to the Ministry of the Environment, Conservation and Parks at SAROntario@ontario.ca.

REPORTING

14. If any injuries or mortalities of wildlife occur as a result of activities taking place, the authorization holder shall notify the MNRF Midhurst District office within seven (7) business days midhurstinfo@ontario.ca.

15. The following mandatory reporting is required and shall be submitted:
    a. A written final report covering the operation under this authorization must be submitted by the authorization holder to the MNRF Midhurst District office by January 31st following the authorization expiry date to midhurstinfo@ontario.ca. **The submission of a complete reort is a prerequisite to any subsequent renewals.**

    The report shall contain:

Signature of authorization holder **Date**

Mar. 8/22

i. a statement outlining the objectives of the operations,
ii. the methods used,
iii. the locations which must be reported using GPS location data using: Projection: Universal Transverse Mercator (UTM); Datum: North American 1983 (NAD83), Canadian Transformation (CNT),
iv. the number and species of wildlife caught and their fate, and
v. a summary and how results related to the objectives.

b. Records of any SARO species observed shall be submitted to the Natural Heritage Information Centre at https://www.ontario.ca/page/report-rare-species-animals-and-plants.

SPECIES-SPECIFIC CONDITIONS

16. The following conditions apply to activities related to the handling of Herpetofauna:

Herpetofauna (Reptiles and Amphibians) Rescue

a. All turtles and amphibians shall be handled in accordance with the Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders, available at: http://files.ontario.ca/environment-and-energy/species-at-risk/mnr_sar_tx_sar_hnd_mnl_en.pdf.

b. Water shall be disposed of at minimum thirty (30) metres from any watercourse.

Signature of authorization holder **Date**

Mar. 8/22

Appendix I: Map and Table

Table 1. NRSI Proj2473 Potential Survey Sites: Location, Legal Description and

Location	Lot and Concession - Legal Description*	Approximate UTM (zone 17T)	
		Easting (m E)	Northing (m N)
Shelburne Quarry, Shelburne, ON	CON 3 OS W PT LOT 13 CON 3 OS W PT LOT 12	561429.00	4888059.00
NAT-01	CON 4 OS W PT LOT 11 CON 4 OS W PT LOT 12 RP;7R2779 PART 5 PT CON 4 OS W PT LOT 12 RP;7R4260 PART 1 CON 4 OS W PT LOTS 12 AND 13 RP 7R2779; PARTS 1 AND 3 CON 4 OS E PT LOT 11 CON 4 OS W PT LOT 13 CON 4 OS E PT LOT 12 CON 4 OS E PT LOTS 11 & 12 CON 3 NE PT LOT 2 PT LOT 3 CON 3 NE PT LOT 2 PT LOT 3;RP 7R5356 PART 4 CON 3 NE PT LOT 4 RP 7R5356; PART 5 CON 4 OS W PT LOT 11 RP;7R2870 PART 1	560066.49	4886642.35
NAT-02	CON 3 OS E PT LOT 8 CON 3 OS E PT LOT 10 CON 3 PT LOTS 9 AND 10 CON 3 PT LOT 9 RP;7R4150 PT PART 1 RP 7R6299; PART 1 CON 3 OS E PT LOT 9 RP;7R4595 PART 1 CON 3 OS E PT LOT 9 RP;7R2732 PART 2 CON 3 OS W PT LOT 10 RP;7R4345 PART 1 CON 3 OS W PT LOT 10 RP;7R5320 PART 2 CON 3 OS W PT LOTS 9 AND 10;RP 7R5320 PART 3 CON 3 OS W PT LOT 9	562368.25	4885863.92
NAT-03	CON 2 OS E PT LOT 8 CON 2 OS E PT LOT 7 CON 2 OS W PT LOT 8 PCL 17 CON 2 OS W PT LOT 8 PCL 18 CON 2 OS W PT LOT 8 PCL 19 CON 2 OS W PT LOT 8 PCL 20 CON 2 OS W PT LOT 9	563386.53	4885896.82
NAT-04	CON 4 OS W PT LOT 7 CON 4 OS W PT LOT 7 RP;7R1669 PART 1 CON 4 OS W PT LOT 8 CON 4 OS PT LOT 8 CON 4 OS W PT LOT 8 CON 4 OS W PT LOTS 9 AND 10 CON 4 OS W PT LOT 10 CON 4 OS E PT LOT 10 CON 4 OS E PT LOT 9 CON 4 OS E PT LOT 8 CON 3 OS W PT LOT 6 CON 4 OS E PT LOT 6	560779.02	4884697.42
NAT-08	CON 2 OS W PT LOT 7 PCL 2 RP;7R2667 PART 2 CON 2 OS W PT LOT 7 PCL 1 CON 2 OS W PT LOT 6 RP7R5015;PART 1	563065.54	4884319.43

Signature of authorization holder **Date**

Mar. 8/22

	CON 2 OS W PT LOT 6 RP7R1110;PART 1 CON 2 OS W PT LOT 6 CON 3 OS E PT LOT 6 CON 3 OS W PT LOT 6 CON 3 OS W PT LOT 7 CON 3 OS E PT LOT 7 CON 3 OS E PT LOT 8 RP;7R3304 PARTS 2, 3, & 4 RP;7R3971 PARTS 1, 2, & 3		
NAT-09	CON 2 SW PT LOT 303 CON 2 SW PT LOT 302 CON 2 SW PT LOT 301 CON 2 SW LOT 301 CON 1 SW PT LOT 300 CON 1 SWTSR PT;LOT 299 CON 1 SW PT LOTS 296 TO 298 CON 4 OS W PT LOT 5 CON 4 OS W PT LOT 3 W PT LOT 4	560448.93	4882095.97
NAT-14	CON 2 OS W PT LOT 16 CON 2 OS E PT LOT 16 CON 2 OS W PT LOT 16 RP;7R3831 PART 1 CON 2 OS W PT LOT 16 RP;7R4245 PART 1 CON 2 OS W PT LOT 15 RP;7R4165 PART 1 CON 2 OS W PT LOT 15 RP;7R4165 PART 2	562537.33	4890114.63
NAT-15	CON 1 OS W PT LOT 16 CON 1 OS W PT LOT 17 CON 1 OS W PT LOT 17 CON 1 OS E PT LOT 17 CON 1 OS E PT LOT 16 CON 1 OS E PT LOT 16 RP;7R2613 PART 2 CON 1 OS W PT LOT 15 CON 1 OS W PT LOT 15 RP;7R4386 PART 1 CON 1 OS W PT LOT 15 PLAN;17A PT MILL RESERVE RP;7R1581 PART 5 RP 7R1332 PART 8 PLAN 17A PT MILL SITE N/S;MILL RP 7R1332 PART 2 CON 1 OS W PT LOT;15 PLAN 17A LOTS 6 TO 9 N/S;MILL LANE PT MILL RESERVE RP;7R1581 PT PART 3	563872.93	4890831.80
NAT-16	CON 1 OS PT LOT 14 PLAN 277; PT LOT 3 TGTHR WITH ROW PLAN 34A PT LOT 35 LOT 103; LOT 104 LOT 140 LOT 141 AND RESERVE PLAN 34A LOT 92 TO LOT 94 PLAN 34A LOT 51 LOT 52	563860.48	4889458.87
NAT-18	CON 2 OS PT LOTS;13 AND 14 PLAN 34A LOTS 21;TO 23 PT LOTS 25 TO 27 PT; LANE AND RP 7R4077 PART 2 RP 7R4114 PARTS 1 2 AND 4 CON 2 OS PT LOT;13 RP 7R6700 PARTS 1 AND 2 PLAN 132 LOT 3 CON 1 OS PT LOT;13 PLAN 132 LOT 6 AND BLK 16;RP 7R6590 PARTS 1 TO 3 CON 1 OS W PT LOT 13 PLAN 44;LOTS 1 TO 7	563755.86	4888728.66
NAT-20	CON 3 OS E PT LOT 11 CON 3 OS W PT LOT 11 CON 4 OS E PT LOT 11	561846.74	4887020.23

Signature of authorization holder **Date** **Page 5 of 8**

Mar. 8/22

	CON 3 OS W PT LOT 12		
NAT-21	CON 4 OS W PT LOT 15 CON 4 OS E PT LOT 14	560618.58	4888399.27

*NRSI is currently reaching out to relevant landowners to confirm access to these properties. These Lots and Concessions have been detailed to encompass the wetlands and wetland complexes that NRSI has identified as suitable habitat for surveys for the 2022 season, but may not reflect the final survey locations. The descriptors for the identified Lots and Concessions were extracted from the County of Dufferin Assessment Lot Parcel Webmap (County of Dufferin; accessed March 3, 2022).

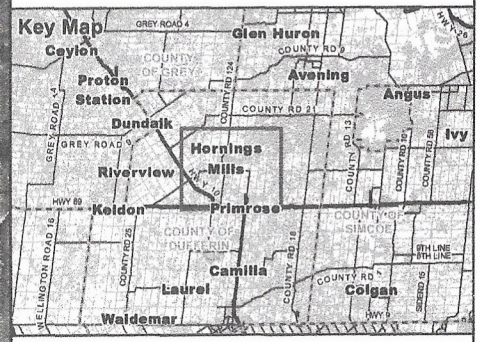
Signature of authorization holder **Date**

Mar. 8/22

Map 1

Shelburne Quarry Feasibility Study

Priority Natural Features



Legend

- Subject Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Water Body
- Provincial Park

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRF© Copyright: Queen's Printer Ontario. Imagery: First Base Solutions Inc. (2018).

Project: 2473A
Date: March 3, 2022

NAD83 - UTM Zone 17
Size: 11x17"
1:50,000

0 1 2 3 Kilometers

Appendix II: List of Assistants

Employee	Title
Anderson, Phil	Senior Aquatic Biologist
Archer, Ryan	Terrestrial and Wetland Biologist
Baldwin, Blair	Aquatic Biologist
Bannon, Erin	Terrestrial and Wetland Biologist
Bannon, Jeremy	Terrestrial and Wetland Biologist
Beck, Megan	Terrestrial and Wetland Biologist
Brenton, Tara	Senior Terrestrial and Wetland Biologist
Burgin, Steve	Aquatic Biologist
Cantwell, Ashley	Terrestrial and Aquatic Biologist
Catry, Sam	Aquatic Field Biologist
Deacon, Patrick	Terrestrial and Wetland Biologist
Dean, Andrew	Terrestrial and Wetland Biologist
Dungey, Michael	Biologist
Filippov, **Kaitlin**	Terrestrial and Wetland Biologist
Fotherby, Heather	Terrestrial and Wetland Biologist
Frey, Desta	Terrestrial and Aquatic Biologist
Gilmour, Sydney	Terrestrial and Wetland Biologist
Gosnell, Elaine	Senior Terrestral and Wetland Biologist
Grant, Nathan	Terrestrial and Wetland Biologist
Hammer, Pamela	Terrestrial and Wetland Biologist
Hardie, Nyssa	Ecohydrologist
Hockley, Laura	GIS Specialist and Environmental Analyst
Hofstetter, Shelby	Terrestrial and Wetland Biologist
Hoo, Kathryn	Terrestrial and Wetland Biologist
Howe, Sara	Terrestrial and Wetland Biologist
Humphrey, Christy	Terrestrial and Wetland Biologist
Knopf, Lillian	Terrestrial and Wetland Biologist
Lance, Joseph	Terrestrial and Wetland Biologist
MacVeigh, Gina	Aquatic Biologist
Manoharan, Hashveenah	Terrestrial and Wetland Biologist
McCarter, Jennifer	Terrestrial and Wetland Biologist
Miller, Nathan	Terrestrial and Wetland Biologist
Milne, Elizabeth	Terrestrial and Wetland Biologist
Mimms, Kayla	Terrestrial and Wetland Biologist
Nene, Jonny	Field Biologst
Ozaruk, Janet	Corporate Administrative Assisstant
Pedersen, Jennifer	Terrestrial and Wetland Biologist
Pivar, Robert	Terrestrial and Wetland Biologist
Pomezanski, Dorian	Terrestrial and Wetland Biologist
Postma, Madison	Terrestrial and Wetland Biologist
Reinert, Amy	Terrestrial and Wetland Biologist
Richard, Jack	Registered Professional Forester
Richter, Katharina	Senior Biologist
Riley, Daniel	Terrestrial and Wetland Biologist
Roussouw, Francois	Field Biologist
Rutland, Andrew	Ecohydrologist and Biologist
Ryckman, Andrew	Senior Terrestral and Wetland Biologist
Sanderson, Megan	Terrestrial and Wetland Biologist
Sieg, Tara	Field Biologist
Stephenson, David	Senior Biologist
Teat, Charlotte	Terrestrial and Wetland Biologist
Timmerman, Art	Biologist
Varga, Monica	GIS Technician
Weber, Jacqueline	Terrestrial and Wetland Biologist
Woodman, Brett	Senior Manager, Terrestrial and Wetland Biologist
Xiang, Johnson	GIS Technician

Signature of authorization holder **Date**

Mar. 8/22

Ministry of Northern Development, Mines, Natural Resources and Forestry

Midhurst District Office
2284 Nursery Road
Midhurst, ON, L9X 1N8
Tel: 705-725-7500
Fax: 705-725-7584

Ministère du Développement du Nord, des Mines, des Richesses naturelles et des Forêts

Bureau de district Midhurst
2284 rue Nursery
Midhurst, ON, L9X 1N8
Tél: 705-725-7500
Téléc: 705-725-7584

Ontario

March 25, 2022

Natural Resource Solutions Inc.
415 Phillip Street, Unit C
Waterloo, ON, N2L 3X2

Attention: Sam Catry
Subject: Licence to Collect Fish for Scientific Purposes #1100333

Dear Sam:

Please find enclosed your Licence to Collect Fish for Scientific Purposes as requested. Please sign the Licence and the Conditions page immediately upon receipt and fax (519) 372-3305 or scan/email to midhurstinfo@ontario.ca a signed copy of the Licence and Conditions.

Please note that this approval allows for the collection of fish and is not an approval to do in-water work for the duration of the licence term. Please visit our website to determine the timing window for in-water work for your project. If you are hoping to deviate from the prescribed in-water work timing window you will require prior approval from the Ministry of Natural Resources and Forestry. Please forward such requests to midhurstinfo@ontario.ca.

As per condition # 19, mandatory report forms documenting the sampling conducted under this licence must be submitted to the licence issuer within 30 days of the termination date, but in no case later than January 31 next following the year of issue. **Condition # 19 now requires you to submit the Mandatory Report (Part 1), the Site Collection Reports (Part 2) and site maps electronically by email to midhurstinfo@ontario.ca.** The most recent electronic report form is attached in this email for your use. Please ensure you use this form.

The electronic report form attached includes Part 1 and Part 2. Please make sure to complete all mandatory fields indicated on the form. In addition to those indicated with an *, please include “Sampling Date” and “Gear Type”. Although not indicated as mandatory on the form, this information is required. Also included is a tool to embed (or electronically attach) a map to the collection record (Part 2).

If you have any questions, please send an email to midhurstinfo@ontario.ca.

Yours truly,

Shari Haak

Shari Haak
Resources Clerk – Midhurst District

Ontario

Ministry of Natural Resources

Ministère des Richesses naturelles

Licence to Collect Fish for Scientific Purposes

Permis pour faire la collecte de poissons à des fins scientifiques

Licence No. / Nº de permis	1100333
Local Reference No. / Nº de référence local	MH2022-00086
Issuer Account No. / Nº de compte du delivreur de permis.	10003100

This licence is issued under Part I of the Fish Licensing Regulation made under the Fish and Wildlife Conservation Act, 1997 to:

Ce permis est délivré en vertu de la Partie I du règlement sur la délivrance de permis de pêche formulé conformément à la Loi sur la protection du poisson et de la faune de 1997 à:

Name of Licencee

Nom du titulaire du permis

Last Name / Nom de famille	First Name / Prénom	Middle Name / Second Prénom
Catry	Sam	

Name of Business/Organization/Affiliation (if applicable) / Nom de l'entreprise/de l'organisme/de l'affiliation (le cas échéant)

Natural Resources Solutions Inc.

Mailing address of Licencee

Adresse postale du titulaire du permis

Street Name & No./PO Box/RR#/Gen. Del./ Nº rue/C.P./R.R./poste restante

415 Phillip Street

City/Town/Municipality / Ville/village/municipalité	Province/State Province/État	Postal Code/Zip Code Code Postal/Zip
Waterloo	ON	N2L 3X2

to collect the species, size and quantites of fish from the waters as set out below.

Pour faire la collecte des espèces suivantes (stade et nombre indiqués ci-dessous):

Species Espèces	Eggs Oeuf X	Juvenile Fretin X	Adults Adulte X	Numbers Nombre	Name of Waterbody Nom de l'étendue d'eau
All Fish Species		X	X		The Boyne River and Pine River, including their tributaries,
					as shown on Appendix I: Maps.

Yes/Oui ☐ Additional species/Waterbody list attached / Liste d'espèces/d'étendue d'eau additionnelles ci-jointe

Purpose of collection

But de la collecte

Fish community assessments as part of a feasibility study

Licence Dates

Dates du permis

Effective Date / Date d'entrée en vigueur	Expiry Date / Date d'expiration
(YYYY-MM-DD) 2022-07-16	(YYYY-MM-DD) 2022-09-30

Licence conditions

Conditions du permis

This licence is subject to the conditions contained in Schedule A if included. / Ce permis doit respecter les conditions de l'annexe A si celle-ci est jointe.

Yes/Oui	No/Non	
☒	☐	Schedule A included. / Annexe A ci-jointe

Issued by (please print) Délivré par (veuillez écrire en caractères d'imprimerie)	Signature of issuer / Signature du délivreur	Date of Issue/Date de délivrance
Julie Simard - District Supervisor		(YYYY-MM-DD) 2022-03-25

Signature of Licencee / Signature du titulaire du permis	Date
	(YYYY-MM-DD) 2022-03-25

Personal information contained on this form is collected under the authority of the Fish and Wildlife Conservation Act, 1997 and will be used for the purpose of licencing, identification, enforcement, resource management and customer service surveys. Please direct further inquiries to the District Manager of the MNR issuing district.

Les renseignements personnels dans ce formulaire sont recueillis conformément à la Loi sur la protection du poisson de la faune, 1997 , et ils seront utilisés aux fins de délivrance de permis, d'identification, d'application des règlements, de gestion des ressources et de sondage sur les services a la clientèle. Veuillez communiquer avec le chef du district du MRN qui délivré le permis si vous avez des questions.

Licence to Collect Fish for Scientific Purposes

Schedule A - Licence Conditions

Licence No.: 1100333

This licence is subject to the conditions listed below.

1. This licence is valid only for the person(s), species, number(s), and date(s) indicated.

2. Licensee may collect fish in the following location(s): The Boyne River and Pine River, including their tributaries, as shown in Appendix I: Maps.

3. Licensee may be assisted by Phil Anderson, Blair Baldwin, Steve Burgin, Ashley Cantwell, Desta Frey, Nyssa Hardie, Nathan Grant, Jonny Nene, and Art Timmerman. Any changes to assistants must be confirmed in writing.

4. A signed copy of the original licence shall be carried by the licensee(s) or designated assistant(s) and be on the permitted site(s) at all times.

5. This licence is not valid in provincial parks, conservation reserves, or national parks without the written permission from the authorized person in charge of the area concerned.

6. This licence does not allow access to any property without permission of the landowner.

COLLECTION

7. Licensee may collect with the following gear: backpack electrofisher, dip nets, seine nets, and holding tanks/aerators, minnow traps, and appropriate personal protective equipment.

8. All collection gear shall be inspected regularly and live holding traps must be inspected at least once daily.

9. All field equipment must be de-contaminated prior to use on each water body in order to prevent the spread of exotic species and disease.

10. Any collection gear left unattended at the end of each sampling day at the designated site(s) shall be clearly marked with the licensee's contact information. If blocker nets are used, they shall be removed from the watercourse immediately following completion of in-water work.

11. The licensee shall follow the best management practices for the collection, handling, transportation and holding of fish identified in the Fisheries Policy Section Technical Bulletin, Best Management Practices (December 15, 2011) included with the licence to minimize the risk of spreading aquatic invasive species and diseases.

12. Due to potential spawning activity by spawning salmonids, visual inspection of all sampling areas should be done prior to sampling with the electrofisher or seine nets. Should spawning activity or redds be observed, all sampling must be stopped in order to prevent disturbance to the fish and habitats.

Signature of Licensee **Date**

2022-03-26

13. Subject to Condition 14 regarding invasive species, the licensee shall release all specimens live at the capture site with the exception of any specimens required for identification purposes.

INVASIVE SPECIES

14. Any person, while acting under the authority of this licence, shall immediately **euthanize and not return to the water or the habitat area** any species listed as prohibited or restricted under the Prescribed Species Lists (Ontario Regulation 354/16) or any other invasive species, unless otherwise specified in an authorization issued under the *Invasive Species Act, 2015*. Any other non-native or invasive species captured outside of their established range (not already naturalized) shall be euthanized and not returned to the water or the habitat area. All euthanized specimens shall be disposed of appropriately so as to ensure they do not re-enter the natural environment.

SPECIES AT RISK

15. Unless specifically authorized by a separate Endangered Species Act (ESA) authorization (i.e., registry or permit) and/or federal Species at Risk Act (SARA) permit, no person shall attempt to catch a Species at Risk.

16. Unless specifically authorized by a separate Endangered Species Act (ESA) authorization (i.e., registry or permit) and/or federal Species at Risk Act (SARA) permit, sampling must cease immediately in an area when a Species at Risk is caught.

17. Unless specifically authorized by a separate *Endangered Species Act, 2007*, authorization (i.e., registry or permit) and/or federal *Species at Risk Act, 2002* permit, any species at risk that are incidentally captured must be photographed and immediately released alive at the point of capture. The photographs, including capture coordinates and date caught, must be forwarded to the Ministry of the Environment, Conservation and Parks at SAROntario@ontario.ca.
    a. All aquatic species at risk records and data must also be reported to the Ministry of Natural Resources and Forestry Natural Heritage Information Centre on the appropriate form at: https://www.ontario.ca/environment-and-energy/natural-heritage-information-centre.

REPORTING

18. Sampling locations must be reported using GPS location data using: Projection: Universal Transverse Mercator (UTM); Datum: North American 1983 (NAD83), Canadian Transformation (CNT); Zone: 17N; Units: Metres.

Signature of Licensee **Date**

2022-03-26

19. A Mandatory Collection Report documenting the sampling conducted under this licence must be submitted to the Midhurst District NDMNRF office (e-mail: midhurstinfo@ontario.ca) within 30 days of the termination date, but in no case later than January 31 next following the year of issue. The report shall include:
    a. The Mandatory Collection Report form (Part 1), completed for each sampling program and the site; and
    b. For each collection site, a digital Site Collection Report (Part 2) and an accompanying map clearly indicating the location of the collection site.

Signature of Licensee **Date**

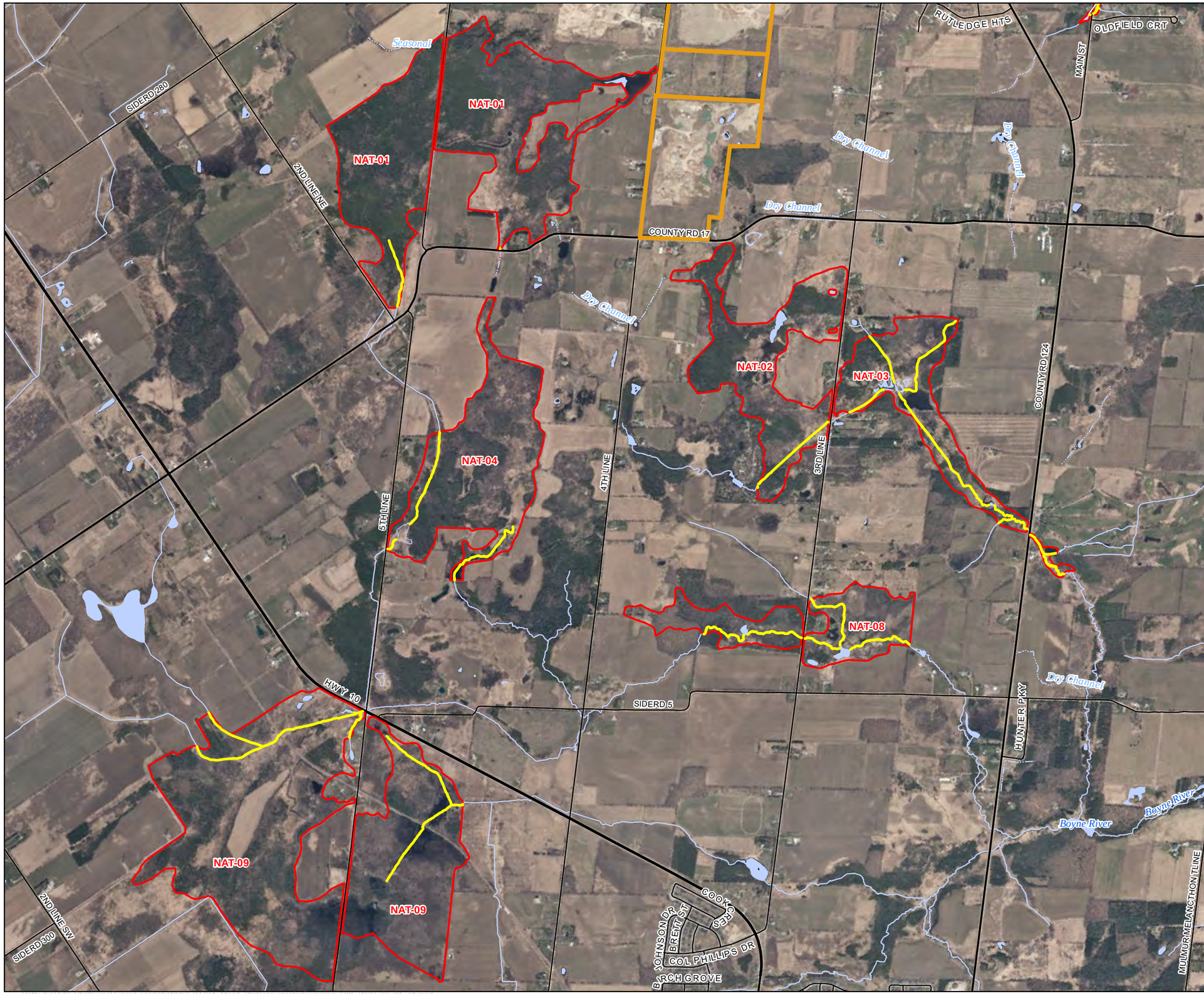
2022-03-26

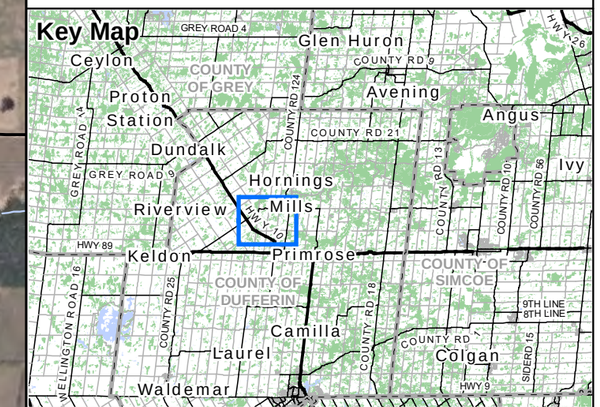
Appendix I: Maps

Map 1a

Shelburne Quarry Feasibility Study

Watercourses for Fish Sampling





Legend

- Subject Property
- Priority Natural Feature (NAT)
- Highway
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Proposed Fish Sampling Locations
- Water Body

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRF© Copyright: Queen's Printer Ontario. Imagery: First Base Solutions Inc. (2018).

Project: 2473A
Date: March 4, 2022

NAD83 - UTM Zone 17
Size: 11x17"
1:24,000

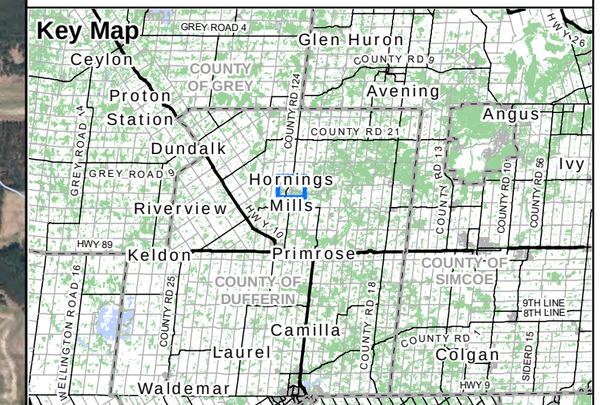
0 300 600 900 1,200 1,500 Meters

Path: X:\2473_ShelburneQuarry\Feasibility\NRSI_2473A_Map1_WatercoursesforSampling_50K_2022_03_04_JX.mxd

Map 1b

Shelburne Quarry Feasibility Study

Watercourses for Fish Sampling



Legend

- Priority Natural Feature (NAT)
- Primary Road
- Secondary Road
- Permanent Watercourse
- Headwater, Ephemeral or Intermittent Drainage Feature
- Proposed Fish Sampling Locations
- Water Body

NATURAL RESOURCE SOLUTIONS INC.
Aquatic, Terrestrial and Wetland Biologists

Map Produced by Natural Resource Solutions Inc. This map is proprietary and confidential and must not be duplicated or distributed by any means without express written permission of NRSI. Data provided by MNRF© Copyright: Queen's Printer Ontario. Imagery: First Base Solutions Inc. (2018).

Project: 2473A Date: March 4, 2022	NAD83 - UTM Zone 17 Size: 11x17" **1:11,000**

0 200 400 600 Meters

N

Path: X:\2473_ShelburneQuarryFeasibility\NRSI_2473A_Map1_WatercoursesforSampling_50K_2022_03_04_JX.mxd

Ontario

CONFIRMATION OF REGISTRATION

Form Name:	Species at risk surveys (O. Reg. 242/08 s.23.17.2)
Date Registration Filed:	03/08/2022
Confirmation ID:	M-102-9467965930
Version Number:	001
Update Date:	

Dear Sir/Madam,

For your reference, your Notice Form contained the following as your contact information:

Natural Resource Solutions Inc.

415 Phillip ST , UNIT, C
Waterloo, ON N2L3X2

If you need to update your contact information, please sign in to your ONe-key account and update the information in "My Profile."
You have submitted a Notice Form to the Ministry of the Environment, Conservation and Parks under the following subsection of the specified regulation under the *Endangered Species Act, 2007*:

Species at risk surveys (O. Reg. 242/08 s.23.17.2)

For activites located at:

NRSI Proj2473: Shelburne Quarry (NAT-03)

Note: If the site for this registration has multiple locations, only the location identified as the primary location will be displayed here.

The species to be impacted by the registered activity are listed in Appendix A (see last page of this document).
Please retain this Confirmation of Registration for your records.

It is your responsibility to:
- Ensure that your activity does not contravene the Endangered Species Act, 2007 (ESA).
- Determine whether your activity will impact a species that is listed as endangered, threatened or extirpated on the Species at Risk in Ontario (SARO) List (Ontario Regulation 230/8) and monitor the SARO List for changes that may be relevant to your activity, such as newly listed species.
- Ensure your activity satisfies the eligibility requirements for the conditional exemption for which you have registered.
- Fulfil all conditions of the conditional exemption for which you have registered.
- Monitor the applicable regulation for changes that may be relevant to your activity.

For more information:
Ontario Regulation 230/08 (SARO List): www.ontario.ca/laws/regulation/080230
Ontario Regulation 242/08 (General Regulation): www.ontario.ca/laws/regulation/080242
Ontario Regulation (Exemptions - Barn Swallow, Bobolink, Eastern Meadowlark and Butternut): https://www.ontario.ca/laws
Information about ESA authorizations and regulatory requirements is available on our website at:
www.ontario.ca/page/how-get-endangered-species-act-permit-or-authorization

Additional requirements:
- You are required to show this Confirmation of Registration upon request of the Ministry.
- When documents are requested by the Ministry of the Environment, Conservation and Parks, they are due within 14 days of the request.

Technical questions about the online registry system should be directed to:
Registry and Approval Services Centre
Toll Free: 1-855-613-4256
Email: mnr.rasc@ontario.ca

Questions about this Confirmation of Registration or the conditional exemptions in regulations under the Endangered Species Act, 2007 should be directed to:

Species at Risk Branch
Ministry of the Environment, Conservation and Parks
Email: SARregistry@ontario.ca

Learn about Ontario's species at risk at www.ontario.ca/page/species-risk-ontario

Appendix A:

Species impacted by the registered activity:

Jefferson Salamander (Ambystoma jeffersonianum)
Unisexual Ambystoma (Jefferson Salamander dependent population)

Amended List

Wildlife Scientific Collector's Authorization Authorization #1100124

Appendix II: List of Assistants

Employee	Title
Anderson, Phil	Senior Aquatic Biologist
Archer, Ryan	Terrestrial and Wetland Biologist
Baldwin, Blair	Aquatic Biologist
Bannon, Erin	Terrestrial and Wetland Biologist
Bannon, Jeremy	Terrestrial and Wetland Biologist
Beck, Megan	Terrestrial and Wetland Biologist
Brenton, Tara	Senior Terrestrial and Wetland Biologist
Burgin, Steve	Aquatic Biologist
Cantwell, Ashley	Terrestrial and Aquatic Biologist
Catry, Sam	Aquatic Field Biologist
Deacon, Patrick	Terrestrial and Wetland Biologist
Dean, Andrew	Terrestrial and Wetland Biologist
Dungey, Michael	Biologist
Filippov, Kaitlin	Terrestrial and Wetland Biologist
Fotherby, Heather	Terrestrial and Wetland Biologist
Frey, Desta	Terrestrial and Aquatic Biologist
Gilmour, Sydney	Terrestrial and Wetland Biologist
Gosnell, Elaine	Senior Terrestral and Wetland Biologist
Grant, Nathan	Terrestrial and Wetland Biologist
Hammer, Pamela	Terrestrial and Wetland Biologist
Hardie, Nyssa	Ecohydrologist
Hockley, Laura	GIS Specialist and Environmental Analyst
Hofstetter, Shelby	Terrestrial and Wetland Biologist
Hoo, Kathryn	Terrestrial and Wetland Biologist
Howe, Sara	Terrestrial and Wetland Biologist
Humphrey, Christy	Terrestrial and Wetland Biologist
Knopf, Lillian	Terrestrial and Wetland Biologist
Lance, Joseph	Terrestrial and Wetland Biologist
MacVeigh, Gina	Aquatic Biologist
Manoharan, Hashveenah	Terrestrial and Wetland Biologist
McCarter, Jennifer	Terrestrial and Wetland Biologist
Miller, Nathan	Terrestrial and Wetland Biologist
Milne, Elizabeth	Terrestrial and Wetland Biologist
Mimms, Kayla	Terrestrial and Wetland Biologist
Nene, Jonny	Field Biologst
Ozaruk, Janet	Corporate Administrative Assisstant
Pedersen, Jennifer	Terrestrial and Wetland Biologist
Pivar, Robert	Terrestrial and Wetland Biologist
Pomezanski, Dorian	Terrestrial and Wetland Biologist
Postma, Madison	Terrestrial and Wetland Biologist
Reinert, Amy	Terrestrial and Wetland Biologist
Richard, Jack	Registered Professional Forester
Richter, Katharina	Senior Biologist
Riley, Daniel	Terrestrial and Wetland Biologist
Roussouw, Francois	Field Biologist
Rutland, Andrew	Ecohydrologist and Biologist
Ryckman, Andrew	Senior Terrestral and Wetland Biologist
Sanderson, Megan	Terrestrial and Wetland Biologist
Sieg, Tara	Field Biologist
Stephenson, David	Senior Biologist
Teat, Charlotte	Terrestrial and Wetland Biologist
Timmerman, Art	Biologist
Varga, Monica	GIS Technician
Weber, Jacqueline	Terrestrial and Wetland Biologist
Woodman, Brett	Senior Manager, Terrestrial and Wetland Biologist
Xiang, Johnson	GIS Technician

Jocelyn Mennen, Amanda Armstrong, Miranda Ruekert, Wiliam Jacob Hunter, Carla Kolar, Tahnee Darmanin, and Natalie Vieira-Lomasney

Signature of authorization holder **Date**

Mar. 21/22

Appendix V
Plant Species Inventoried within the Study Area

Plant Species Reported from NAT-01 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWT3	FOM7-2/FOD5-7	SWM6	SWD7-1	CUT1 (with CUM1 complex)	FOC2-2	Roadside 2021
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022							
Pteridophytes	**Ferns & Allies**																
Dennstaedtiaceae	**Bracken Fern Family**																
Pteridium aquilinum	Bracken Fern	S5								X		X					X
Dryopteridaceae	**Wood Fern Family**																
Athyrium filix-femina var. angustum	Northeastern Lady Fern	S5					X			X		X					
Cystopteris tenuis	Mackay's Bladder Fern	S4					X			X			X				
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X		X					
Dryopteris cristata	Crested Wood Fern	S5					X	Medium	X	X	X		X				
Gymnocarpium dryopteris	Common Oak Fern	S5					X			X			X				
Matteuccia struthiopteris	Ostrich Fern	S5								X		X					
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X			X			
Equisetaceae	**Horsetail Family**																
Equisetum arvense	Field Horsetail	S5					X			X							X
Equisetum fluviatile	Water Horsetail	S5					X	Medium		X			X	X			X
Equisetum palustre	Marsh Horsetail	S5						High		X			X				
Equisetum scirpoides	Dwarf Scouring-rush	S5					X			X			X				
Equisetum sylvaticum	Woodland Horsetail	S5					X	Medium		X		X					
Equisetum variegatum	Variegated Horsetail	S5								X							X
Thelypteridaceae	**Beech Fern Family**																
Thelypteris palustris	Marsh Fern	S5								X			X	X			X
Gymnosperms	**Conifers**																
Cupressaceae	**Cypress Family**																
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X		X		X	X	X	X
Pinaceae	**Pine Family**																
Abies balsamea	Balsam Fir	S5					X	Medium	X	X	X	X	X				X
Larix laricina	Tamarack	S5					X	Medium		X			X				X
Picea glauca	White Spruce	S5					X			X		X	X				X
Pinus sylvestris	Scots Pine	SE5					I			X						X	
Dicotyledons	**Dicots**																
Aceraceae	**Maple Family**																
Acer rubrum	Red Maple	S5					X			X		X	X	X			X
Acer saccharum	Sugar Maple	S5					X			X		X				X	
Acer spicatum	Mountain Maple	S5					X			X			X				X
Acer x freemanii	Freeman's Maple	SNA						Medium		X	X						
Apiaceae	**Carrot or Parsley Family**																
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5					X	Medium		X			X	X			
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X			X	X			
Aquifoliaceae	**Holly Family**																
Ilex verticillata	Common Winterberry	S5					X	Medium		X			X				
Araliaceae	**Ginseng Family**																
Aralia nudicaulis	Wild Sarsaparilla	S5					X			X			X				X
Asclepiadaceae	**Milkweed Family**																
Asclepias incarnata	Swamp Milkweed	S5								X				X			
Asteraceae	**Composite or Aster Family**																
Bidens connata	Purple-stemmed Beggarticks	S4?								X			X				
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X				X			X
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X				X			X
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X			X	X			X
Lactuca biennis	Tall Blue Lettuce	S5					X			X			X				
Solidago rugosa	Rough-stemmed Goldenrod	S5								X			X	X			X
Symphyotrichum boreale	Rush Aster	S5						High		X							X
Symphyotrichum lanceolatum	Panicled Aster	S5								X			X	X			X
Symphyotrichum puniceum	Swamp Aster	S5								X			X	X			X
Balsaminaceae	**Touch-me-not Family**																
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X		X	X			X
Berberidaceae	**Barberry Family**																

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWT3	FOM7-2/FOD5-7	SWM6	SWD7-1	CUT1 (with CUM1 complex)	FOC2-2	Roadside 2021
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X		X					
Betulaceae	**Birch Family**																
Betula papyrifera	Paper Birch	S5					X			X			X	X			X
Corylus cornuta	Beaked Hazelnut	S5								X		X					
Ostrya virginiana	Eastern Hop-hornbeam	S5					X			X		X					
Brassicaceae	**Mustard Family**																
Cardamine pensylvanica	Pennsylvania Bittercress	S5					X	Medium		X			X				
Nasturtium officinale	Watercress	SE					I			X				X			

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWT3	FOM7-2/FOD5-7	SWM6	SWD7-1	CUT1 (with CUM1 complex)	FOC2-2	Roadside 2021
Caprifoliaceae	**Honeysuckle Family**																
Linnaea borealis	Twinflower	S5								X			X				
Lonicera canadensis	Canada Fly Honeysuckle	S5					X			X			X				
Lonicera oblongifolia	Swamp Fly Honeysuckle	S5					X	High		X			X	X			
Lonicera tatarica	Tatarian Honeysuckle	SE5					I			X		X					
Sambucus canadensis	Common Elderberry	S5					X			X			X				
Cornaceae	**Dogwood Family**																
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X	X		X		
Cornus canadensis	Bunchberry	S5					X			X			X				X
Cornus sericea	Red-osier Dogwood	S5					X			X	X			X			X
Grossulariaceae	**Currant Family**																
Ribes americanum	Wild Black Currant	S5					X			X	X		X	X			
Ribes cynosbati	Prickly Gooseberry	S5					X			X		X					
Ribes lacustre	Bristly Black Currant	S5					X			X			X				
Ribes triste	Swamp Red Currant	S5					X	Medium		X			X				X
Lamiaceae	**Mint Family**																
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X			X	X			
Mentha canadensis	Canada Mint	S5					X			X			X				
Mentha spicata	Spearmint	SE4								X							X
Prunella vulgaris	Self-heal	S5								X			X				X
Scutellaria lateriflora	Mad Dog Skullcap	S5					X	Medium		X			X	X			X
Lythraceae	**Loosestrife Family**																
Lythrum salicaria	Purple Loosestrife	SE5					X			X				X			X
Monotropaceae	**Indian Pipe Family**																
Hypopitys monotropa	Pinesap	S4					X			X			X				
Monotropa uniflora	Indian-pipe	S5					X			X			X				
Oleaceae	**Olive Family**																
Fraxinus americana	White Ash	S4					X			X					X		
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X			X	X			X
Fraxinus pennsylvanica	Green Ash	S4					X			X		X	X	X			
Onagraceae	**Evening-primrose Family**																
Circaea alpina	Small Enchanter's Nightshade	S5					X	Medium		X			X				
Epilobium coloratum	Purple-veined Willowherb	S5					X	Low		X				X			
Epilobium leptophyllum	Linear-leaved Willowherb	S5					X	Medium		X				X			
Polygonaceae	**Smartweed Family**																
Rumex britannica	Water Dock	S5					X	Medium		X	X						
Primulaceae	**Primrose Family**																
Lysimachia borealis	Northern Starflower	S5					X			X			X				
Lysimachia ciliata	Fringed Loosestrife	S5					X			X			X	X			
Ranunculaceae	**Buttercup Family**																
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X			X	X			
Clematis virginiana	Virginia Virgin's-bower	S5					X			X			X	X			
Coptis trifolia	Goldthread	S5					X	Medium	X	X			X				
Ranunculus caricetorum	Northern Swamp Buttercup	S5					X	Medium		X		X					
Ranunculus recurvatus	Hooked Buttercup	S5								X			X				
Thalictrum dasycarpum	Purple Meadow-rue	S4?								X			X				
Rhamnaceae	**Buckthorn Family**																
Endotropis alnifolia	Alder-leaved Buckthorn	S5					X	Medium		X			X	X			X
Rosaceae	**Rose Family**																
Agrimonia striata	Woodland Agrimony	S4								X		X					
Crataegus sp.	Hawthorn sp.									X					X		
Fragaria virginiana	Wild Strawberry	S5								X					X		
Geum rivale	Purple Avens	S5					X	Medium	X	X				X			
Malus pumila	Common Apple	SE4					I			X					X		
Prunus serotina	Black Cherry	S5					X			X		X	X				
Prunus virginiana	Choke Cherry	S5					X			X		X	X		X	X	X
Rubus pubescens	Dewberry	S5					X	Medium	X	X	X		X	X			X
Rubiaceae	**Madder Family**																
Galium tinctorium	Stiff Marsh Bedstraw	S5					X	Medium		X			X	X			
Galium triflorum	Three-flowered Bedstraw	S5					X			X			X				
Mitchella repens	Partridge-berry	S5					X			X		X					

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWT3	FOM7-2/FOD5-7	SWM6	SWD7-1	CUT1 (with CUM1 complex)	FOC2-2	Roadside 2021
Salicaceae	**Willow Family**																
Populus balsamifera	Balsam Poplar	S5					X			X	X		X	X			X
Populus tremuloides	Trembling Aspen	S5					X			X			X	X	X		X
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X			X				X
Salix discolor	Pussy Willow	S5					X	Low	X	X	X						X
Salix eriocephala	Heart-leaved Willow	S5					X	Medium		X							X
Salix lucida	Shining Willow	S5					X	Medium	X	X				X			
Salix petiolaris	Meadow Willow	S5					X	Low		X	X			X			X
Saxifragaceae	**Saxifrage Family**																
Mitella nuda	Naked Mitrewort	S5						Medium	X	X			X				X
Tiarella stolonifera	Heart-leaved Foam-flower	S5					X			X			X				
Solanaceae	**Nightshade Family**																
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X		X				X
Thymelaeaceae	**Mezereum Family**																
Dirca palustris	Eastern Leatherwood	S4					X			X		X					
Tiliaceae	**Linden Family**																
Tilia americana	American Basswood	S5					X			X		X					
Ulmaceae	**Elm Family**																
Ulmus americana	American Elm	S5					X			X	X			X	X		X
Urticaceae	**Nettle Family**																
Laportea canadensis	Wood Nettle	S5					X			X			X				
Urtica dioica	Stinging Nettle	SE2								X							X
Violaceae	**Violet Family**																
Viola macloskeyi	Smooth White Violet	S5					X	Medium		X				X			
Viola nephrophylla	Northern Bog Violet	S5					X			X				X			
Monocotyledons	**Monocots**																
Araceae	**Arum Family**																
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium	X	X			X				
Cyperaceae	**Sedge Family**																
Carex bebbii	Bebb's Sedge	S5					X			X				X			X
Carex comosa	Bristly Sedge	S5						Medium		X			X				
Carex cristatella	Crested Sedge	S5					X			X			X				
Carex deweyana	Dewey's Sedge	S5					X			X			X				
Carex diandra	Lesser Panicled Sedge	S5					X	Medium		X			X				X
Carex disperma	Two-seeded Sedge	S5					X	High	X	X			X				
Carex eburnea	Bristle-leaved Sedge	S5					X			X						X	
Carex flava	Yellow Sedge	S5					X	Medium	X	X							X
Carex gracillima	Graceful Sedge	S5					X			X		X				X	
Carex hystericina	Porcupine Sedge	S5					X	Medium	X	X			X				X
Carex interior	Inland Sedge	S5					X	Medium	X	X			X	X			X
Carex intumescens	Bladder Sedge	S5					X	Medium		X				X			
Carex lacustris	Lake Sedge	S5					X	Medium		X							X
Carex leptalea	Bristle-stalked Sedge	S5					X	High	X	X			X	X			X
Carex limosa	Mud Sedge	S5					X	High		X			X				X
Carex lupulina	Hop Sedge	S5					X	High		X			X	X			
Carex peckii	Peck's Sedge	S5					X			X		X					
Carex pedunculata	Long-stalked Sedge	S5					X			X		X					
Carex projecta	Necklace Sedge	S5					X	Medium		X			X	X			
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X			X	X			
Carex retrorsa	Retrorse Sedge	S5					X			X			X	X			
Carex stipata	Awl-fruited Sedge	S5					X	Low		X			X	X			
Carex stricta	Tussock Sedge	S5					X	Medium	X	X			X	X			X
Carex tuckermanii	Tuckerman's Sedge	S5					X	Medium		X			X	X			
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X			X				
Carex vulpinoidea	Fox Sedge	S5					X			X				X			X
Eleocharis obtusa	Blunt Spikerush	S5					X	Medium		X				X			
Eleocharis palustris	Creeping Spikerush	S5					X	Medium		X			X				
Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	S5					X	Medium		X			X				
Scirpus atrocinctus	Black-girdled Bulrush	S5								X							X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X			X	X			
Scirpus cyperinus	Cottongrass Bulrush	S5					X	Medium		X			X	X			X

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Iridaceae	**Iris Family**																
Iris versicolor	Harlequin Blue Flag	S5					X	Medium		X				X			
Juncaceae	**Rush Family**																
Juncus articulatus	Jointed Rush	S5					X	Medium		X							X
Juncus dudleyi	Dudley's Rush	S5					X			X							X
Lemnaceae	**Duckweed Family**																
Lemna minor	Lesser Duckweed	S5					X			X	X						
Liliaceae	**Lily Family**																
Clintonia borealis	Blue Bead-lily	S5					X			X			X				
Erythronium americanum	Yellow Trout-lily	S5								X		X					
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X		X		X			
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X		X					
Maianthemum trifolium	Three-leaved Solomon's Seal	S5					X	High		X			X				
Polygonatum biflorum	Giant Solomon's Seal	S4								X			X				
Polygonatum pubescens	Hairy Solomon's Seal	S5					X			X		X					
Trillium grandiflorum	White Trillium	S5					X			X		X					
Orchidaceae	**Orchid Family**																
Cypripedium parviflorum	Yellow Lady's-slipper	S5								X							X
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-slipper	S5					X			X			X				
Cypripedium reginae	Showy Lady's-slipper	S4					X	Medium	X	X			X				X
Poaceae	**Grass Family**																
Agrostis gigantea	Redtop	SE5					I			X							X
Bromus ciliatus	Fringed Brome	S5					X	Medium	X	X							X
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X			X	X			
Cinna latifolia	Drooping Woodreed	S5					X	Medium		X			X				
Dactylis glomerata	Orchard Grass	SE5					I			X					X		
Glyceria grandis	Tall Mannagrass	S5					X	Medium		X				X			
Glyceria septentrionalis	Eastern Mannagrass	S4						High		X			X				
Glyceria striata	Fowl Mannagrass	S5					X			X				X			X
Muhlenbergia mexicana	Mexican Muhly	S5								X							X
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X			X			X
Phragmites australis	Common Reed	SU								X							X
Poa palustris	Fowl Bluegrass	S5					X	Medium		X			X	X			X
Sphenopholis intermedia	Slender Wedge Grass	S4S5					X			X			X	X			
Typhaceae	**Cattail Family**																
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X							X
Total							**139**	**73**	**24**	**171**	**16**	**32**	**95**	**64**	**10**	**6**	**66**

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Ministry of the Environment, Conservation, and Parks (MECP). 2024. Species at Risk in Ontario. Published: 2018-07-12. Updated: 2023-04-19. Available: https://www.ontario.ca/page/species-risk-ontario

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Plant Species Reported from NAT-02 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022	
Pteridophytes	**Ferns & Allies**										
Dennstaedtiaceae	**Bracken Fern Family**										
Pteridium aquilinum	Bracken Fern	S5								X	X
Dryopteridaceae	**Wood Fern Family**										
Matteuccia struthiopteris	Ostrich Fern	S5								X	X
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X
Equisetaceae	**Horsetail Family**										
Equisetum arvense	Field Horsetail	S5					X			X	X
Thelypteris palustris var. pubescens	Eastern Marsh Fern	S5					X	Medium		X	X
Gymnosperms	**Conifers**										
Cupressaceae	**Cypress Family**										
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X
Pinaceae	**Pine Family**										
Larix laricina	Tamarack	S5					X	Medium		X	X
Picea glauca	White Spruce	S5					X			X	X
Dicotyledons	**Dicots**										
Aceraceae	**Maple Family**										
Acer negundo	Manitoba Maple	S5					X			X	X
Apiaceae	**Carrot or Parsley Family**										
Cicuta maculata	Spotted Water-hemlock	S5					X	Medium		X	X
Asteraceae	**Composite or Aster Family**										
Bidens cernua	Nodding Beggarticks	S5					X	Low		X	X
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X	X
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	S5					X	Low	X	X	X
Solidago altissima var. altissima	Eastern Tall Goldenrod	S5					X			X	X
Solidago rugosa	Rough-stemmed Goldenrod	S5								X	X
Symphyotrichum lanceolatum ssp. lanceol	Panicled Aster	S5								X	X
Symphyotrichum puniceum	Swamp Aster	S5								X	X
Balsaminaceae	**Touch-me-not Family**										
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X
Betulaceae	**Birch Family**										
Betula papyrifera	Paper Birch	S5					X			X	X
Brassicaceae	**Mustard Family**										
Nasturtium officinale	Watercress	SE					I			X	X
Caprifoliaceae	**Honeysuckle Family**										
Sambucus canadensis	Common Elderberry	S5					X			X	X
Viburnum lentago	Nannyberry	S5					X			X	X
Viburnum opulus var. opulus	Cranberry Viburnum	SE4?					I			X	X
Clusiaceae	**St. John's-wort Family**										
Hypericum perforatum	Common St. John's-wort	SE5					I			X	X
Convolvulaceae	**Morning-glory Family**										
Calystegia sepium	Hedge False Bindweed	S5					X			X	X
Cornaceae	**Dogwood Family**										
Cornus sericea	Red-osier Dogwood	S5					X			X	X
Grossulariaceae	**Currant Family**										
Ribes americanum	Wild Black Currant	S5					X			X	X
Lamiaceae	**Mint Family**										
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X	X
Lythraceae	**Loosestrife Family**										
Lythrum salicaria	Purple Loosestrife	SE5					X			X	X
Oleaceae	**Olive Family**										
Fraxinus americana	White Ash	S4					X			X	X
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X	X
Onagraceae	**Evening-primrose Family**										
Epilobium leptophyllum	Linear-leaved Willowherb	S5					X	Medium		X	X
Polygonaceae	**Smartweed Family**										
Rumex britannica	Water Dock	S5					X	Medium		X	X
Rumex crispus	Curly Dock	SE5					I			X	X

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside
Ranunculaceae	**Buttercup Family**										
Anemonastrum canadense	Canada Anemone	S5					X			X	X
Clematis virginiana	Virginia Virgin's-bower	S5					X			X	X
Ranunculus acris	Tall Buttercup	SE5					I			X	X
Ranunculus sceleratus	Cursed Buttercup	S5								X	X
Rosaceae	**Rose Family**										
Spiraea alba	White Meadowsweet	S5					X	Low		X	X
Rubiaceae	**Madder Family**										
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X
Salicaceae	**Willow Family**										
Populus balsamifera	Balsam Poplar	S5					X			X	X
Populus tremuloides	Trembling Aspen	S5					X			X	X
Salix alba	White Willow	SE4					X			X	X
Salix amygdaloides	Peach-leaved Willow	S5					X	Medium		X	X
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X	X
Salix discolor	Pussy Willow	S5					X	Low	X	X	X
Salix eriocephala	Heart-leaved Willow	S5					X	Medium		X	X
Scrophulariaceae	**Figwort Family**										
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium	X	X	X
Solanaceae	**Nightshade Family**										
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X
Ulmaceae	**Elm Family**										
Ulmus americana	American Elm	S5					X			X	X
Valerianaceae	**Valerian Family**										
Valeriana officinalis	Common Valerian	SE3					I			X	X
Verbenaceae	**Vervain Family**										
Verbena hastata	Blue Vervain	S5					X			X	X
Monocotyledons	**Monocots**										
Cyperaceae	**Sedge Family**										
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X
Carex gracillima	Graceful Sedge	S5					X			X	X
Carex interior	Inland Sedge	S5					X	Medium	X	X	X
Carex projecta	Necklace Sedge	S5					X	Medium		X	X
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X	X
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X	X
Eleocharis palustris	Creeping Spikerush	S5					X	Medium		X	X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X
Juncaceae	**Rush Family**										
Juncus dudleyi	Dudley's Rush	S5					X			X	X
Juncus nodosus	Knotted Rush	S5					X	Medium		X	X
Poaceae	**Grass Family**										
Agrostis gigantea	Redtop	SE5					I			X	X
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X	X
Glyceria striata	Fowl Mannagrass	S5					X			X	X
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X
Phalaris arundinacea var. arundinacea	Reed Canary Grass	S5								X	X
Phragmites australis	Common Reed	SU								X	X
Poa palustris	Fowl Bluegrass	S5					X	Medium		X	X
Typhaceae	**Cattail Family**										
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X	X
Total							**62**	**31**	**11**	**71**	**71**

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Plant Species Reported from NAT-03 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWD7 (NAT03-1)	MAS3 (NAT03-1)	SWT3-2 (NAT03-1)	SWM4 (NAT03-1)	Roadside Survey (2022; wetland edges for SWM/SWT)	SWD4 (NAT03-5/NAT05-6)	MAS2 (NAT03-5)	OA (NAT03-5/NAT05-6)	SWT3 (NAT03-5/NAT05-6)	MAS3-1 (NAT03-5)	FOM4-2	Roadside Survey (2021)
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022												
Pteridophytes	**Ferns & Allies**																					
Dennstaedtiaceae	**Bracken Fern Family**																					
Pteridium aquilinum	Bracken Fern	S5								X				X								
Dryopteridaceae	**Wood Fern Family**																					
Athyrium filix-femina	Common Lady Fern	S5								X	X			X								
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X			X	X		X						
Dryopteris cristata	Crested Wood Fern	S5					X	Medium	X	X				X						X		
Gymnocarpium dryopteris	Common Oak Fern	S5					X			X				X								
Matteuccia struthiopteris	Ostrich Fern	S5								X	X			X								
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X	X		X								
Equisetaceae	**Horsetail Family**																					
Equisetum arvense	Field Horsetail	S5					X			X	X	X	X	X	X	X			X			X
Equisetum sylvaticum	Woodland Horsetail	S5					X	Medium		X				X								
Equisetum variegatum	Variegated Horsetail	S5								X							X				X	
Thelypteridaceae	**Beech Fern Family**																					
Thelypteris palustris	Marsh Fern	S5								X				X					X			
Gymnosperms	**Conifers**																					
Cupressaceae	**Cypress Family**																					
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X			X	X				X		X	X
Pinaceae	**Pine Family**																					
Abies balsamea	Balsam Fir	S5					X	Medium	X	X	X			X								
Larix laricina	Tamarack	S5					X	Medium		X					X				X		X	X
Picea glauca	White Spruce	S5					X			X	X			X	X						X	X
Pinus sylvestris	Scots Pine	SE5					I			X											X	
Dicotyledons	**Dicots**																					
Aceraceae	**Maple Family**																					
Acer rubrum	Red Maple	S5					X			X	X			X								
Acer spicatum	Mountain Maple	S5					X			X	X			X								
Apiaceae	**Carrot or Parsley Family**																					
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5					X	Medium		X		X	X						X	X		
Cicuta maculata	Spotted Water-hemlock	S5					X	Medium		X									X			
Hydrocotyle americana	American Water-pennywort	S4S5					X	Medium	X	X				X								
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X			X							X		
Araliaceae	**Ginseng Family**																					
Aralia nudicaulis	Wild Sarsaparilla	S5					X			X				X								
Asclepiadaceae	**Milkweed Family**																					
Asclepias incarnata	Swamp Milkweed	S5								X			X									
Asteraceae	**Composite or Aster Family**																					
Bidens sp.	Beggarticks sp.									X									X			
Bidens cernua	Nodding Beggarticks	S5					X	Low		X	X	X		X			X	X	X	X		
Bidens connata	Purple-stemmed Beggarticks	S4?								X		X	X									
Erigeron philadelphicus var. philadelphicus	Philadelphia Fleabane	S5					X			X					X							
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X	X	X							X	X		
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X						X						
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X	X	X	X		X	X		X	X		X
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	S5					X	Low	X	X					X							
Lactuca biennis	Tall Blue Lettuce	S5					X			X						X						
Solidago altissima	Tall Goldenrod	S5								X						X						
Solidago canadensis	Canada Goldenrod	S5					X			X									X			
Solidago gigantea	Giant Goldenrod	S5					X			X				X								
Solidago rugosa	Rough-stemmed Goldenrod	S5								X	X	X	X	X		X			X			
Symphyotrichum firmum	Glossy-leaved Aster	S4?								X	X			X					X	X		
Symphyotrichum lanceolatum	Panicled Aster	S5								X				X			X		X			X
Symphyotrichum lanceolatum ssp. lanceol	Panicled Aster	S5								X					X							
Symphyotrichum lateriflorum	Calico Aster	S5								X	X					X	X					
Symphyotrichum novae-angliae	New England Aster	S5					X			X	X				X							
Symphyotrichum ontarionis	Ontario Aster	S5								X					X							
Symphyotrichum puniceum	Swamp Aster	S5								X	X		X	X	X	X			X	X		X
Balsaminaceae	**Touch-me-not Family**																					
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X	X	X	X	X	X			X	X		X
Betulaceae	**Birch Family**																					
Alnus incana ssp. rugosa	Speckled Alder	S5					X	Medium	X	X			X	X								X
Betula papyrifera	Paper Birch	S5					X			X	X	X		X	X							
Boraginaceae	**Borage Family**																					

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		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022												
Myosotis laxa	Small Forget-me-not	S5					X	Medium		X				X						X		
Myosotis sylvatica	Woodland Forget-me-not	SE4								X				X								
Brassicaceae	**Mustard Family**																					
Alliaria petiolata	Garlic Mustard	SE5					I			X					X							
Barbarea vulgaris	Bitter Wintercress	SE5					I			X		X			X							
Nasturtium officinale	Watercress	SE					I			X				X	X				X			X
Caprifoliaceae	**Honeysuckle Family**																					
Lonicera canadensis	Canada Fly Honeysuckle	S5					X			X				X								
Sambucus canadensis	Common Elderberry	S5					X			X	X	X		X								X
Viburnum lentago	Nannyberry	S5					X			X	X	X	X	X								
Viburnum opulus	Cranberry Viburnum	S5					I			X	X	X	X									
Viburnum opulus var. americanum	Highbush Cranberry	S5					X	Medium		X	X											
Ceratophyllaceae	**Hornwort Family**																					
Ceratophyllum demersum	Common Hornwort	S5					X	Medium		X									X			
Cornaceae	**Dogwood Family**																					
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X	X			X	X							X
Cornus sericea	Red-osier Dogwood	S5					X			X	X	X	X	X	X	X			X		X	
Geraniaceae	**Geranium Family**																					
Geranium robertianum	Herb-Robert	S5					I			X	X			X								
Grossulariaceae	**Currant Family**																					
Ribes americanum	Wild Black Currant	S5					X			X	X			X								
Ribes cynosbati	Prickly Gooseberry	S5					X			X	X											
Ribes triste	Swamp Red Currant	S5					X	Medium		X				X			X			X		
Lamiaceae	**Mint Family**																					
Galeopsis tetrahit	Common Hemp-nettle	SE					I			X												X
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X			X	X		X			X	X		
Mentha canadensis	Canada Mint	S5					X			X		X		X					X			
Prunella vulgaris ssp. vulgaris	Common Self-heal	SE3					I			X					X							
Scutellaria galericulata	Hooded Skullcap	S5					X	Medium		X									X	X		
Scutellaria lateriflora	Mad Dog Skullcap	S5					X	Medium		X	X	X		X								
Lentibulariaceae	**Bladderwort Family**																					
Utricularia minor	Lesser Bladderwort	S5						High		X			X					X		X		
Lythraceae	**Loosestrife Family**																					
Lythrum salicaria	Purple Loosestrife	SE5					X			X	X		X	X			X	X	X	X		X
Oleaceae	**Olive Family**																					
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X	X		X	X								
Fraxinus pennsylvanica	Green Ash	S4					X			X	X											
Onagraceae	**Evening-primrose Family**																					
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5					X			X	X			X								
Epilobium coloratum	Purple-veined Willowherb	S5					X	Low		X		X							X	X		
Epilobium leptophyllum	Linear-leaved Willowherb	S5					X	Medium		X			X				X					
Epilobium parviflorum	Small-flowered Willowherb	SE4					I			X	X	X		X		X				X		
Polygonaceae	**Smartweed Family**																					
Persicaria maculosa	Spotted Lady's-thumb	SE5					I			X									X			
Rumex britannica	Water Dock	S5					X	Medium		X		X	X									
Primulaceae	**Primrose Family**																					
Lysimachia borealis	Northern Starflower	S5					X			X				X								
Lysimachia ciliata	Fringed Loosestrife	S5					X			X						X						
Pyrolaceae	**Wintergreen Family**																					
Pyrola elliptica	Shinleaf	S5					X			X				X								
Ranunculaceae	**Buttercup Family**																					
Anemonastrum canadense	Canada Anemone	S5					X			X						X			X			X
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X									X			
Clematis virginiana	Virginia Virgin's-bower	S5					X			X	X		X	X	X	X						X
Ranunculus acris	Tall Buttercup	SE5					I			X					X							
Ranunculus caricetorum	Northern Swamp Buttercup	S5					X	Medium		X				X								
Ranunculus repens	Creeping Buttercup	SE5					I			X				X								
Ranunculus sceleratus	Cursed Buttercup	S5								X	X		X	X								
Thalictrum dasycarpum	Purple Meadow-rue	S4?								X	X			X								X
Thalictrum pubescens	Tall Meadow-rue	S5					X			X	X											
Rhamnaceae	**Buckthorn Family**																					
Endotropis alnifolia	Alder-leaved Buckthorn	S5					X	Medium		X	X		X	X								
Rosaceae	**Rose Family**																					
Agrimonia gryposepala	Hooked Agrimony	S5					X			X	X					X						
Agrimonia striata	Woodland Agrimony	S4								X				X								
Fragaria virginiana	Wild Strawberry	S5								X	X			X								
Geum canadense	White Avens	S5					X			X	X			X								

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWD7 (NAT03-1)	MAS3 (NAT03-1)	SWT3-2 (NAT03-1)	SWM4 (NAT03-1)	Roadside Survey (2022; wetland edges for SWM/SWT)	SWD4 (NAT03-5/NAT05-6)	MAS2 (NAT03-5)	OA (NAT03-5/NAT05-6)	SWT3 (NAT03-5/NAT05-6)	MAS3-1 (NAT03-5)	FOM4-2	Roadside Survey (2021)
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022												
Potentilla anserina	Silverweed	S5					X			X							X					
Prunus serotina	Black Cherry	S5					X			X				X								
Prunus virginiana	Choke Cherry	S5					X			X			X	X								
Rubus idaeus	Common Red Raspberry	S5								X												X
Rubus idaeus ssp. strigosus	Wild Red Raspberry	S5					X			X				X	X							
Rubus occidentalis	Black Raspberry	S5					X			X						X						
Rubus pubescens	Dewberry	S5					X	Medium	X	X	X		X	X		X	X					
Spiraea alba	White Meadowsweet	S5					X	Low		X	X	X	X	X		X						
Rubiaceae	**Madder Family**																					
Galium sp.	Bedstraw sp.									X						X						
Galium asprellum	Rough Bedstraw	S5					X			X		X										
Galium palustre	Marsh Bedstraw	S5					X	Medium		X		X										
Galium tinctorium	Stiff Marsh Bedstraw	S5					X	Medium		X		X					X			X		
Galium trifidum	Three-petalled Bedstraw	S5								X			X									
Salicaceae	**Willow Family**																					
Populus balsamifera	Balsam Poplar	S5					X			X	X	X	X	X	X	X			X		X	X
Populus tremuloides	Trembling Aspen	S5					X			X	X	X	X									X
Salix sp.	Willow sp.									X									X		X	
Salix alba	White Willow	SE4					X			X					X	X						X
Salix amygdaloides	Peach-leaved Willow	S5					X	Medium		X			X								X	
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X		X	X									X
Salix discolor	Pussy Willow	S5					X	Low	X	X	X	X	X	X	X							
Salix eriocephala	Heart-leaved Willow	S5					X	Medium		X							X					
Salix euxina	Crack Willow	SE								X									X			
Salix lucida	Shining Willow	S5					X	Medium	X	X			X						X			
Salix petiolaris	Meadow Willow	S5					X	Low		X									X			
Salix purpurea	Purple Willow	SE4					I			X											X	
Saxifragaceae	**Saxifrage Family**																					
Tiarella stolonifera	Heart-leaved Foam-flower	S5					X			X				X								
Scrophulariaceae	**Figwort Family**																					
Mimulus ringens	Square-stemmed Monkeyflower	S5					X	Medium		X								X		X		
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium	X	X			X	X				X	X	X		
Veronica officinalis	Common Speedwell	SE5					I			X				X					X			
Solanaceae	**Nightshade Family**																					
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X	X			X	X						X
Ulmaceae	**Elm Family**																					
Ulmus americana	American Elm	S5					X			X	X	X	X									X
Urticaceae	**Nettle Family**																					
Pilea pumila	Dwarf Clearweed	S5					X	Medium		X				X								
Urtica dioica	Stinging Nettle	SE2								X												X
Verbenaceae	**Vervain Family**																					
Verbena hastata	Blue Vervain	S5					X			X									X	X		
Violaceae	**Violet Family**																					
Viola blanda	Sweet White Violet	S5					X	Medium		X				X					X	X		
Viola labradorica	Labrador Violet	S5					X	Medium		X	X			X			X		X	X		
Viola nephrophylla	Northern Bog Violet	S5					X			X		X	X									
Viola sororia	Woolly Blue Violet	S5								X		X		X								
Vitaceae	**Grape Family**																					
Parthenocissus quinquefolia	Virginia Creeper	S4?								X	X											
Vitis riparia	Riverbank Grape	S5					X			X	X											
Monocotyledons	**Monocots**																					
Alismataceae	**Water-plantain Family**																					
Alisma sp.	Water-plantain sp.									X									X			
Sagittaria latifolia	Broad-leaved Arrowhead	S5					X	Medium		X				X					X	X		
Araceae	**Arum Family**																					
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium	X	X	X					X				X		
Cyperaceae	**Sedge Family**																					
Carex aquatilis	Water Sedge	S5					X	Medium		X									X			
Carex aurea	Golden Sedge	S5					X	Medium		X					X						X	
Carex bebbii	Bebb's Sedge	S5					X			X		X							X	X		
Carex cristatella	Crested Sedge	S5					X			X	X											
Carex deweyana	Dewey's Sedge	S5					X			X	X											
Carex diandra	Lesser Panicled Sedge	S5					X	Medium		X			X									

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWD7 (NAT03-1)	MAS3 (NAT03-1)	SWT3-2 (NAT03-1)	SWM4 (NAT03-1)	Roadside Survey (2022; wetland edges for SWM/SWT)	SWD4 (NAT03-5/NAT05-6)	MAS2 (NAT03-5)	OA (NAT03-5/NAT05-6)	SWT3 (NAT03-5/NAT05-6)	MAS3-1 (NAT03-5)	FOM4-2	Roadside Survey (2021)
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022												
Carex eburnea	Bristle-leaved Sedge	S5					X			X				X								
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X				X		X	X				
Carex gracillima	Graceful Sedge	S5					X			X	X		X	X		X			X			
Carex granularis	Limestone Meadow Sedge	S5					X			X					X							
Carex hystericina	Porcupine Sedge	S5					X	Medium	X	X					X							
Carex interior	Inland Sedge	S5					X	Medium	X	X	X		X	X			X			X		
Carex intumescens	Bladder Sedge	S5					X	Medium		X	X		X	X			X					
Carex leptalea	Bristle-stalked Sedge	S5					X	High	X	X		X	X	X								
Carex pedunculata	Long-stalked Sedge	S5					X			X				X								
Carex projecta	Necklace Sedge	S5					X	Medium		X	X	X		X								
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X		X	X							X		
Carex retrorsa	Retrorse Sedge	S5					X			X		X										
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X		X									
Carex stricta	Tussock Sedge	S5					X	Medium	X	X									X			X
Carex tenera	Tender Sedge	S5					X			X						X						
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X			X				X		X	X	X	
Carex viridula	Greenish Sedge	S5								X											X	
Carex vulpinoidea	Fox Sedge	S5					X			X	X								X			
Eleocharis palustris	Creeping Spikerush	S5					X	Medium		X							X	X	X	X		
Schoenoplectus tabernaemontani	Soft-stemmed Bulrush	S5					X	Medium		X						X	X	X	X	X		
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X			X			X		X			X
Scirpus cyperinus	Cottongrass Bulrush	S5					X	Medium		X		X	X			X				X		
Scirpus pendulus	Rufous Bulrush	S5					X	Low		X							X		X			
Juncaceae	**Rush Family**																					
Juncus articulatus	Jointed Rush	S5					X	Medium		X	X						X	X		X		
Juncus dudleyi	Dudley's Rush	S5					X			X	X					X	X					
Juncus effusus	Soft Rush	S5						Medium		X		X							X	X		
Lemnaceae	**Duckweed Family**																					
Lemna minor	Lesser Duckweed	S5					X			X		X	X					X	X			
Liliaceae	**Lily Family**																					
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X	X											
Maianthemum stellatum	Star-flowered False Solomon's Seal	S5					X			X	X											
Najadaceae	**Naiad Family**																					
Najas flexilis	Slender Naiad	S4S5					X	Medium		X									X	X		
Orchidaceae	**Orchid Family**																					
Epipactis helleborine	Eastern Helleborine	SE5					I			X	X					X						

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	SWD7 (NAT03-1)	MAS3 (NAT03-1)	SWT3-2 (NAT03-1)	SWM4 (NAT03-1)	Roadside Survey (2022; wetland edges for SWM/SWT)	SWD4 (NAT03-5/NAT05-6)	MAS2 (NAT03-5)	OA (NAT03-5/NAT05-6)	SWT3 (NAT03-5/NAT05-6)	MAS3-1 (NAT03-5)	FOM4-2	Roadside Survey (2021)
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022												
Poaceae	**Grass Family**																					
Agrostis gigantea	Redtop	SE5					I			X		X	X			X	X		X			X
Agrostis stolonifera	Creeping Bentgrass	SE5					X			X		X		X					X	X		
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X	X				X				X	X		X
Dactylis glomerata	Orchard Grass	SE5					I			X					X							
Glyceria grandis	Tall Mannagrass	S5					X	Medium		X			X						X	X		
Glyceria maxima	Rough Mannagrass	SE4								X		X	X						X			
Glyceria melicaria	Slender Mannagrass	S4								X		X										
Glyceria striata	Fowl Mannagrass	S5					X			X	X	X	X							X		
Leersia oryzoides	Rice Cutgrass	S5					X	Low		X		X	X	X			X		X	X		X
Muhlenbergia mexicana	Mexican Muhly	S5								X		X		X		X						
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X		X	X					X			X
Phalaris arundinacea var. arundinacea	Reed Canary Grass	S5								X					X							
Phragmites australis ssp. australis	European Reed	SE5								X									X			
Poa palustris	Fowl Bluegrass	S5					X	Medium		X		X	X	X		X			X	X		
Potamogetonaceae	**Pondweed Family**																					
Potamogeton natans	Floating Pondweed	S5					X	Medium		X										X		
Potamogeton zosteriformis	Flatstem Pondweed	S5						Medium		X								X	X	X		
Sparganiaceae	**Burreed Family**																					
Sparganium emersum	Green-fruited Burreed	SU					X	Medium		X									X	X		
Typhaceae	**Cattail Family**																					
Typha angustifolia	Narrow-leaved Cattail	SE5					X			X					X		X					X
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X	X	X	X	X	X		X		X	X	X	X
Total							**156**	**76**	**22**	**196**	**72**	**49**	**54**	**85**	**34**	**34**	**27**	**11**	**64**	**45**	**14**	**33**

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Plant Species Reported from NAT-04 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey (2022; wetland edges for SWM)	FOD8-1 (NAT04-13)	SWT3-5 (NAT04-13; MAM3-2 comp.)	FOM6-2 (NAT04-13; SWT3-5 incl. and MAM3 incl.)	SWC3-1 (NAT04-13)	FOC4-1 (NAT04-13)	FOC4-1 (NAT04-2)	FOD8-1 (NAT04-2; SWT2-1 incl.)	FOD6-5 (NAT04-2)	SWM3-2 (NAT04-2)	SWM6-2 (NAT04-2)	SWT3-5 (NAT04-2)	CUW1 (NAT04-2)	FOD5-7 (NAT04-2)	CUM1 (NAT04-13)	Roadside Survey (2021)
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022																
Pteridophytes	**Ferns & Allies**																									
Dryopteridaceae	**Wood Fern Family**																									
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X		X		X						X	X					
Dryopteris clintoniana	Clinton's Wood Fern	S4					X	Medium	X	X											X					
Dryopteris cristata	Crested Wood Fern	S5					X	Medium	X	X											X					
Dryopteris intermedia	Evergreen Wood Fern	S5					X			X				X							X					
Gymnocarpium dryopteris	Common Oak Fern	S5					X			X				X						X	X					
Matteuccia struthiopteris	Ostrich Fern	S5								X				X						X	X	X				
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X		X		X	X					X	X	X				
Equisetaceae	**Horsetail Family**																									
Equisetum arvense	Field Horsetail	S5					X			X		X	X													X
Equisetum fluviatile	Water Horsetail	S5					X	Medium		X												X				
Equisetum hyemale	Common Scouring-rush	S5								X	X															
Equisetum variegatum	Variegated Horsetail	S5								X	X															
Thelypteridaceae	**Beech Fern Family**																									
Thelypteris palustris	Marsh Fern	S5								X												X				
Gymnosperms	**Conifers**																									
Cupressaceae	**Cypress Family**																									
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X				X	X	X	X	X			X					X
Pinaceae	**Pine Family**																									
Abies balsamea	Balsam Fir	S5					X	Medium	X	X				X	X				X	X	X	X				
Larix laricina	Tamarack	S5					X	Medium		X						X										
Picea abies	Norway Spruce	SE3					I			X											X					
Picea glauca	White Spruce	S5					X			X																X
Tsuga canadensis	Eastern Hemlock	S5					X			X				X												
Dicotyledons	**Dicots**																									
Aceraceae	**Maple Family**																									
Acer negundo	Manitoba Maple	S5					X			X													X			
Acer rubrum	Red Maple	S5					X			X				X							X	X				
Acer saccharum	Sugar Maple	S5					X			X						X			X					X		
Acer spicatum	Mountain Maple	S5					X			X										X	X					
Apiaceae	**Carrot or Parsley Family**																									
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5					X	Medium		X																X
Torilis japonica	Erect Hedge-parsley	SE4								X								X								
Apocynaceae	**Dogbane Family**																									
Apocynum androsaemifolium	Spreading Dogbane	S5					X			X								X								
Aquifoliaceae	**Holly Family**																									
Ilex verticillata	Common Winterberry	S5					X	Medium		X											X	X				
Aristolochiaceae	**Duchman's-pipe Family**																									
Asarum canadense	Canada Wild-ginger	S5					X			X								X	X							
Asclepiadaceae	**Milkweed Family**																									
Asclepias incarnata	Swamp Milkweed	S5								X	X															
Asteraceae	**Composite or Aster Family**																									
Erigeron annuus	Annual Fleabane	S5								X								X								
Erigeron philadelphicus	Philadelphia Fleabane	S5					X			X								X								
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X										X						
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X																X
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X								X		X	X	X				X
Eutrochium maculatum var. maculatum	Spotted Joe Pye Weed	S5					X	Low	X	X					X						X	X				
Lactuca biennis	Tall Blue Lettuce	S5					X			X											X	X				
Packera paupercula	Balsam Groundsel	S5								X	X															
Solidago altissima	Tall Goldenrod	S5								X												X				
Solidago altissima var. altissima	Eastern Tall Goldenrod	S5					X			X															X	
Solidago canadensis	Canada Goldenrod	S5					X			X												X				
Solidago rugosa	Rough-stemmed Goldenrod	S5								X								X		X	X	X				X
Solidago rugosa ssp. rugosa	Northern Rough-stemmed Goldenrod	S5					X			X												X				
Symphyotrichum lanceolatum	Panicled Aster	S5								X												X				X
Symphyotrichum lateriflorum var. lateriflor	Calico Aster	S5					X			X								X			X					
Symphyotrichum novae-angliae	New England Aster	S5					X			X								X								
Symphyotrichum puniceum	Swamp Aster	S5								X	X															X
Taraxacum officinale	Common Dandelion	SE5					I			X		X				X		X								
Tussilago farfara	Colt's-foot	SE5					I			X			X			X		X								X
Balsaminaceae	**Touch-me-not Family**																									
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X								X				X				
Berberidaceae	**Barberry Family**																									

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey (2022; wetland edges for SWM)	FOD8-1 (NAT04-13)	SWT3-5 (NAT04-13; MAM3-2 comp.)	FOM6-2 (NAT04-13; SWT3-5 incl. and MAM3 incl.)	SWC3-1 (NAT04-13)	FOC4-1 (NAT04-13)	FOC4-1 (NAT04-2)	FOD8-1 (NAT04-2; SWT2-1 incl.)	FOD6-5 (NAT04-2)	SWM3-2 (NAT04-2)	SWM6-2 (NAT04-2)	SWT3-5 (NAT04-2)	CUW1 (NAT04-2)	FOD5-7 (NAT04-2)	CUM1 (NAT04-13)	Roadside Survey (2021)
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X				X												
Betulaceae	**Birch Family**																									
Alnus incana	Grey Alder	S5					X			X	X							X		X	X					
Betula alleghaniensis	Yellow Birch	S5					X			X				X							X	X				
Betula papyrifera	Paper Birch	S5					X			X					X	X		X	X	X	X	X		X		
Ostrya virginiana	Eastern Hop-hornbeam	S5					X			X									X							
Brassicaceae	**Mustard Family**																									
Alliaria petiolata	Garlic Mustard	SE5					I			X				X				X			X	X				
Camelina sativa	Large-seeded False-flax	SE2								X						X										
Cardamine diphylla	Two-leaved Toothwort	S5					X			X				X												
Nasturtium officinale	Watercress	SE					I			X								X								
Caprifoliaceae	**Honeysuckle Family**																									
Sambucus canadensis	Common Elderberry	S5					X			X										X						
Viburnum lentago	Nannyberry	S5					X			X								X	X			X				
Viburnum opulus	Cranberry Viburnum	S5					I			X									X		X					
Cornaceae	**Dogwood Family**																									
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X		X				X	X		X			X		
Cornus obliqua	Pale Dogwood	S5					X	Medium		X			X													
Cornus sericea	Red-osier Dogwood	S5					X			X		X	X	X					X			X			X	X
Cucurbitaceae	**Gourd Family**																									
Echinocystis lobata	Wild Mock-cucumber	S5					X			X				X												
Fagaceae	**Beech Family**																									
Fagus grandifolia	American Beech	S4					X			X				X												
Geraniaceae	**Geranium Family**																									
Geranium robertianum	Herb-Robert	S5					I			X				X												
Grossulariaceae	**Currant Family**																									
Ribes americanum	Wild Black Currant	S5					X			X	X															
Ribes cynosbati	Prickly Gooseberry	S5					X			X			X	X				X								
Ribes oxyacanthoides	Canada Gooseberry	S5								X		X														
Ribes triste	Swamp Red Currant	S5					X	Medium		X															X	
Lamiaceae	**Mint Family**																									
Galeopsis tetrahit	Common Hemp-nettle	SE					I			X										X						
Lycopus americanus	American Water-horehound	S5					X	Medium		X	X															
Mentha canadensis	Canada Mint	S5					X			X											X	X				X
Prunella vulgaris	Self-heal	S5								X								X								X
Scutellaria galericulata	Hooded Skullcap	S5					X	Medium		X												X				
Scutellaria lateriflora	Mad Dog Skullcap	S5					X	Medium		X										X						
Linaceae	**Flax Family**																									
Linum catharticum	Fairy Flax	SE2								X								X								
Lythraceae	**Loosestrife Family**																									
Lythrum salicaria	Purple Loosestrife	SE5					X			X	X							X				X				X
Oleaceae	**Olive Family**																									
Fraxinus americana	White Ash	S4					X			X				X					X	X						
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X				X						X	X					
Onagraceae	**Evening-primrose Family**																									
Circaea alpina	Small Enchanter's Nightshade	S5					X	Medium		X										X	X					
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5					X			X								X								
Polygonaceae	**Smartweed Family**																									
Persicaria amphibia var. stipulacea	Flanged Smartweed	S5?								X	X															
Primulaceae	**Primrose Family**																									
Lysimachia borealis	Northern Starflower	S5					X			X											X					
Lysimachia ciliata	Fringed Loosestrife	S5					X			X								X								
Lysimachia thyrsiflora	Water Loosestrife	S5					X	Medium		X	X															
Ranunculaceae	**Buttercup Family**																									
Anemonastrum canadense	Canada Anemone	S5					X			X	X							X								X
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X	X											X				
Clematis virginiana	Virginia Virgin's-bower	S5					X			X					X			X	X	X	X	X				X
Ranunculus abortivus	Kidney-leaved Buttercup	S5					X			X					X							X				
Ranunculus acris	Tall Buttercup	SE5					I			X		X		X	X							X				
Ranunculus caricetorum	Northern Swamp Buttercup	S5					X	Medium		X										X		X				
Ranunculus recurvatus	Hooked Buttercup	S5								X				X							X					
Thalictrum pubescens	Tall Meadow-rue	S5					X			X								X								
Rhamnaceae	**Buckthorn Family**																									
Endotropis alnifolia	Alder-leaved Buckthorn	S5					X	Medium		X											X					
Rhamnus cathartica	Common Buckthorn	SE5					I			X											X			X	X	
Rosaceae	**Rose Family**																									
Agrimonia gryposepala	Hooked Agrimony	S5					X			X								X			X	X				
Crataegus sp.	Hawthorn sp.									X		X														
Fragaria virginiana	Wild Strawberry	S5								X				X												
Fragaria virginiana ssp. virginiana	Wild Strawberry	S5					X			X		X						X								

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey (2022; wetland edges for SWM)	FOD8-1 (NAT04-13)	SWT3-5 (NAT04-13; MAM3-2 comp.)	FOM6-2 (NAT04-13; SWT3-5 incl. and MAM3 incl.)	SWC3-1 (NAT04-13)	FOC4-1 (NAT04-13)	FOC4-1 (NAT04-2)	FOD8-1 (NAT04-2; SWT2-1 incl.)	FOD6-5 (NAT04-2)	SWM3-2 (NAT04-2)	SWM6-2 (NAT04-2)	SWT3-5 (NAT04-2)	CUW1 (NAT04-2)	FOD5-7 (NAT04-2)	CUM1 (NAT04-13)	Roadside Survey (2021)
Geum canadense	White Avens	S5					X			X											X					
Geum rivale	Purple Avens	S5					X	Medium	X	X	X															
Malus pumila	Common Apple	SE4					I			X		X				X										
Potentilla anserina	Silverweed	S5					X			X	X															
Prunus serotina	Black Cherry	S5					X			X		X		X		X		X		X			X	X		
Prunus virginiana	Choke Cherry	S5					X			X		X		X		X		X	X		X		X			
Rubus idaeus ssp. strigosus	Wild Red Raspberry	S5					X			X		X				X		X	X	X				X		
Rubus pubescens	Dewberry	S5					X	Medium	X	X				X				X		X	X					
Sorbus aucuparia	European Mountain-ash	SE4					I			X				X				X								
Spiraea alba	White Meadowsweet	S5					X	Low		X					X					X						
Rubiaceae	**Madder Family**																									
Galium asprellum	Rough Bedstraw	S5					X			X										X	X	X				
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X															
Galium tinctorium	Stiff Marsh Bedstraw	S5					X	Medium		X								X								
Salicaceae	**Willow Family**																									
Populus balsamifera	Balsam Poplar	S5					X			X		X	X	X				X	X		X			X		X
Populus tremuloides	Trembling Aspen	S5					X			X		X		X			X	X	X	X	X	X		X		
Salix alba	White Willow	SE4					X			X	X															X
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X	X															X
Salix eriocephala	Heart-leaved Willow	S5					X	Medium		X	X															
Salix lucida	Shining Willow	S5					X	Medium	X	X	X							X								
Salix petiolaris	Meadow Willow	S5					X	Low		X	X									X						
Saxifragaceae	**Saxifrage Family**																									
Chrysosplenium americanum	American Golden-saxifrage	S4					X	High	X	X												X				
Mitella nuda	Naked Mitrewort	S5						Medium	X	X											X	X				
Tiarella stolonifera	Heart-leaved Foam-flower	S5					X			X									X	X		X				
Scrophulariaceae	**Figwort Family**																									
Veronica americana	American Speedwell	S5					X	Medium		X			X													
Veronica officinalis	Common Speedwell	SE5					I			X				X												
Veronica scutellata	Marsh Speedwell	S5					X	Medium		X	X															
Tiliaceae	**Linden Family**																									
Tilia americana	American Basswood	S5					X			X								X								
Ulmaceae	**Elm Family**																									
Ulmus americana	American Elm	S5					X			X		X		X												X
Urticaceae	**Nettle Family**																									
Urtica gracilis	Slender Stinging Nettle	S5					X			X	X							X			X					
Valerianaceae	**Valerian Family**																									
Valeriana officinalis	Common Valerian	SE3					I			X		X									X					
Violaceae	**Violet Family**																									
Viola labradorica	Labrador Violet	S5					X	Medium		X				X				X	X		X					
Viola macloskeyi	Smooth White Violet	S5					X	Medium		X											X					
Viola pubescens	Yellow Violet	S5					X			X										X						
Viola sororia	Woolly Blue Violet	S5								X										X	X					
Monocotyledons	**Monocots**																									
Araceae	**Arum Family**																									
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium	X	X				X								X				
Cyperaceae	**Sedge Family**																									
Carex aurea	Golden Sedge	S5					X	Medium		X	X															
Carex bebbii	Bebb's Sedge	S5					X			X																X
Carex chordorrhiza	Creeping Sedge	S5						High		X				X								X				
Carex deweyana	Dewey's Sedge	S5					X			X				X												
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X							X								X
Carex gracillima	Graceful Sedge	S5					X			X								X								
Carex granularis	Limestone Meadow Sedge	S5					X			X	X							X								
Carex hystericina	Porcupine Sedge	S5					X	Medium	X	X								X								
Carex interior	Inland Sedge	S5					X	Medium	X	X								X		X						
Carex intumescens	Bladder Sedge	S5					X	Medium		X											X					
Carex lacustris	Lake Sedge	S5					X	Medium		X												X				
Carex pedunculata	Long-stalked Sedge	S5					X			X				X						X	X	X				
Carex projecta	Necklace Sedge	S5					X	Medium		X										X	X	X				
Carex retrorsa	Retrorse Sedge	S5					X			X											X	X				
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X										X	X				
Carex stricta	Tussock Sedge	S5					X	Medium	X	X	X															
Carex tuckermanii	Tuckerman's Sedge	S5					X	Medium		X										X		X				
Carex vulpinoidea	Fox Sedge	S5					X			X	X															
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X																X
Scirpus cyperinus	Cottongrass Bulrush	S5					X	Medium		X					X											
Iridaceae	**Iris Family**																									
Iris versicolor	Harlequin Blue Flag	S5					X	Medium		X	X															
Juncaceae	**Rush Family**																									

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey (2022; wetland edges for SWM)	FOD8-1 (NAT04-13)	SWT3-5 (NAT04-13; MAM3-2 comp.)	FOM6-2 (NAT04-13; SWT3-5 incl. and MAM3 incl.)	SWC3-1 (NAT04-13)	FOC4-1 (NAT04-13)	FOC4-1 (NAT04-2)	FOD8-1 (NAT04-2; SWT2-1 incl.)	FOD6-5 (NAT04-2)	SWM3-2 (NAT04-2)	SWM6-2 (NAT04-2)	SWT3-5 (NAT04-2)	CUW1 (NAT04-2)	FOD5-7 (NAT04-2)	CUM1 (NAT04-13)	Roadside Survey (2021)
Juncus articulatus	Jointed Rush	S5					X	Medium		X								X								
Juncus dudleyi	Dudley's Rush	S5					X			X	X															
Juncus pylaei	Pylae's Soft Rush	S4S5								X	X															
Liliaceae	**Lily Family**																									
Erythronium americanum	Yellow Trout-lily	S5								X		X	X	X		X			X					X		
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X									X		X	X				
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X				X					X							
Trillium erectum	Red Trillium	S5					X			X				X						X						
Trillium grandiflorum	White Trillium	S5					X			X									X							
Orchidaceae	**Orchid Family**																									
Epipactis helleborine	Eastern Helleborine	SE5					I			X								X			X					
Platanthera aquilonis	Tall Northern Green Orchid	S5								X								X								
Poaceae	**Grass Family**																									
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X	X											X				
Cinna latifolia	Drooping Woodreed	S5					X	Medium		X											X	X				
Elymus virginicus	Virginia Wildrye	S5								X											X					
Glyceria grandis	Tall Mannagrass	S5					X	Medium		X												X				
Glyceria striata	Fowl Mannagrass	S5					X			X										X		X				
Muhlenbergia mexicana	Mexican Muhly	S5								X											X	X				
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X															X
Phalaris arundinacea var. arundinacea	Reed Canary Grass	S5								X			X	X	X			X				X	X		X	
Phleum pratense	Common Timothy	SE5					I			X								X								
Poa compressa	Canada Bluegrass	SE5					I			X								X								
Poa palustris	Fowl Bluegrass	S5					X	Medium		X										X	X	X				X
Poa pratensis	Kentucky Bluegrass	S5								X												X				
Sphenopholis intermedia	Slender Wedge Grass	S4S5					X			X											X					
Typhaceae	**Cattail Family**																									
Typha angustifolia	Narrow-leaved Cattail	SE5					X			X															X	X
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X			X	X								X				
Total							**150**	**59**	**21**	**181**	**34**	**19**	**10**	**42**	**11**	**12**	**2**	**53**	**21**	**36**	**57**	**53**	**4**	**9**	**6**	**26**

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Plant Species Reported from NAT-14 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Surveys	FOD8-1	SWD4	FOC4-1	SWM6-2
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022					
Pteridophytes	**Ferns & Allies**														
Dryopteridaceae	**Wood Fern Family**														
Athyrium filix-femina	Common Lady Fern	S5								X				X	
Cystopteris bulbifera	Bulblet Fern	S5					X	Medium	X	X	X				
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X		X	X		X
Equisetaceae	**Horsetail Family**														
Equisetum arvense	Field Horsetail	S5					X			X	X	X			X
Equisetum scirpoides	Dwarf Scouring-rush	S5					X			X	X				
Thelypteridaceae	**Beech Fern Family**														
Thelypteris palustris	Marsh Fern	S5								X	X				
Gymnosperms	**Conifers**														
Cupressaceae	**Cypress Family**														
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X	X	X	X	X
Pinaceae	**Pine Family**														
Abies balsamea	Balsam Fir	S5					X	Medium	X	X	X				X
Larix laricina	Tamarack	S5					X	Medium		X	X				X
Picea glauca	White Spruce	S5					X			X	X				
Dicotyledons	**Dicots**														
Araliaceae	**Ginseng Family**														
Aralia nudicaulis	Wild Sarsaparilla	S5					X			X	X				
Asteraceae	**Composite or Aster Family**														
Erigeron philadelphicus	Philadelphia Fleabane	S5					X			X			X		
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X	X				X
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X		X	X		X
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X	X	X		X
Solidago sp.	Goldenrod sp.									X		X	X		
Solidago canadensis	Canada Goldenrod	S5					X			X		X	X		
Solidago rugosa	Rough-stemmed Goldenrod	S5								X	X	X	X		X
Symphyotrichum firmum	Glossy-leaved Aster	S4?								X					X
Symphyotrichum lanceolatum	Panicled Aster	S5								X	X		X		
Symphyotrichum lateriflorum	Calico Aster	S5								X		X	X		
Symphyotrichum puniceum	Swamp Aster	S5								X	X	X	X		X
Tussilago farfara	Colt's-foot	SE5					I			X	X				
Balsaminaceae	**Touch-me-not Family**														
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X		X		
Betulaceae	**Birch Family**														
Betula alleghaniensis	Yellow Birch	S5					X			X	X				
Betula papyrifera	Paper Birch	S5					X			X	X				X
Boraginaceae	**Borage Family**														
Myosotis laxa	Small Forget-me-not	S5					X	Medium		X	X		X		X
Myosotis scorpioides	True Forget-me-not	SE5								X					X
Brassicaceae	**Mustard Family**														
Nasturtium officinale	Watercress	SE					I			X	X				X
Caprifoliaceae	**Honeysuckle Family**														
Lonicera villosa	Mountain Fly Honeysuckle	S5								X	X				
Sambucus canadensis	Common Elderberry	S5					X			X	X				
Viburnum opulus var. opulus	Cranberry Viburnum	SE4?					I			X					X
Clusiaceae	**St. John's-wort Family**														
Hypericum punctatum	Spotted St. John's-wort	S5					X			X			X		X

Convolvulaceae	**Morning-glory Family**														
Calystegia sepium	Hedge False Bindweed	S5					X			X	X				
Cornaceae	**Dogwood Family**														
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X			
Cornus sericea	Red-osier Dogwood	S5					X			X	X	X	X		X
Geraniaceae	**Geranium Family**														
Geranium maculatum	Spotted Geranium	S5					X			X				X	
Grossulariaceae	**Currant Family**														
Ribes americanum	Wild Black Currant	S5					X			X		X			X
Lamiaceae	**Mint Family**														
Clinopodium vulgare	Field Basil	S5					X			X				X	
Lycopus americanus	American Water-horehound	S5					X	Medium		X			X		
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X			X		X
Mentha canadensis	Canada Mint	S5					X			X	X				
Mentha x piperita	*(Mentha aquatica X Mentha spicata)*	SNA					I			X	X				
Prunella vulgaris	Self-heal	S5								X		X		X	
Oleaceae	**Olive Family**														
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X					X
Fraxinus pennsylvanica	Green Ash	S4					X			X	X				
Onagraceae	**Evening-primrose Family**														
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5					X			X		X		X	
Epilobium coloratum	Purple-veined Willowherb	S5					X	Low		X					X
Epilobium parviflorum	Small-flowered Willowherb	SE4					I			X					X
Polygonaceae	**Smartweed Family**														
Rumex crispus	Curly Dock	SE5					I			X			X		
Primulaceae	**Primrose Family**														
Lysimachia ciliata	Fringed Loosestrife	S5					X			X		X			
Ranunculaceae	**Buttercup Family**														
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X			X		X
Ranunculus caricetorum	Northern Swamp Buttercup	S5					X	Medium		X	X				
Ranunculus sceleratus	Cursed Buttercup	S5								X					X
Rhamnaceae	**Buckthorn Family**														
Endotropis alnifolia	Alder-leaved Buckthorn	S5					X	Medium		X			X		
Rhamnus cathartica	Common Buckthorn	SE5					I			X				X	
Rosaceae	**Rose Family**														
Agrimonia gryposepala	Hooked Agrimony	S5					X			X		X		X	
Fragaria virginiana	Wild Strawberry	S5								X		X			
Geum canadense	White Avens	S5					X			X		X	X	X	
Prunus serotina	Black Cherry	S5					X			X				X	
Prunus virginiana	Choke Cherry	S5					X			X		X			
Rubus pubescens	Dewberry	S5					X	Medium	X	X			X		X
Rubiaceae	**Madder Family**														
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X				X
Salicaceae	**Willow Family**														
Populus balsamifera	Balsam Poplar	S5					X			X	X	X			X
Populus tremuloides	Trembling Aspen	S5					X			X	X	X	X	X	X
Salix sp.	Willow sp.									X		X			X
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X	X				
Salix discolor	Pussy Willow	S5					X	Low	X	X	X				
Salix euxina	Crack Willow	SE								X	X				
Salix lucida	Shining Willow	S5					X	Medium	X	X	X				X
Salix petiolaris	Meadow Willow	S5					X	Low		X					X
Scrophulariaceae	**Figwort Family**														
Penstemon digitalis	Foxglove Beardtongue	S4S5					X			X			X		
Veronica americana	American Speedwell	S5					X	Medium		X	X				
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium	X	X	X				X
Veronica serpyllifolia	Thyme-leaved Speedwell	SU					I			X				X	
Solanaceae	**Nightshade Family**														

Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X			X	
Ulmaceae	**Elm Family**														
Ulmus americana	American Elm	S5					X			X	X		X		
Violaceae	**Violet Family**														
Viola labradorica	Labrador Violet	S5					X	Medium		X			X		
Monocotyledons	**Monocots**														
Alismataceae	**Water-plantain Family**														
Alisma triviale	Northern Water-plantain	S5					X	Low		X					X
Cyperaceae	**Sedge Family**														
Carex sp.	Sedge sp.									X					X
Carex bebbii	Bebb's Sedge	S5					X			X			X		X
Carex disperma	Two-seeded Sedge	S5					X	High	X	X	X				
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X		X		X
Carex gracilescens	Slender Loose-flowered Sedge	S4								X	X				
Carex gracillima	Graceful Sedge	S5					X			X		X	X		
Carex interior	Inland Sedge	S5					X	Medium	X	X	X		X		
Carex leptalea	Bristle-stalked Sedge	S5					X	High	X	X	X				
Carex pedunculata	Long-stalked Sedge	S5					X			X	X				
Carex stricta	Tussock Sedge	S5					X	Medium	X	X	X				X
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X	X		X		X
Carex vulpinoidea	Fox Sedge	S5					X			X					X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X		X		X
Juncaceae	**Rush Family**														
Juncus dudleyi	Dudley's Rush	S5					X			X			X		
Juncus pylaei	Pylae's Soft Rush	S4S5								X			X		X
Liliaceae	**Lily Family**														
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X	X				
Orchidaceae	**Orchid Family**														
Cypripedium parviflorum	Yellow Lady's-slipper	S5								X	X				
Cypripedium parviflorum var. pubescens	Large Yellow Lady's-slipper	S5					X			X	X				
Cypripedium reginae	Showy Lady's-slipper	S4					X	Medium	X	X	X				
Epipactis helleborine	Eastern Helleborine	SE5					I			X	X	X		X	
Poaceae	**Grass Family**														
Dactylis glomerata	Orchard Grass	SE5					I			X				X	
Glyceria grandis	Tall Mannagrass	S5					X	Medium		X			X		X
Glyceria maxima	Rough Mannagrass	SE4								X	X		X		
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X	X			X
Poa palustris	Fowl Bluegrass	S5					X	Medium		X			X		X
Total							**83**	**35**	**19**	**104**	**55**	**26**	**37**	**15**	**45**

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Plant Species Reported from NAT-15 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Surveys	FOC4-1	SWC3-2	FOD5-10	MAM3-4	FOM4	FOC2-2
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022							
Pteridophytes	**Ferns & Allies**																
Dryopteridaceae	**Wood Fern Family**																
Athyrium filix-femina	Common Lady Fern	S5								X				X			
Cystopteris bulbifera	Bulblet Fern	S5					X	Medium	X	X						X	
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X							X
Dryopteris intermedia	Evergreen Wood Fern	S5					X			X						X	
Dryopteris marginalis	Marginal Wood Fern	S5					X			X				X			
Gymnocarpium dryopteris	Common Oak Fern	S5					X			X			X				
Matteuccia struthiopteris	Ostrich Fern	S5								X	X				X		
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X				X		
Equisetaceae	**Horsetail Family**																
Equisetum arvense	Field Horsetail	S5					X			X				X			
Equisetum fluviatile	Water Horsetail	S5					X	Medium		X		X					
Thelypteridaceae	**Beech Fern Family**																
Thelypteris palustris	Marsh Fern	S5								X	X		X				
Gymnosperms	**Conifers**																
Cupressaceae	**Cypress Family**																
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X	X	X		X	X	X
Pinaceae	**Pine Family**																
Abies balsamea	Balsam Fir	S5					X	Medium	X	X			X				X
Larix laricina	Tamarack	S5					X	Medium		X	X						
Picea abies	Norway Spruce	SE3					I			X		X					
Picea glauca	White Spruce	S5					X			X	X		X				
Pinus strobus	Eastern White Pine	S5					X			X		X					
Pinus sylvestris	Scots Pine	SE5					I			X		X					
Taxaceae	**Yew Family**																
Taxus canadensis	Canada Yew	S4					X			X				X			
Dicotyledons	**Dicots**																
Aceraceae	**Maple Family**																
Acer saccharum	Sugar Maple	S5					X			X				X		X	
Acer spicatum	Mountain Maple	S5					X			X			X				
Apiaceae	**Carrot or Parsley Family**																
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5					X	Medium		X		X	X				
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X		X					
Asteraceae	**Composite or Aster Family**																
Bidens sp.	Beggarticks sp.									X		X					
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X					X		
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X	X						
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X		X		X		
Rudbeckia laciniata	Cut-leaved Coneflower	S5								X	X						
Solidago caesia	Blue-stemmed Goldenrod	S5					X			X						X	
Solidago patula	Round-leaved Goldenrod	S4						High		X	X						
Symphyotrichum lanceolatum	Panicled Aster	S5								X	X						
Symphyotrichum puniceum	Swamp Aster	S5								X	X	X	X		X		
Balsaminaceae	**Touch-me-not Family**																
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X	X			X		
Berberidaceae	**Barberry Family**																
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X				X		X	
Betulaceae	**Birch Family**																
Betula alleghaniensis	Yellow Birch	S5					X			X		X	X			X	
Betula papyrifera	Paper Birch	S5					X			X				X			
Ostrya virginiana	Eastern Hop-hornbeam	S5					X			X				X			
Boraginaceae	**Borage Family**																
Myosotis laxa	Small Forget-me-not	S5					X	Medium		X	X						
Myosotis scorpioides	True Forget-me-not	SE5								X	X						

Brassicaceae	**Mustard Family**																
Cardamine diphylla	Two-leaved Toothwort	S5					X			X				X			
Nasturtium officinale	Watercress	SE					I			X	X	X			X		
Campanulaceae	**Bellflower Family**																
Lobelia siphilitica	Great Blue Lobelia	S5					X	Medium	X	X					X		
Palustricodon aparinoides var. aparinoides	Marsh Bellflower	S5					X	Medium		X					X		
Caprifoliaceae	**Honeysuckle Family**																
Sambucus racemosa	Red Elderberry	S5								X		X	X				
Cornaceae	**Dogwood Family**																
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X				X	
Cornus sericea	Red-osier Dogwood	S5					X			X	X						
Quercus macrocarpa	Bur Oak	S5								X		X					
Lamiaceae	**Mint Family**																
Mentha canadensis	Canada Mint	S5					X			X	X						
Lentibulariaceae	**Bladderwort Family**																
Utricularia cornuta	Horned Bladderwort	S5								X		X					
Lythraceae	**Loosestrife Family**																
Lythrum salicaria	Purple Loosestrife	SE5					X			X	X						
Oleaceae	**Olive Family**																
Fraxinus americana	White Ash	S4					X			X				X			
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X			X				
Fraxinus pennsylvanica	Green Ash	S4					X			X	X				X		
Onagraceae	**Evening-primrose Family**																
Ludwigia palustris	Marsh Seedbox	S5					X	Medium		X		X					
Oxalidaceae	**Wood Sorrel Family**																
Oxalis montana	Common Wood-sorrel	S5					X			X			X				
Polygonaceae	**Smartweed Family**																
Rumex britannica	Water Dock	S5					X	Medium		X	X						
Rumex obtusifolius	Bitter Dock	SE5					I			X			X				
Primulaceae	**Primrose Family**																
Lysimachia borealis	Northern Starflower	S5					X			X			X				
Ranunculaceae	**Buttercup Family**																
Actaea pachypoda	White Baneberry	S5					X			X						X	
Anemonastrum canadense	Canada Anemone	S5					X			X	X						
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X	X	X	X		X		
Ranunculus caricetorum	Northern Swamp Buttercup	S5					X	Medium		X	X		X				
Ranunculus repens	Creeping Buttercup	SE5					I			X	X						
Ranunculus sceleratus	Cursed Buttercup	S5								X	X						
Thalictrum dasycarpum	Purple Meadow-rue	S4?								X	X						
Rosaceae	**Rose Family**																
Geum rivale	Purple Avens	S5					X	Medium	X	X		X	X				
Prunus serotina	Black Cherry	S5					X			X		X		X		X	
Spiraea alba	White Meadowsweet	S5					X	Low		X	X						
Rubiaceae	**Madder Family**																
Galium sp.	Bedstraw sp.									X		X					
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X		X				
Salicaceae	**Willow Family**																
Populus balsamifera	Balsam Poplar	S5					X			X	X						
Populus tremuloides	Trembling Aspen	S5					X			X	X						
Salix bebbiana	Bebb's Willow	S5					X	Medium	X	X		X					
Salix discolor	Pussy Willow	S5					X	Low	X	X	X						
Saxifragaceae	**Saxifrage Family**																
Mitella diphylla	Two-leaved Mitrewort	S5					X			X		X					
Tiarella stolonifera	Heart-leaved Foam-flower	S5					X			X					X		
Scrophulariaceae	**Figwort Family**																
Chelone glabra	White Turtlehead	S5					X	Medium	X	X					X		
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium	X	X	X		X		X		
Veronica scutellata	Marsh Speedwell	S5					X	Medium		X	X						
Solanaceae	**Nightshade Family**																
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X						X
Thymelaeaceae	**Mezereum Family**																
Dirca palustris	Eastern Leatherwood	S4					X			X				X			
Tiliaceae	**Linden Family**																
Tilia americana	American Basswood	S5					X			X	X			X			

Ulmaceae	**Elm Family**																
Ulmus americana	American Elm	S5					X			X	X						
Urticaceae	**Nettle Family**																
Urtica dioica ssp. dioica	European Stinging Nettle	SE2								X					X		
Verbenaceae	**Vervain Family**																
Verbena hastata	Blue Vervain	S5					X			X	X	X			X		
Monocotyledons	**Monocots**																
Alismataceae	**Water-plantain Family**																
Alisma sp.	Water-plantain sp.									X					X		
Sagittaria latifolia	Broad-leaved Arrowhead	S5					X	Medium		X					X		
Araceae	**Arum Family**																
Calla palustris	Wild Calla	S5					X	High		X					X		
Cyperaceae	**Sedge Family**																
Carex sp.	Sedge sp.									X		X					
Carex aquatilis	Water Sedge	S5					X	Medium		X					X		
Carex brunnescens	Brownish Sedge	S5								X			X				
Carex deweyana	Dewey's Sedge	S5					X			X							X
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X						
Carex interior	Inland Sedge	S5					X	Medium	X	X	X						
Carex lacustris	Lake Sedge	S5					X	Medium		X	X						
Carex peckii	Peck's Sedge	S5					X			X				X			
Carex pedunculata	Long-stalked Sedge	S5					X			X				X		X	
Carex pellita	Woolly Sedge	S5						Medium		X	X						
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X						
Carex stricta	Tussock Sedge	S5					X	Medium	X	X	X	X					
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X	X						
Carex vulpinoidea	Fox Sedge	S5					X			X	X				X		
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X						
Scirpus cyperinus	Cottongrass Bulrush	S5					X	Medium		X					X		
Iridaceae	**Iris Family**																
Iris versicolor	Harlequin Blue Flag	S5					X	Medium		X		X					
Juncaceae	**Rush Family**																
Juncus effusus	Soft Rush	S5						Medium		X					X		
Lemnaceae	**Duckweed Family**																
Lemna minor	Lesser Duckweed	S5					X			X		X					
Liliaceae	**Lily Family**																
Erythronium americanum	Yellow Trout-lily	S5								X				X			
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X							X
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X				X		X	
Polygonatum pubescens	Hairy Solomon's Seal	S5					X			X							X
Trillium grandiflorum	White Trillium	S5					X			X						X	
Poaceae	**Grass Family**																
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X	X	X	X				
Glyceria striata	Fowl Mannagrass	S5					X			X			X		X		
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X	X			X		
Poa palustris	Fowl Bluegrass	S5					X	Medium		X	X						
Typhaceae	**Cattail Family**																
Typha angustifolia	Narrow-leaved Cattail	SE5					X			X			X				
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X	X	X			X		
Total							**95**	**44**	**17**	**118**	**51**	**31**	**24**	**17**	**27**	**13**	**7**

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Toronto and Region Conservation Authority (TRCA). 2017. Wetland Water Balance Risk Evaluation: Appendix 3. November 2017.

Plant Species Reported from NAT-16 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022	
Gymnosperms	**Conifers**										
Cupressaceae	**Cypress Family**										
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X
Dicotyledons	**Dicots**										
Aceraceae	**Maple Family**										
Acer negundo	Manitoba Maple	S5					X			X	X
Asteraceae	**Composite or Aster Family**										
Bidens cernua	Nodding Beggarticks	S5					X	Low		X	X
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X
Symphyotrichum lanceolatum	Panicled Aster	S5								X	X
Symphyotrichum puniceum	Swamp Aster	S5								X	X
Balsaminaceae	**Touch-me-not Family**										
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X
Boraginaceae	**Borage Family**										
Myosotis scorpioides	True Forget-me-not	SE5								X	X
Brassicaceae	**Mustard Family**										
Nasturtium officinale	Watercress	SE					I			X	X
Caprifoliaceae	**Honeysuckle Family**										
Sambucus canadensis	Common Elderberry	S5					X			X	X
Cornaceae	**Dogwood Family**										
Cornus sericea	Red-osier Dogwood	S5					X			X	X
Lamiaceae	**Mint Family**										
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X	X
Oleaceae	**Olive Family**										
Fraxinus pennsylvanica	Green Ash	S4					X			X	X
Onagraceae	**Evening-primrose Family**										
Chamaenerion angustifolium	Fireweed	S5								X	X
Epilobium coloratum	Purple-veined Willowherb	S5					X	Low		X	X
Primulaceae	**Primrose Family**										
Lysimachia thyrsiflora	Water Loosestrife	S5					X	Medium		X	X
Ranunculaceae	**Buttercup Family**										
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X	X
Rubiaceae	**Madder Family**										
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X
Salicaceae	**Willow Family**										
Populus tremuloides	Trembling Aspen	S5					X			X	X
Salix alba	White Willow	SE4					X			X	X
Salix euxina	Crack Willow	SE								X	X
Scrophulariaceae	**Figwort Family**										
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium	X	X	X
Veronica scutellata	Marsh Speedwell	S5					X	Medium		X	X
Solanaceae	**Nightshade Family**										
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X
Ulmaceae	**Elm Family**										
Ulmus americana	American Elm	S5					X			X	X
Monocotyledons	**Monocots**										
Alismataceae	**Water-plantain Family**										

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey
Sagittaria latifolia	Broad-leaved Arrowhead	S5					X	Medium		X	X
Cyperaceae	**Sedge Family**										
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X
Carex hystericina	Porcupine Sedge	S5					X	Medium	X	X	X
Carex interior	Inland Sedge	S5					X	Medium	X	X	X
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X	X
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X
Carex stricta	Tussock Sedge	S5					X	Medium	X	X	X
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X	X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X
Lemnaceae	**Duckweed Family**										
Lemna minor	Lesser Duckweed	S5					X			X	X
Poaceae	**Grass Family**										
Glyceria striata	Fowl Mannagrass	S5					X			X	X
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X
Phragmites australis	Common Reed	SU								X	X
Potamogetonaceae	**Pondweed Family**										
Potamogeton crispus	Curly-leaved Pondweed	SE5								X	X
Potamogeton foliosus ssp. foliosus	Leafy Pondweed	S5								X	X
Potamogeton natans	Floating Pondweed	S5					X	Medium		X	X
Typhaceae	**Cattail Family**										
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X	X
Total							**34**	**21**	**8**	**42**	**42**

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Plant Species Reported from NAT-18 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	Roadside Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022	
Gymnosperms	**Conifers**										
Cupressaceae	**Cypress Family**										
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X
Dicotyledons	**Dicots**										
Asteraceae	**Composite or Aster Family**										
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X	X
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X
Solidago rugosa	Rough-stemmed Goldenrod	S5								X	X
Symphyotrichum lanceolatum	Panicled Aster	S5								X	X
Symphyotrichum puniceum	Swamp Aster	S5								X	X
Balsaminaceae	**Touch-me-not Family**										
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X	X
Boraginaceae	**Borage Family**										
Myosotis laxa	Small Forget-me-not	S5					X	Medium		X	X
Myosotis scorpioides	True Forget-me-not	SE5								X	X
Brassicaceae	**Mustard Family**										
Nasturtium officinale	Watercress	SE					I			X	X
Cornaceae	**Dogwood Family**										
Cornus sericea	Red-osier Dogwood	S5					X			X	X
Lamiaceae	**Mint Family**										
Mentha canadensis	Canada Mint	S5					X			X	X
Mentha spicata	Spearmint	SE4								X	X
Mentha x piperita	*(Mentha aquatica X Mentha spicata)*	SNA					I			X	X
Lythraceae	**Loosestrife Family**										
Lythrum salicaria	Purple Loosestrife	SE5					X			X	X
Polygonaceae	**Smartweed Family**										
Rumex britannica	Water Dock	S5					X	Medium		X	X
Rumex crispus	Curly Dock	SE5					I			X	X
Ranunculaceae	**Buttercup Family**										
Anemonastrum canadense	Canada Anemone	S5					X			X	X
Caltha palustris	Yellow Marsh Marigold	S5					X	Medium	X	X	X
Ranunculus repens	Creeping Buttercup	SE5					I			X	X
Rosaceae	**Rose Family**										
Rubus idaeus	Common Red Raspberry	S5								X	X
Rubiaceae	**Madder Family**										
Galium palustre	Marsh Bedstraw	S5					X	Medium		X	X
Salicaceae	**Willow Family**										
Populus tremuloides	Trembling Aspen	S5					X			X	X
Salix alba	White Willow	SE4					X			X	X
Salix discolor	Pussy Willow	S5					X	Low	X	X	X
Solanaceae	**Nightshade Family**										

Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X
Ulmaceae	**Elm Family**										
Ulmus americana	American Elm	S5					X			X	X
Monocotyledons	**Monocots**										
Cyperaceae	**Sedge Family**										
Carex aurea	Golden Sedge	S5					X	Medium		X	X
Carex flava	Yellow Sedge	S5					X	Medium	X	X	X
Carex hystericina	Porcupine Sedge	S5					X	Medium	X	X	X
Carex pellita	Woolly Sedge	S5						Medium		X	X
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X	X
Carex stipata	Awl-fruited Sedge	S5					X	Low		X	X
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X	X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X
Iridaceae	**Iris Family**										
Iris pseudacorus	Yellow Iris	SE4					I			X	X
Juncaceae	**Rush Family**										
Juncus articulatus	Jointed Rush	S5					X	Medium		X	X
Lemnaceae	**Duckweed Family**										
Lemna minor	Lesser Duckweed	S5					X			X	X
Poaceae	**Grass Family**										
Glyceria grandis	Tall Mannagrass	S5					X	Medium		X	X
Glyceria striata	Fowl Mannagrass	S5					X			X	X
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X
Sparganiaceae	**Burreed Family**										
Sparganium eurycarpum	Broad-fruited Burreed	S5						Low		X	X
Typhaceae	**Cattail Family**										
Typha angustifolia	Narrow-leaved Cattail	SE5					X			X	X
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X	X
Total							**36**	**19**	**6**	**44**	**44**

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Plant Species Reported from NAT-19 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	FOC4-1	FOD5-9	SWD4	SWM4-1
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022				
Pteridophytes	**Ferns & Allies**													
Dennstaedtiaceae	**Bracken Fern Family**													
Pteridium aquilinum	Bracken Fern	S5								X		X		
Dryopteridaceae	**Wood Fern Family**													
Athyrium filix-femina	Common Lady Fern	S5								X	X			X
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X	X	X		
Dryopteris cristata	Crested Wood Fern	S5					X	Medium	X	X				X
Gymnocarpium dryopteris	Common Oak Fern	S5					X			X	X			X
Matteuccia struthiopteris	Ostrich Fern	S5								X	X			
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X			X
Equisetaceae	**Horsetail Family**													
Equisetum arvense	Field Horsetail	S5					X			X	X			
Osmundaceae	**Royal Fern Family**													
Osmundastrum cinnamomeum	Cinnamon Fern	S5					X	Medium		X				X
Thelypteridaceae	**Beech Fern Family**													
Thelypteris palustris	Marsh Fern	S5								X			X	X
Gymnosperms	**Conifers**													
Cupressaceae	**Cypress Family**													
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X			X
Pinaceae	**Pine Family**													
Abies balsamea	Balsam Fir	S5					X	Medium	X	X	X	X		
Picea glauca	White Spruce	S5					X			X				X
Taxaceae	**Yew Family**													
Taxus canadensis	Canada Yew	S4					X			X				X
Dicotyledons	**Dicots**													
Aceraceae	**Maple Family**													
Acer rubrum	Red Maple	S5					X			X	X	X		
Acer saccharum	Sugar Maple	S5					X			X	X	X		
Acer spicatum	Mountain Maple	S5					X			X				X
Apiaceae	**Carrot or Parsley Family**													
Cicuta bulbifera	Bulb-bearing Water-hemlock	S5					X	Medium		X				X
Cicuta maculata	Spotted Water-hemlock	S5					X	Medium		X			X	
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X				X
Araliaceae	**Ginseng Family**													
Aralia nudicaulis	Wild Sarsaparilla	S5					X			X		X		
Aristolochiaceae	**Duchman's-pipe Family**													
Asarum canadense	Canada Wild-ginger	S5					X			X		X		
Asclepiadaceae	**Milkweed Family**													
Asclepias syriaca	Common Milkweed	S5					X			X	X			
Asteraceae	**Composite or Aster Family**													
Bidens sp.	Beggarticks sp.									X			X	
Bidens connata	Purple-stemmed Beggarticks	S4?								X				X
Bidens frondosa	Devil's Beggarticks	S5					X	Low		X				X
Erigeron philadelphicus	Philadelphia Fleabane	S5					X			X		X		
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X			X	X
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X			X	
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X			X	
Solidago canadensis	Canada Goldenrod	S5					X			X	X			
Solidago rugosa	Rough-stemmed Goldenrod	S5								X			X	X

Symphyotrichum lanceolatum	Panicled Aster	S5								X			X	X
Symphyotrichum lateriflorum	Calico Aster	S5								X	X			
Symphyotrichum puniceum	Swamp Aster	S5								X				X
Betulaceae	**Birch Family**													
Betula alleghaniensis	Yellow Birch	S5					X			X		X		X
Betula papyrifera	Paper Birch	S5					X			X	X	X		
Corylus cornuta	Beaked Hazelnut	S5								X		X		
Campanulaceae	**Bellflower Family**													
Lobelia siphilitica	Great Blue Lobelia	S5					X	Medium	X	X			X	
Caprifoliaceae	**Honeysuckle Family**													
Diervilla lonicera	Northern Bush-honeysuckle	S5					X			X		X		
Viburnum lentago	Nannyberry	S5					X			X				X
Cornaceae	**Dogwood Family**													
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X	X	X		
Cornus sericea	Red-osier Dogwood	S5					X			X	X		X	X
Geraniaceae	**Geranium Family**													
Geranium robertianum	Herb-Robert	S5					I			X		X		
Grossulariaceae	**Currant Family**													
Ribes cynosbati	Prickly Gooseberry	S5					X			X		X		
Ribes lacustre	Bristly Black Currant	S5					X			X				X
Ribes rubrum	Northern Red Currant	SE5					I			X		X		
Ribes triste	Swamp Red Currant	S5					X	Medium		X				X
Lamiaceae	**Mint Family**													
Clinopodium vulgare	Field Basil	S5					X			X			X	
Lycopus uniflorus	Northern Water-horehound	S5					X	Medium		X				X
Mentha canadensis	Canada Mint	S5					X			X				X
Prunella vulgaris	Self-heal	S5								X	X			
Scutellaria lateriflora	Mad Dog Skullcap	S5					X	Medium		X				X
Lythraceae	**Loosestrife Family**													
Lythrum salicaria	Purple Loosestrife	SE5					X			X				X
Monotropaceae	**Indian Pipe Family**													
Monotropa uniflora	Indian-pipe	S5					X			X	X			
Oleaceae	**Olive Family**													
Fraxinus nigra	Black Ash	S4	END	T	NS	No schedule	X	Medium	X	X				X
Onagraceae	**Evening-primrose Family**													
Circaea alpina	Small Enchanter's Nightshade	S5					X	Medium		X				X
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5					X			X	X	X		
Epilobium coloratum	Purple-veined Willowherb	S5					X	Low		X			X	
Epilobium hirsutum	Hairy Willowherb	SE5					I			X				X
Epilobium leptophyllum	Linear-leaved Willowherb	S5					X	Medium		X				X
Primulaceae	**Primrose Family**													
Lysimachia borealis	Northern Starflower	S5					X			X				X
Pyrolaceae	**Wintergreen Family**													
Pyrola elliptica	Shinleaf	S5					X			X		X		
Ranunculaceae	**Buttercup Family**													
Actaea pachypoda	White Baneberry	S5					X			X		X		
Actaea rubra	Red Baneberry	S5					X			X		X		
Anemonastrum canadense	Canada Anemone	S5					X			X			X	
Ranunculus recurvatus	Hooked Buttercup	S5								X				X
Rhamnaceae	**Buckthorn Family**													
Rhamnus cathartica	Common Buckthorn	SE5					I			X	X			X
Rosaceae	**Rose Family**													
Agrimonia gryposepala	Hooked Agrimony	S5					X			X	X	X	X	
Fragaria virginiana	Wild Strawberry	S5								X	X			
Geum canadense	White Avens	S5					X			X		X		
Prunus serotina	Black Cherry	S5					X			X	X	X		
Prunus virginiana	Choke Cherry	S5					X			X	X	X		
Rubus canadensis	Smooth Blackberry	S5								X		X		
Rubus idaeus	Common Red Raspberry	S5								X		X		

Rubus pubescens	Dewberry	S5					X	Medium	X	X				X
Sorbus aucuparia	European Mountain-ash	SE4					I			X	X			
Rubiaceae	**Madder Family**													
Galium sp.	Bedstraw sp.									X				X
Galium palustre	Marsh Bedstraw	S5					X	Medium		X				X
Galium tinctorium	Stiff Marsh Bedstraw	S5					X	Medium		X				X
Galium triflorum	Three-flowered Bedstraw	S5					X			X		X		
Mitchella repens	Partridge-berry	S5					X			X		X		
Salicaceae	**Willow Family**													
Populus balsamifera	Balsam Poplar	S5					X			X	X	X	X	
Populus tremuloides	Trembling Aspen	S5					X			X	X		X	
Salix sp.	Willow sp.									X			X	X
Salix euxina	Crack Willow	SE								X			X	
Saxifragaceae	**Saxifrage Family**													
Mitella nuda	Naked Mitrewort	S5						Medium	X	X				X
Scrophulariaceae	**Figwort Family**													
Veronica officinalis	Common Speedwell	SE5					I			X	X			
Solanaceae	**Nightshade Family**													
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X			
Tiliaceae	**Linden Family**													
Tilia americana	American Basswood	S5					X			X		X		
Ulmaceae	**Elm Family**													
Ulmus americana	American Elm	S5					X			X	X	X		
Urticaceae	**Nettle Family**													
Boehmeria cylindrica	False Nettle	S5					X	Medium		X				X
Vitaceae	**Grape Family**													
Vitis riparia	Riverbank Grape	S5					X			X	X			
Monocotyledons	**Monocots**													
Araceae	**Arum Family**													
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium	X	X		X		
Cyperaceae	**Sedge Family**													
Carex sp.	Sedge sp.									X				X
Carex bebbii	Bebb's Sedge	S5					X			X				X
Carex deweyana	Dewey's Sedge	S5					X			X				X
Carex disperma	Two-seeded Sedge	S5					X	High	X	X				X
Carex gracillima	Graceful Sedge	S5					X			X	X	X		
Carex interior	Inland Sedge	S5					X	Medium	X	X				X
Carex intumescens	Bladder Sedge	S5					X	Medium		X				X
Carex pedunculata	Long-stalked Sedge	S5					X			X		X		
Carex projecta	Necklace Sedge	S5					X	Medium		X				X
Carex pseudocyperus	Cyperus-like Sedge	S5					X	Medium		X				X
Carex retrorsa	Retrorse Sedge	S5					X			X				X
Carex stipata	Awl-fruited Sedge	S5					X	Low		X				X
Carex utriculata	Northern Beaked Sedge	S5					X	Medium		X				X
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X			X	X
Scirpus cyperinus	Cottongrass Bulrush	S5					X	Medium		X				X
Juncaceae	**Rush Family**													
Juncus effusus	Soft Rush	S5						Medium		X				X
Liliaceae	**Lily Family**													
Erythronium americanum	Yellow Trout-lily	S5								X	X			
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X	X			
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X		X		
Trillium erectum	Red Trillium	S5					X			X		X		
Trillium grandiflorum	White Trillium	S5					X			X		X		
Orchidaceae	**Orchid Family**													
Epipactis helleborine	Eastern Helleborine	SE5					I			X	X	X		X
Poaceae	**Grass Family**													
Agrostis gigantea	Redtop	SE5					I			X			X	
Agrostis stolonifera	Creeping Bentgrass	SE5					X			X				X

Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X				X
Dactylis glomerata	Orchard Grass	SE5					I			X	X			
Glyceria striata	Fowl Mannagrass	S5					X			X				X
Leersia oryzoides	Rice Cutgrass	S5					X	Low		X				X
Phalaris arundinacea	Reed Canary Grass	S5					X			X			X	
Phleum pratense	Common Timothy	SE5					I			X			X	
Poa palustris	Fowl Bluegrass	S5					X	Medium		X				X
Poa trivialis	Rough Bluegrass	SE3								X				X
Typhaceae	**Cattail Family**													
Typha latifolia	Broad-leaved Cattail	S5					X	Low		X			X	X
Total							**102**	**38**	**12**	**127**	**36**	**38**	**23**	**63**

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Plant Species Reported from NAT-20 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	CUM1	FOD5-6 w FOC2 incl.	MAM2-2 w MAS2 incl.	CUP3-1
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022				
Pteridophytes	**Ferns & Allies**													
Dryopteridaceae	**Wood Fern Family**													
Athyrium filix-femina	Common Lady Fern	S5								X		X		
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X		X		
Matteuccia struthiopteris	Ostrich Fern	S5								X			X	
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X			X	
Equisetaceae	**Horsetail Family**													
Equisetum arvense	Field Horsetail	S5					X			X	X			
Gymnosperms	**Conifers**													
Cupressaceae	**Cypress Family**													
Thuja occidentalis	Eastern White Cedar	S5					X	Medium	X	X	X			
Pinaceae	**Pine Family**													
Pinus resinosa	Red Pine	S5					X			X				X
Dicotyledons	**Dicots**													
Aceraceae	**Maple Family**													
Acer saccharum	Sugar Maple	S5					X			X		X		X
Apiaceae	**Carrot or Parsley Family**													
Daucus carota	Wild Carrot	SE5					I			X	X			
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X			X	
Aristolochiaceae	**Duchman's-pipe Family**													
Asarum canadense	Canada Wild-ginger	S5					X			X		X		
Asclepiadaceae	**Milkweed Family**													
Asclepias incarnata	Swamp Milkweed	S5								X			X	
Asteraceae	**Composite or Aster Family**													
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X			X	
Solidago rugosa	Rough-stemmed Goldenrod	S5								X			X	
Symphyotrichum lanceolatum	Panicled Aster	S5								X			X	
Taraxacum officinale	Common Dandelion	SE5					I			X	X			
Balsaminaceae	**Touch-me-not Family**													
Impatiens capensis	Spotted Jewelweed	S5					X	Medium	X	X			X	
Berberidaceae	**Barberry Family**													
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X		X		
Betulaceae	**Birch Family**													
Betula alleghaniensis	Yellow Birch	S5					X			X			X	
Ostrya virginiana	Eastern Hop-hornbeam	S5					X			X		X		
Brassicaceae sp.	Mustard Family sp.									X				X
Cornaceae	**Dogwood Family**													
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X		X

Cornus sericea	Red-osier Dogwood	S5					X			X			X	
Cucurbitaceae	**Gourd Family**													
Echinocystis lobata	Wild Mock-cucumber	S5					X			X				X
Fabaceae	**Pea Family**													
Vicia cracca	Tufted Vetch	SE5					I			X	X			
Fagaceae	**Beech Family**													
Fagus grandifolia	American Beech	S4					X			X		X		
Ranunculaceae	**Buttercup Family**													
Actaea pachypoda	White Baneberry	S5					X			X		X		
Thalictrum dioicum	Early Meadow-rue	S5					X			X		X		
Rosaceae	**Rose Family**													
Crataegus sp.	Hawthorn sp.									X	X			
Fragaria virginiana	Wild Strawberry	S5								X	X			
Prunus serotina	Black Cherry	S5					X			X		X		X
Prunus virginiana	Choke Cherry	S5					X			X	X			
Rubus allegheniensis	Allegheny Blackberry	S5					X			X		X		
Rubus idaeus	Common Red Raspberry	S5								X	X			
Spiraea alba	White Meadowsweet	S5					X	Low		X			X	
Rubiaceae	**Madder Family**													
Galium sp.	Bedstraw sp.									X				X
Salicaceae	**Willow Family**													
Populus balsamifera	Balsam Poplar	S5					X			X			X	
Populus tremuloides	Trembling Aspen	S5					X			X	X			
Salix sp.	Willow sp.									X			X	
Saxifragaceae	**Saxifrage Family**													
Tiarella stolonifera	Heart-leaved Foam-flower	S5					X			X		X		
Ulmaceae	**Elm Family**													
Ulmus americana	American Elm	S5					X			X	X	X	X	
Violaceae	**Violet Family**													
Viola labradorica	Labrador Violet	S5					X	Medium		X		X		
Viola pubescens	Yellow Violet	S5					X			X		X		
Monocotyledons	**Monocots**													
Cyperaceae	**Sedge Family**													
Carex sp.	Sedge sp.									X		X		
Carex communis	Fibrous-root Sedge	S5					X			X		X		
Carex deweyana	Dewey's Sedge	S5					X			X		X		
Carex lacustris	Lake Sedge	S5					X	Medium		X			X	
Carex leptonervia	Finely-nerved Sedge	S5					X			X		X		
Carex pedunculata	Long-stalked Sedge	S5					X			X		X		
Carex pensylvanica	Pennsylvania Sedge	S5					X			X		X		
Carex sprengelii	Sprengel's Sedge	S5					X			X		X		
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X			X	
Liliaceae	**Lily Family**													
Erythronium americanum	Yellow Trout-lily	S5								X		X		
Maianthemum canadense	Wild Lily-of-the-valley	S5					X			X				X
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X		X		
Trillium erectum	Red Trillium	S5					X			X		X		
Trillium grandiflorum	White Trillium	S5					X			X		X		
Orchidaceae	**Orchid Family**													
Corallorhiza trifida	Early Coralroot	S5					X	Medium		X				X
Poaceae	**Grass Family**													
Bromus inermis	Smooth Brome	SE5					I			X	X			
Calamagrostis canadensis	Bluejoint Reedgrass	S5					X			X			X	
Dactylis glomerata	Orchard Grass	SE5					I			X				X
Glyceria striata	Fowl Mannagrass	S5					X			X			X	

Phalaris arundinacea	Reed Canary Grass	S5					X			X			X	
Total							**49**	**11**	**4**	**63**	**12**	**27**	**19**	**10**

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Toronto and Region Conservation Authority (TRCA). 2017. Wetland Water Balance Risk Evaluation: Appendix 3. November 2017.

Plant Species Reported from the Former Prince Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	CUP3-2	FOD5-1
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results from 2021 and 2022		
Pteridophytes	**Ferns & Allies**											
Dryopteridaceae	**Wood Fern Family**											
Athyrium filix-femina var. angustum	Northeastern Lady Fern	S5					X			X		X
Dryopteris carthusiana	Spinulose Wood Fern	S5					X	Medium		X	X	
Dryopteris intermedia	Evergreen Wood Fern	S5					X			X		X
Onoclea sensibilis	Sensitive Fern	S5						Medium	X	X	X	
Pinaceae	**Pine Family**											
Pinus strobus	Eastern White Pine	S5					X			X	X	
Dicotyledons	**Dicots**											
Aceraceae	**Maple Family**											
Acer saccharum	Sugar Maple	S5					X			X		X
Apocynaceae	**Dogbane Family**											
Apocynum androsaemifolium	Spreading Dogbane	S5					X			X	X	
Asteraceae	**Composite or Aster Family**											
Arctium lappa	Great Burdock	SE5								X	X	X
Erigeron philadelphicus	Philadelphia Fleabane	S5					X			X		X
Lapsana communis	Common Nipplewort	SE5					I			X		X
Solidago altissima	Tall Goldenrod	S5								X	X	
Solidago canadensis	Canada Goldenrod	S5					X			X	X	
Solidago rugosa	Rough-stemmed Goldenrod	S5								X	X	
Symphyotrichum novae-angliae	New England Aster	S5					X			X	X	
Taraxacum officinale	Common Dandelion	SE5					I			X		X
Tussilago farfara	Colt's-foot	SE5					I			X	X	X
Balsaminaceae	**Touch-me-not Family**											
Impatiens pallida	Pale Jewelweed	S4					X	Medium		X		X
Berberidaceae	**Barberry Family**											
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X		X
Boraginaceae	**Borage Family**											
Cynoglossum officinale	Common Hound's-tongue	SE5					I			X	X	
Brassicaceae	**Mustard Family**											
Cardamine concatenata	Cut-leaved Toothwort	S5					X			X		X
Cardamine diphylla	Two-leaved Toothwort	S5					X			X		X
Caprifoliaceae	**Honeysuckle Family**											
Lonicera tatarica	Tatarian Honeysuckle	SE5					I			X		X
Sambucus racemosa	Red Elderberry	S5								X	X	X
Viburnum opulus var. opulus	Cranberry Viburnum	SE4?					I			X		X
Caryophyllaceae	**Pink Family**											
Silene vulgaris	Bladder Campion	SE5					I			X	X	
Cornaceae	**Dogwood Family**											
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X	X	X

Euphorbiaceae	**Spurge Family**											
Euphorbia virgata	Russian Leafy Spurge	SE5?					I			X	X	
Fabaceae	**Pea Family**											
Vicia cracca	Tufted Vetch	SE5					I			X	X	
Fagaceae	**Beech Family**											
Fagus grandifolia	American Beech	S4					X			X		X
Quercus rubra	Northern Red Oak	S5					X			X	X	
Geraniaceae	**Geranium Family**											
Geranium robertianum	Herb-Robert	S5					I			X	X	X
Grossulariaceae	**Currant Family**											
Ribes cynosbati	Prickly Gooseberry	S5					X			X	X	X
Hydrophyllaceae	**Water-leaf Family**											
Hydrophyllum virginianum	Virginia Waterleaf	S5					X			X	X	X
Lamiaceae	**Mint Family**											
Clinopodium vulgare	Field Basil	S5					X			X	X	
Leonurus cardiaca	Common Motherwort	SE5								X	X	
Nepeta cataria	Catnip	SE5					I			X	X	
Oleaceae	**Olive Family**											
Fraxinus americana	White Ash	S4					X			X		X
Onagraceae	**Evening-primrose Family**											
Circaea canadensis	Broad-leaved Enchanter's Nightshade	S5					X			X	X	X
Oxalidaceae	**Wood Sorrel Family**											
Oxalis stricta	Upright Yellow Wood-sorrel	SE5								X		X
Polygonaceae	**Smartweed Family**											
Rumex obtusifolius	Bitter Dock	SE5					I			X		X
Ranunculaceae	**Buttercup Family**											
Ranunculus abortivus	Kidney-leaved Buttercup	S5					X			X		X
Ranunculus acris	Tall Buttercup	SE5					I			X	X	
Ranunculus recurvatus	Hooked Buttercup	S5								X	X	X
Rosaceae	**Rose Family**											
Agrimonia gryposepala	Hooked Agrimony	S5					X			X		X
Fragaria virginiana	Wild Strawberry	S5								X	X	X
Geum aleppicum	Yellow Avens	S5					X			X		X
Geum canadense	White Avens	S5					X			X		X
Potentilla recta	Sulphur Cinquefoil	SE5					I			X	X	
Prunus serotina	Black Cherry	S5					X			X	X	X
Prunus virginiana	Choke Cherry	S5					X			X	X	X
Rubus idaeus	Common Red Raspberry	S5								X	X	
Sorbus aucuparia	European Mountain-ash	SE4					I			X		X
Rubiaceae	**Madder Family**											
Galium mollugo	Smooth Bedstraw	SE5					I			X	X	
Salicaceae	**Willow Family**											
Populus balsamifera	Balsam Poplar	S5					X			X	X	
Populus tremuloides	Trembling Aspen	S5					X			X		X
Scrophulariaceae	**Figwort Family**											
Veronica officinalis	Common Speedwell	SE5					I			X	X	
Solanaceae	**Nightshade Family**											
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X	X
Ulmaceae	**Elm Family**											

Ulmus americana	American Elm	S5					X			X	X	X
Verbenaceae	**Vervain Family**											
Verbena urticifolia	White Vervain	S5					X			X	X	
Violaceae	**Violet Family**											
Viola pubescens	Yellow Violet	S5					X			X	X	X
Vitaceae	**Grape Family**											
Parthenocissus vitacea	Thicket Creeper	S5					X			X		X
Monocotyledons	**Monocots**											
Araceae	**Arum Family**											
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium	X	X		X
Cyperaceae	**Sedge Family**											
Carex cephaloidea	Thin-leaved Sedge	S4					X			X		X
Carex deweyana	Dewey's Sedge	S5					X			X		X
Carex laxiflora	Loose-flowered Sedge	S5					X			X		X
Carex rosea	Rosy Sedge	S5					X			X		X
Liliaceae	**Lily Family**											
Maianthemum racemosum	Large False Solomon's Seal	S5					X			X	X	X
Trillium erectum	Red Trillium	S5					X			X		X
Trillium grandiflorum	White Trillium	S5					X			X		X
Orchidaceae	**Orchid Family**											
Epipactis helleborine	Eastern Helleborine	SE5					I			X	X	
Poaceae	**Grass Family**											
Bromus inermis	Smooth Brome	SE5					I			X	X	
Dactylis glomerata	Orchard Grass	SE5					I			X		X
Phleum pratense	Common Timothy	SE5					I			X		X
Poa pratensis	Kentucky Bluegrass	S5								X	X	
Total							**102**	**4**	**2**	**74**	**42**	**48**

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Plant Species Reported from the Former Bonnefield Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater Indicator	NRSI Observed	MAS	CUP3-2	FOD5-1
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022			
Pteridophytes	**Ferns & Allies**												
Dryopteridaceae	**Wood Fern Family**												
Athyrium filix-femina	Common Lady Fern	S5								X		X	
Matteuccia struthiopteris	Ostrich Fern	S5								X	X		
Thelypteridaceae	**Beech Fern Family**												
Thelypteris palustris	Marsh Fern	S5								X	X		
Gymnosperms	**Conifers**												
Pinaceae	**Pine Family**												
Pinus strobus	Eastern White Pine	S5					X			X		X	
Dicotyledons	**Dicots**												
Aceraceae	**Maple Family**												
Acer saccharum	Sugar Maple	S5					X			X		X	X
Apiaceae	**Carrot or Parsley Family**												
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X	X		
Apocynaceae	**Dogbane Family**												
Apocynum cannabinum	Hemp Dogbane	S5					X			X	X		
Asclepiadaceae	**Milkweed Family**												
Asclepias incarnata	Swamp Milkweed	S5								X	X		
Asteraceae	**Composite or Aster Family**												
Bidens cernua	Nodding Beggarticks	S5					X	Low		X	X		
Bidens connata	Purple-stemmed Beggarticks	S4?								X	X		
Bidens frondosa	Devil's Beggarticks	S5					X	Low		X	X		
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X		
Symphyotrichum lanceolatum ssp. lanceol	Panicled Aster	S5								X	X		
Impatiens sp.	Jewelweed sp.									X	X		
Berberidaceae	**Barberry Family**												
Caulophyllum giganteum	Giant Blue Cohosh	S5					X			X			X
Betulaceae	**Birch Family**												
Ostrya virginiana	Eastern Hop-hornbeam	S5					X			X			X
Brassicaceae	**Mustard Family**												
Cardamine concatenata	Cut-leaved Toothwort	S5					X			X			X
Nasturtium microphyllum	Small-leaved Watercress	SE5					I			X	X		
Caprifoliaceae	**Honeysuckle Family**												
Sambucus racemosa	Red Elderberry	S5								X		X	
Cornaceae	**Dogwood Family**												
Cornus alternifolia	Alternate-leaved Dogwood	S5					X			X		X	
Fagaceae	**Beech Family**												
Fagus grandifolia	American Beech	S4					X			X			X
Grossulariaceae	**Currant Family**												
Ribes americanum	Wild Black Currant	S5					X			X			X
Hydrophyllaceae	**Water-leaf Family**												
Hydrophyllum virginianum	Virginia Waterleaf	S5					X			X			X
Juglandaceae	**Walnut Family**												
Juglans cinerea	Butternut	S2?	END	E	E	Schedule 1	X						
Lamiaceae	**Mint Family**												
Mentha canadensis	Canada Mint	S5					X			X	X		
Oleaceae	**Olive Family**												
Fraxinus americana	White Ash	S4					X			X			X

Ranunculaceae	**Buttercup Family**												
Ranunculus sceleratus	Cursed Buttercup	S5								X	X		
Rosaceae	**Rose Family**												
Prunus serotina	Black Cherry	S5					X			X		X	X
Prunus virginiana	Choke Cherry	S5					X			X		X	
Scrophulariaceae	**Figwort Family**												
Veronica anagallis-aquatica	Water Speedwell	SE					I	Medium		X	X		
Solanaceae	**Nightshade Family**												
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X		
Thymelaeaceae	**Mezereum Family**												
Dirca palustris	Eastern Leatherwood	S4					X			X			X
Tiliaceae	**Linden Family**												
Tilia americana	American Basswood	S5					X			X			X
Urticaceae	**Nettle Family**												
Pilea pumila	Dwarf Clearweed	S5					X	Medium		X	X		
Urtica dioica	Stinging Nettle	SE2								X	X		
Urtica gracilis	Slender Stinging Nettle	S5					X			X	X		
Violaceae	**Violet Family**												
Viola pubescens	Yellow Violet	S5					X			X		X	
Monocotyledons	**Monocots**												
Araceae	**Arum Family**												
Arisaema triphyllum	Jack-in-the-pulpit	S5					X	Medium		X			X
Cyperaceae	**Sedge Family**												
Carex schweinitzii	Schweinitz's Sedge	S3					X	High					
Scirpus atrovirens	Dark-green Bulrush	S5					X	Low		X	X		
Lemnaceae	**Duckweed Family**												
Lemna minor	Lesser Duckweed	S5					X			X	X		
Liliaceae	**Lily Family**												
Allium tricoccum var. tricoccum	Wild Leek	S4								X			X
Erythronium americanum	Yellow Trout-lily	S5								X		X	X
Trillium grandiflorum	White Trillium	S5					X			X			X
Poaceae	**Grass Family**												
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X		
Total							**33**	**8**	**0**	**43**	**22**	**9**	**15**

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Plant Species Reported from the Melancthon Pit #2 Site - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Dufferin County	Sensitivity to Hydrological Change	Groundwater indicator	NRSI Observed	MAM2-2	OA
		MNRF 2024	MECP 2024	Government of Canada 2023			Riley 1989	TRCA 2017		NRSI Results From 2021 & 2022		
Pteridophytes	**Ferns & Allies**											
Equisetaceae	**Horsetail Family**											
Equisetum arvense	Field Horsetail	S5					X			X	X	
Dicotyledons	**Dicots**											
Apiaceae	**Carrot or Parsley Family**											
Hydrocotyle americana	American Water-pennywort	S4S5					X	Medium	X			
Sium suave	Hemlock Water-parsnip	S5					X	Medium		X		X
Asteraceae	**Composite or Aster Family**											
Centaurea sp.	Knapweed sp.								Centaurea sp.		Centaurea sp.	Centaurea sp.
Eupatorium perfoliatum	Common Boneset	S5					X	Low	X	X	X	
Euthamia graminifolia	Grass-leaved Goldenrod	S5					X			X	X	
Eutrochium maculatum	Spotted Joe Pye Weed	S5					X			X	X	X
Solidago gigantea	Giant Goldenrod	S5					X			X		X
Symphyotrichum lanceolatum	Panicled Aster	S5								X	X	
Symphyotrichum lateriflorum	Calico Aster	S5								X		X
Cornaceae	**Dogwood Family**											
Cornus sericea	Red-osier Dogwood	S5					X			X	X	
Fabaceae	**Pea Family**											
Vicia cracca	Tufted Vetch	SE5					I			X	X	
Lamiaceae	**Mint Family**											
Mentha canadensis	Canada Mint	S5					X			X		X
Scutellaria lateriflora	Mad Dog Skullcap	S5					X	Medium		X		X
Primulaceae	**Primrose Family**											
Lysimachia ciliata	Fringed Loosestrife	S5					X			X	X	
Ranunculaceae	**Buttercup Family**											
Ranunculus repens	Creeping Buttercup	SE5					I			X		X
Salicaceae	**Willow Family**											
Salix sp.	Willow sp.									X	X	
Salix euxina	Crack Willow	SE								X	X	
Solanaceae	**Nightshade Family**											
Solanum dulcamara	Bittersweet Nightshade	SE5					I			X	X	
Verbenaceae	**Vervain Family**											
Verbena hastata	Blue Vervain	S5					X			X	X	
Violaceae	**Violet Family**											
Viola baxteri	Baxter's Violet	S1?							Viola baxteri		Viola baxteri	Viola baxteri
Monocotyledons	**Monocots**											
Cyperaceae	**Sedge Family**											
Carex retrorsa	Retrorse Sedge	S5					X			X		X
Poaceae	**Grass Family**											
Agrostis gigantea	Redtop	SE5					I			X	X	
Lolium sp.	Ryegrass sp.								Lolium sp.		Lolium sp.	Lolium sp.
Phalaris arundinacea	Reed Canary Grass	S5					X			X	X	X
Potamogetonaceae	**Pondweed Family**											
Potamogeton zosteriformis	Flatstem Pondweed	S5						Medium		X		X
Sparganiaceae	**Burreed Family**											
Sparganium emersum	Green-fruited Burreed	SU					X	Medium		X		X
Total							**19**	**6**	**2**	**23**	**18**	**15**

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Appendix VI
Bird Species Reported from the Study Area and Vicinity

Bird Species Reported from NAT-01 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	BMB-01A	BMB-01A	BMB-01B	BMB-01C	BMB-01D	BMB-01E	MBB-01F	BMB-01G	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**																	
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	OB									OB
Anas platyrhynchos	Mallard	S5					Low	CO	PO		PO							OB
Branta canadensis	Canada Goose	S5					Low	CO	OB									OB
Lophodytes cucullatus	Hooded Merganser	S5					High	CO										
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR										
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO										
Phasianidae	**Partridges, Grouse & Turkeys**																	
Bonasa umbellus	Ruffed Grouse	S5						PO										
Meleagris gallopavo	Wild Turkey	S5						CO										
Podicipediformes	**Grebes**																	
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO										
Columbidae	**Pigeons & Doves**																	
Columba livia	Rock Pigeon	SNA						PR										
Zenaida macroura	Mourning Dove	S5						PR	PR		PO		PR	PO	PO			OB
Cuculiformes	**Cuckoos & Anis**																	
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO										
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO										
Apodidae	**Swifts**																	
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR										
Trochilidae	**Hummingbirds**																	
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO										
Rallidae	**Rails, Gallinules & Coots**																	
Porzana carolina	Sora	S5B					Medium	PO										
Rallus limicola	Virginia Rail	S4S5B					Medium	PO										
Charadriidae	**Plovers & Lapwings**																	
Charadrius vociferus	Killdeer	S4B						PR	OB									OB
Scolopacidae	**Sandpipers & Allies**																	
Actitis macularia	Spotted Sandpiper	S5B						PO										
Bartramia longicauda	Upland Sandpiper	S2B						PR										
Scolopax minor	American Woodcock	S4B						PO	OB									OB
Ardeidae	**Herons & Bitterns**																	
Ardea herodias	Great Blue Heron	S4					Low	CO										
Botaurus lentiginosus	American Bittern	S5B					High	PO										
Butorides virescens	Green Heron	S4B					Low	PO										
Cathartidae	**Vultures**																	
Cathartes aura	Turkey Vulture	S5B,S3N						PR										
Accipitridae	**Hawks, Kites, Eagles & Allies**																	
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO										
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO										
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO										
Buteo platypterus	Broad-winged Hawk	S5B						PR										
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR	OB									OB
Strigidae	**Typical Owls**																	
Bubo virginianus	Great Horned Owl	S4						PO										
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO										
Strix varia	Barred Owl	S5						PO										
Alcedinidae	**Kingfishers**																	
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	OB									OB
Picidae	**Woodpeckers**																	
Colaptes auratus	Northern Flicker	S5						PO	PR							PR	PO	OB
Dryobates pubescens	Downy Woodpecker	S5						PO	OB									OB
Dryobates villosus	Hairy Woodpecker	S5						PO	OB									OB
Dryocopus pileatus	Pileated Woodpecker	S5						PO	OB									OB
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO										
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO										
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR										
Falconidae	**Caracaras & Falcons**																	

Falco sparverius	American Kestrel	S4						PR										
Tyrannidae	**Tyrant Flycatchers**																	
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PR			PR	PO				PR	PO
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PO						PO			
Empidonax minimus	Least Flycatcher	S5B						PO										
Empidonax traillii	Willow Flycatcher	S4B						PO	PO							PO		
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PR	PO	PO	PO					PR	OB
Sayornis phoebe	Eastern Phoebe	S5B						CO	OB									OB
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR							PR		OB
Vireonidae	**Vireos**																	
Vireo flavifrons	Yellow-throated Vireo	S4B						PO										
Vireo gilvus	Warbling Vireo	S5B						PR										
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR	PR	PO	PR	PO	PR	PO		PR	OB
Vireo solitarius	Blue-headed Vireo	S5B						PO										
Corvidae	**Crows & Jays**																	
Corvus brachyrhynchos	American Crow	S5						CO	PR		PR	PO	PR	PO	PO	PR		OB
Corvus corax	Common Raven	S5							PO	PO								
Cyanocitta cristata	Blue Jay	S5						PR	PR	PO	PO		PR			PO	PO	OB
Alaudidae	**Larks**																	
Eremophila alpestris	Horned Lark	S4						CO										
Hirundinidae	**Swallows**																	
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	PO							PO		
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO										
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO	PO							PO		
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO										
Tachycineta bicolor	Tree Swallow	S4S5B						CO										
Paridae	**Chickadees & Titmice**																	
Poecile atricapillus	Black-capped Chickadee	S5						CO	PO		PO	PO	PO	PO			PO	PO
Sittidae	**Nuthatches**																	
Sitta canadensis	Red-breasted Nuthatch	S5						CO	OB									OB
Sitta carolinensis	White-breasted Nuthatch	S5						CO	PO			PO				PO		OB
Troglodytidae	**Wrens**																	
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO										
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO										
Troglodytes aedon	House Wren	S5B						PR	PR			PR	PO	PO	PO	PO		
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO		PO		PO					
Regulidae	**Kinglets**																	
Regulus satrapa	Golden-crowned Kinglet	S5						PO										
Turdidae	**Thrushes**																	
Catharus fuscescens	Veery	S5B						PR	PR	PO	PO	PR	PO	PO	PO			
Catharus guttatus	Hermit Thrush	S5B,S4N						PO										
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR	PO			PO	PO				PO	PO
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO										
Turdus migratorius	American Robin	S5						CO	CO	PO	PR		PO	PR	PO	CO	PO	OB
Mimidae	**Mockingbirds, Thrashers & Allies**																	
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PR							PR		
Toxostoma rufum	Brown Thrasher	S4B						PO										
Sturnidae	**Starlings**																	
Sturnus vulgaris	European Starling	SNA						CO	PR					PR	PR			
Bombycillidae	**Waxwings**																	
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PO	PO								
Passeridae	**Old World Sparrows**																	
Passer domesticus	House Sparrow	SNA						CO	OB									OB
Fringillidae	**Finches & Allies**																	
Haemorhous mexicanus	House Finch	SNA						PO										
Haemorhous purpureus	Purple Finch	S5						PO	PO	PO								
Spinus tristis	American Goldfinch	S5						PR	PR					PO	PR	PO	PO	OB
Emberizidae	**New World Sparrows & Allies**																	
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO	PO							PO		
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO	PO	PO							OB
Melospiza melodia	Song Sparrow	S5						CO	PR				PO	PO	PR	PO	PO	
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PR					PO		PR		
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO										
Pooecetes gramineus	Vesper Sparrow	S4B						PO										
Spizella pallida	Clay-colored Sparrow	S4B						PR										
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PR	PO			PO	PO	PR	PO		
Spizella pusilla	Field Sparrow	S4B,S3N						PR	OB									OB
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PR	PR	PR	PR	PO					

Icteridae	**Troupials & Allies**																	
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PR				PO	PO	PR	PO		
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR	PO				PO			PO		OB
Icterus galbula	Baltimore Oriole	S4B						PR	PO							PO		OB
Molothrus ater	Brown-headed Cowbird	S5						PO	PO					PO				
Quiscalus quiscula	Common Grackle	S5						CO	PR				PO	PR	PO			OB
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PO							PO		
Parulidae	**Wood Warblers**																	
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR	PO		PO							
Geothlypis philadelphia	Mourning Warbler	S5B						PR										
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PR	PR	PR	PR		PO	PO		OB
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO										
Mniotilta varia	Black-and-white Warbler	S5B						CO	PO								PO	
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR										
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PR		PO		PR					OB
Seiurus aurocapilla	Ovenbird	S5B						PR	PR			PO					PR	
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO										
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO										
Setophaga fusca	Blackburnian Warbler	S5B						PR										
Setophaga magnolia	Magnolia Warbler	S5B						PO										
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO	PO			PO						OB
Setophaga petechia	Yellow Warbler	S5B						PR	PR		PO		PO		PR	PR		OB
Setophaga pinus	Pine Warbler	S5B,S3N						PR										
Setophaga ruticilla	American Redstart	S5B						PR	PR	PO					PR			OB
Setophaga virens	Black-throated Green Warbler	S5B						PR	PO	PR		PO						
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO										
Cardinalidae	**Cardinals, Grosbeaks & Allies**																	
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO					PO				OB
Passerina cyanea	Indigo Bunting	S5B						PR	PO	PO	PO	PO		PO	PO	PO	PO	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	OB									OB
Piranga olivacea	Scarlet Tanager	S5B						PO										
Spiza americana	Dickcissel	S2M						PR										
Total							**16**	**121**	**63**	**15**	**17**	**15**	**20**	**17**	**17**	**23**	**13**	**38**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-02 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	BMB-02A	BMB-02A	BMB-02B	BMB-02B	MBB-02C	MBB-02C	MBB-02D	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**																
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	OB					OB			
Anas platyrhynchos	Mallard	S5					Low	CO	PO		OB				OB	PO	
Branta canadensis	Canada Goose	S5					Low	CO	OB	OB							
Lophodytes cucullatus	Hooded Merganser	S5					High	CO									
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR									
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO									
Phasianidae	**Partridges, Grouse & Turkeys**																
Bonasa umbellus	Ruffed Grouse	S5						PO									
Meleagris gallopavo	Wild Turkey	S5						CO									
Podicipediformes	**Grebes**																
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO									
Columbidae	**Pigeons & Doves**																
Columba livia	Rock Pigeon	SNA						PR	OB						OB		
Zenaida macroura	Mourning Dove	S5						PR	PO	PO	PO	PO	PO	PO	PO		PO
Cuculiformes	**Cuckoos & Anis**																
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO									
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO	PO			PO					
Apodidae	**Swifts**																
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR									
Trochilidae	**Hummingbirds**																
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO									
Rallidae	**Rails, Gallinules & Coots**																
Porzana carolina	Sora	S5B					Medium	PO									
Rallus limicola	Virginia Rail	S4S5B					Medium	PO									
Charadriidae	**Plovers & Lapwings**																
Charadrius vociferus	Killdeer	S4B						PR	PO		PO						
Scolopacidae	**Sandpipers & Allies**																
Actitis macularia	Spotted Sandpiper	S5B						PO									
Bartramia longicauda	Upland Sandpiper	S2B						PR									
Scolopax minor	American Woodcock	S4B						PO	OB								OB
Laridae	**Gulls, Terns & Skimmers**																
Larus delawarensis	Ring-billed Gull	S5							OB				OB				
Ardeidae	**Herons & Bitterns**																
Ardea herodias	Great Blue Heron	S4					Low	CO									
Botaurus lentiginosus	American Bittern	S5B					High	PO									
Butorides virescens	Green Heron	S4B					Low	PO	PR	OB					PR		OB
Cathartidae	**Vultures**																
Cathartes aura	Turkey Vulture	S5B,S3N						PR	PO					PO			OB
Accipitridae	**Hawks, Kites, Eagles & Allies**																
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO									
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO									
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO									
Buteo platypterus	Broad-winged Hawk	S5B						PR									
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR									
Strigidae	**Typical Owls**																
Bubo virginianus	Great Horned Owl	S4						PO									
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO									
Strix varia	Barred Owl	S5						PO									
Alcedinidae	**Kingfishers**																
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO									
Picidae	**Woodpeckers**																
Colaptes auratus	Northern Flicker	S5						PO	PR				PR				
Dryobates pubescens	Downy Woodpecker	S5						PO	PO					PO			
Dryobates villosus	Hairy Woodpecker	S5						PO	OB								OB
Dryocopus pileatus	Pileated Woodpecker	S5						PO									

Melanerpes carolinus	Red-bellied Woodpecker	S5						PO									
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO									
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR									
Falconidae	**Caracaras & Falcons**																
Falco sparverius	American Kestrel	S4						PR									
Tyrannidae	**Tyrant Flycatchers**																
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO									
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PR			PO	PO	PR	PO	PO	
Empidonax minimus	Least Flycatcher	S5B						PO									
Empidonax traillii	Willow Flycatcher	S4B						PO	PO							PO	
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PO								PO
Sayornis phoebe	Eastern Phoebe	S5B						CO									
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PO		PO		PO	PO			PO
Vireonidae	**Vireos**																
Vireo flavifrons	Yellow-throated Vireo	S4B						PO									
Vireo gilvus	Warbling Vireo	S5B						PR	PO	PO	PO						OB
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PO				PO	PO	PO		
Vireo solitarius	Blue-headed Vireo	S5B						PO									
Corvidae	**Crows & Jays**																
Corvus brachyrhynchos	American Crow	S5						CO	PR	PO		PO		PR	PR	PO	PO
Cyanocitta cristata	Blue Jay	S5						PR	CO	PO	PR	PO	PO	PO	PO	CO	
Alaudidae	**Larks**																
Eremophila alpestris	Horned Lark	S4						CO									
Hirundinidae	**Swallows**																
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO									
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO									
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO									
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO									
Tachycineta bicolor	Tree Swallow	S4S5B						CO	OB								OB
Paridae	**Chickadees & Titmice**																
Poecile atricapillus	Black-capped Chickadee	S5						CO	PO		PO	PO	PO	PO	PO	PO	
Sittidae	**Nuthatches**																
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PO								PO
Sitta carolinensis	White-breasted Nuthatch	S5						CO									
Certhiidae	**Creepers**																
Troglodytidae	**Wrens**																
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO									
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO									
Troglodytes aedon	House Wren	S5B						PR	PR	PO	PO	PO	PR	PO	PR		
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO			PO					
Regulidae	**Kinglets**																
Regulus satrapa	Golden-crowned Kinglet	S5						PO									
Turdidae	**Thrushes**																
Catharus fuscescens	Veery	S5B						PR									
Catharus guttatus	Hermit Thrush	S5B,S4N						PO									
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR									
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO									
Turdus migratorius	American Robin	S5						CO	PR	PR	PO	PO	PR	PO	PR	PR	
Mimidae	**Mockingbirds, Thrashers & Allies**																
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PO			PO	PO	PO			
Toxostoma rufum	Brown Thrasher	S4B						PO									
Sturnidae	**Starlings**																
Sturnus vulgaris	European Starling	SNA						CO	CO	OB	PO		PR		CO		
Bombycillidae	**Waxwings**																
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PR				OB	PO	PR	PO	
Passeridae	**Old World Sparrows**																
Passer domesticus	House Sparrow	SNA						CO									
Fringillidae	**Finches & Allies**																
Haemorhous mexicanus	House Finch	SNA						PO	PR	PR							
Haemorhous purpureus	Purple Finch	S5						PO									
Spinus tristis	American Goldfinch	S5						PR	PR	PO	PR	PR	PR	PR	PO	PR	
Emberizidae	**New World Sparrows & Allies**																
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO									
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PR		PO	PR	PO	PO	PO	PR	PR
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PO	PR	PR	PR	PR	PR	PR
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR									

Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO									
Pooecetes gramineus	Vesper Sparrow	S4B						PO									
Spizella pallida	Clay-colored Sparrow	S4B						PR									
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO		PO		PO	PO			
Spizella pusilla	Field Sparrow	S4B,S3N						PR									
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PO					PO		PO	PO
Icteridae	**Troupials & Allies**																
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PR	PR	PR	PR	PR	PR	PR	PR	
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR	OB		OB						
Icterus galbula	Baltimore Oriole	S4B						PR	PR	PO					PR		
Molothrus ater	Brown-headed Cowbird	S5						PO	PR	PR		PO	PR	PR	OB	PR	
Quiscalus quiscula	Common Grackle	S5						CO	CO	CO	PO	PR	CO	PO	OB		
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PR	PR	PR						
Parulidae	**Wood Warblers**																
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR									
Geothlypis philadelphia	Mourning Warbler	S5B						PR	PR					PR		PR	
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PR	PO	PR	PR	PO	PO	PR	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO									
Mniotilta varia	Black-and-white Warbler	S5B						CO	PO	PO							
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR									
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PO		PO	PO					
Seiurus aurocapilla	Ovenbird	S5B						PR									
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO									
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO									
Setophaga fusca	Blackburnian Warbler	S5B						PR									
Setophaga magnolia	Magnolia Warbler	S5B						PO									
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO									
Setophaga petechia	Yellow Warbler	S5B						PR	PR	PO		PO	PR	PR	PO	PR	
Setophaga pinus	Pine Warbler	S5B,S3N						PR									
Setophaga ruticilla	American Redstart	S5B						PR	PR				PO	PO		PR	
Setophaga virens	Black-throated Green Warbler	S5B						PR									
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO									
Cardinalidae	**Cardinals, Grosbeaks & Allies**																
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO		PO			PO		PO	
Passerina cyanea	Indigo Bunting	S5B						PR	PR					PR		PR	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PR	PO				PO		PR	
Piranga olivacea	Scarlet Tanager	S5B						PO									
Spiza americana	Dickcissel	S2M						PR									
Total							**16**	**121**	**52**	**21**	**21**	**19**	**23**	**29**	**22**	**21**	**14**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-03 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-03A - 2021	MBB-03A - 2022	BMB-03B - 2022	MBB-03C - 2022	MBB-03D - 2022	MBB-03E - 2022	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**															
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	PR					PR		
Anas platyrhynchos	Mallard	S5					Low	CO	PO				PO			OB
Branta canadensis	Canada Goose	S5					Low	CO	OB							OB
Lophodytes cucullatus	Hooded Merganser	S5					High	CO	PR					PR		
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR								
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO								
Phasianidae	**Partridges, Grouse & Turkeys**															
Bonasa umbellus	Ruffed Grouse	S5						PO								
Meleagris gallopavo	Wild Turkey	S5						CO								
Podicipediformes	**Grebes**															
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO								
Columbidae	**Pigeons & Doves**															
Columba livia	Rock Pigeon	SNA						PR								
Zenaida macroura	Mourning Dove	S5						PR	PR		PR			PO	PO	
Cuculiformes	**Cuckoos & Anis**															
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO								
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO								
Apodidae	**Swifts**															
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR								
Trochilidae	**Hummingbirds**															
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO								
Rallidae	**Rails, Gallinules & Coots**															
Porzana carolina	Sora	S5B					Medium	PO								
Rallus limicola	Virginia Rail	S4S5B					Medium	PO								
Charadriidae	**Plovers & Lapwings**															
Charadrius vociferus	Killdeer	S4B						PR								
Scolopacidae	**Sandpipers & Allies**															
Actitis macularia	Spotted Sandpiper	S5B						PO								
Bartramia longicauda	Upland Sandpiper	S2B						PR								
Scolopax minor	American Woodcock	S4B						PO								
Laridae	**Gulls, Terns & Skimmers**															
Larus delawarensis	Ring-billed Gull	S5							OB						OB	
Ardeidae	**Herons & Bitterns**															
Ardea herodias	Great Blue Heron	S4					Low	CO	PR					PR		
Botaurus lentiginosus	American Bittern	S5B					High	PO								
Butorides virescens	Green Heron	S4B					Low	PO								
Cathartidae	**Vultures**															
Cathartes aura	Turkey Vulture	S5B,S3N						PR								
Accipitridae	**Hawks, Kites, Eagles & Allies**															
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PR								
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO								
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO								
Buteo platypterus	Broad-winged Hawk	S5B						PR								
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR								
Strigidae	**Typical Owls**															
Bubo virginianus	Great Horned Owl	S4						PO								
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO								
Strix varia	Barred Owl	S5						PO								
Alcedinidae	**Kingfishers**															

Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PR		PO			PR		
Picidae	**Woodpeckers**															
Colaptes auratus	Northern Flicker	S5						PO								
Dryobates pubescens	Downy Woodpecker	S5						PO								
Dryobates villosus	Hairy Woodpecker	S5						PO								
Dryocopus pileatus	Pileated Woodpecker	S5						PO								
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO								
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO								
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR								
Falconidae	**Caracaras & Falcons**															
Falco sparverius	American Kestrel	S4						PR								
Tyrannidae	**Tyrant Flycatchers**															
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO								
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PO	PO	PO			PO		
Empidonax minimus	Least Flycatcher	S5B						PO	PO	PO						
Empidonax traillii	Willow Flycatcher	S4B						PO	PO					PO	PO	
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PO			PO		PO	PO	
Sayornis phoebe	Eastern Phoebe	S5B						CO	PO		PO					
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	CO	CO	PO		PO	PR	PO	
Vireonidae	**Vireos**															
Vireo flavifrons	Yellow-throated Vireo	S4B						PO								
Vireo gilvus	Warbling Vireo	S5B						PR								
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PO	PO	PO		PO	PO		
Vireo solitarius	Blue-headed Vireo	S5B						PR								
Corvidae	**Crows & Jays**															
Corvus brachyrhynchos	American Crow	S5						CO	CO	PO	PO	PR	PO	PO	PO	CO
Cyanocitta cristata	Blue Jay	S5						PR	PR	PO	PO	PR	PO	PO	PO	OB
Alaudidae	**Larks**															
Eremophila alpestris	Horned Lark	S4						CO								
Hirundinidae	**Swallows**															
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO								
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO								
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO								
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO								
Tachycineta bicolor	Tree Swallow	S4S5B						CO								
Paridae	**Chickadees & Titmice**															
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR	PO	PO	PR	PR	PO		OB
Sittidae	**Nuthatches**															
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PO		PO					
Sitta carolinensis	White-breasted Nuthatch	S5						CO								
Troglodytidae	**Wrens**															
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO								
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO								
Troglodytes aedon	House Wren	S5B						PR	PR	PR		PO			PO	
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO								
Regulidae	**Kinglets**															
Regulus satrapa	Golden-crowned Kinglet	S5						PO								
Turdidae	**Thrushes**															
Catharus fuscescens	Veery	S5B						PR	PO			PO			PO	
Catharus guttatus	Hermit Thrush	S5B,S4N						PO								
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR								
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO								
Turdus migratorius	American Robin	S5						CO	CO	CO	PR	PR	PR		PO	
Mimidae	**Mockingbirds, Thrashers & Allies**															
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR								
Toxostoma rufum	Brown Thrasher	S4B						PO								
Sturnidae	**Starlings**															
Sturnus vulgaris	European Starling	SNA						CO	CO	PR	PO	CO				
Bombycillidae	**Waxwings**															
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PR	PO	PR	PO	PO		PO	
Passeridae	**Old World Sparrows**															

Passer domesticus	House Sparrow	SNA						CO								
Fringillidae	**Finches & Allies**															
Haemorhous mexicanus	House Finch	SNA						PO								
Haemorhous purpureus	Purple Finch	S5						PO								
Spinus tristis	American Goldfinch	S5						PR	PR	PO	PR	PR	PO	PO		
Emberizidae	**New World Sparrows & Allies**															
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO								
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PR				PR	PR	PR	
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PR	PO	PR	PR	PO	
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PO	PO	PO					
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO								
Pooecetes gramineus	Vesper Sparrow	S4B						PO								
Spizella pallida	Clay-colored Sparrow	S4B						PR								
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PR	PR	PO	PO	PO			
Spizella pusilla	Field Sparrow	S4B,S3N						CO								
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PO			PO				
Icteridae	**Troupials & Allies**															
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PR	PR	PO	PO	PO	PR	PO	OB
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR								
Icterus galbula	Baltimore Oriole	S4B						PR	PO					PO		
Molothrus ater	Brown-headed Cowbird	S5						PO	PR	PO		PR			PO	
Quiscalus quiscula	Common Grackle	S5						CO	PR	PO	PR	PO		PO		
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PR			PR				OB
Parulidae	**Wood Warblers**															
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR								
Geothlypis philadelphia	Mourning Warbler	S5B						PR								
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PO			PO	PR	PR	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO								
Mniotilta varia	Black-and-white Warbler	S5B						CO								
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR								
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PO					PO		
Seiurus aurocapilla	Ovenbird	S5B						PR								
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO								
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO								
Setophaga fusca	Blackburnian Warbler	S5B						PR								
Setophaga magnolia	Magnolia Warbler	S5B						PO								
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO								
Setophaga petechia	Yellow Warbler	S5B						PR	PR	PO			PR	PR	PR	
Setophaga pinus	Pine Warbler	S5B,S3N						PR								
Setophaga ruticilla	American Redstart	S5B						PR	PR	PR			PO		PR	
Setophaga virens	Black-throated Green Warbler	S5B						PR								
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO								
Cardinalidae	**Cardinals, Grosbeaks & Allies**															
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO			PO				OB
Passerina cyanea	Indigo Bunting	S5B						PR								
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO				PO	PO	PO	
Piranga olivacea	Scarlet Tanager	S5B						PO								
Spiza americana	Dickcissel	S2M						PR								
Total							**16**	**121**	**41**	**21**	**19**	**18**	**17**	**23**	**19**	**7**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-04 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-04A	MBB-04A	BMB-04B	MBB-04C	BMB-04D	BMB-04E	BMB-04F	BMB-04G	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**																	
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR										
Anas platyrhynchos	Mallard	S5					Low	CO	PO		PO							
Branta canadensis	Canada Goose	S5					Low	CO	CO		CO							
Lophodytes cucullatus	Hooded Merganser	S5					High	CO										
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR										
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO										
Phasianidae	**Partridges, Grouse & Turkeys**																	
Bonasa umbellus	Ruffed Grouse	S5						PO										
Meleagris gallopavo	Wild Turkey	S5						CO										
Podicipediformes	**Grebes**																	
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO										
Columbidae	**Pigeons & Doves**																	
Columba livia	Rock Pigeon	SNA						PR										
Zenaida macroura	Mourning Dove	S5						PR	PO	PO	PO							
Cuculiformes	**Cuckoos & Anis**																	
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO										
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO										
Apodidae	**Swifts**																	
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR										
Trochilidae	**Hummingbirds**																	
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO										
Rallidae	**Rails, Gallinules & Coots**																	
Porzana carolina	Sora	S5B					Medium	PO										
Rallus limicola	Virginia Rail	S4S5B					Medium	PO										
Charadriidae	**Plovers & Lapwings**																	
Charadrius vociferus	Killdeer	S4B						PR										
Scolopacidae	**Sandpipers & Allies**																	
Actitis macularia	Spotted Sandpiper	S5B						PO										
Bartramia longicauda	Upland Sandpiper	S2B						PR										
Scolopax minor	American Woodcock	S4B						PO										
Laridae	**Gulls, Terns & Skimmers**																	
Larus delawarensis	Ring-billed Gull	S5							OB				OB					
Ardeidae	**Herons & Bitterns**																	
Ardea herodias	Great Blue Heron	S4					Low	CO										
Botaurus lentiginosus	American Bittern	S5B					High	PO										
Butorides virescens	Green Heron	S4B					Low	PO										
Cathartidae	**Vultures**																	
Cathartes aura	Turkey Vulture	S5B,S3N						PR	PO							PO		OB
Accipitridae	**Hawks, Kites, Eagles & Allies**																	
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO	PO							PO		
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO										
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO										
Buteo platypterus	Broad-winged Hawk	S5B						PR										
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR										
Strigidae	**Typical Owls**																	
Bubo virginianus	Great Horned Owl	S4						PO										
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO										
Strix varia	Barred Owl	S5						PO										
Alcedinidae	**Kingfishers**																	
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	OB									OB
Picidae	**Woodpeckers**																	
Colaptes auratus	Northern Flicker	S5						PO	PR			PO	PR	PO		PO		
Dryobates pubescens	Downy Woodpecker	S5						PO	PO			PO	PO					OB
Dryobates villosus	Hairy Woodpecker	S5						PO										
Dryocopus pileatus	Pileated Woodpecker	S5						PO										
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO										
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO										
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR	PO				PO					
Falconidae	**Caracaras & Falcons**																	
Falco sparverius	American Kestrel	S4						PR										
Tyrannidae	**Tyrant Flycatchers**																	

Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PR	PO			PR					OB
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PO		PO	PO	PO	PO				
Empidonax minimus	Least Flycatcher	S5B						PO										
Empidonax traillii	Willow Flycatcher	S4B						PO										
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PR	PR			PO					
Sayornis phoebe	Eastern Phoebe	S5B						CO										
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR		PR	PO						
Vireonidae	**Vireos**																	
Vireo flavifrons	Yellow-throated Vireo	S4B						PO										
Vireo gilvus	Warbling Vireo	S5B						PR										
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR	PR	PO	PR	PR			PO	PO	
Vireo solitarius	Blue-headed Vireo	S5B						PO										
Corvidae	**Crows & Jays**																	
Corvus brachyrhynchos	American Crow	S5						CO	PR	PO		PR	PR	PR	OB	PO	PR	
Corvus corax	Common Raven	S5							PO			PO						
Cyanocitta cristata	Blue Jay	S5						PR	PO	PO	PO		PO		PO			OB
Alaudidae	**Larks**																	
Eremophila alpestris	Horned Lark	S4						CO										
Hirundinidae	**Swallows**																	
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO										
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO										
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO										
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO										
Tachycineta bicolor	Tree Swallow	S4S5B						CO										
Paridae	**Chickadees & Titmice**																	
Poecile atricapillus	Black-capped Chickadee	S5						CO	CO	PO			PO	PO	PO	PO	CO	PO
Sittidae	**Nuthatches**																	
Sitta canadensis	Red-breasted Nuthatch	S5						CO										
Sitta carolinensis	White-breasted Nuthatch	S5						CO										
Troglodytidae	**Wrens**																	
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO										
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO										
Troglodytes aedon	House Wren	S5B						PR	PR	PO	PR			PR	PO	PO		
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO										
Regulidae	**Kinglets**																	
Regulus satrapa	Golden-crowned Kinglet	S5						PO										
Turdidae	**Thrushes**																	
Catharus fuscescens	Veery	S5B						PR	PR		PO	PO	PR	PO	PO	PO	PO	
Catharus guttatus	Hermit Thrush	S5B,S4N						PO										
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR										
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO										
Turdus migratorius	American Robin	S5						CO	PR	PR	PR		PO	PO	PO			PO
Mimidae	**Mockingbirds, Thrashers & Allies**																	
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PR			PR		PO	PO	PO		
Toxostoma rufum	Brown Thrasher	S4B						PO										
Sturnidae	**Starlings**																	
Sturnus vulgaris	European Starling	SNA						CO	PR		PO	PR		OB				OB
Bombycillidae	**Waxwings**																	
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PR	PO		PO		PR				
Passeridae	**Old World Sparrows**																	
Passer domesticus	House Sparrow	SNA						CO										
Fringillidae	**Finches & Allies**																	
Haemorhous mexicanus	House Finch	SNA						PO										
Haemorhous purpureus	Purple Finch	S5						PO										
Spinus tristis	American Goldfinch	S5						PR	PR	PO	PO	PR	PO	PO	PO	PO	OB	
Emberizidae	**New World Sparrows & Allies**																	
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO										
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO		PO		PO	PO				
Melospiza melodia	Song Sparrow	S5						CO	PR	PO	PR	PO	PR	PR	PR	PO	PR	
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PO		PO	PO		PO				
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO										
Pooecetes gramineus	Vesper Sparrow	S4B						PO										
Spizella pallida	Clay-colored Sparrow	S4B						PR										
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO	PO	PO				PO			
Spizella pusilla	Field Sparrow	S4B,S3N						PR										
Zonotrichia albicollis	White-throated Sparrow	S5						PO										
Icteridae	**Troupials & Allies**																	
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PR		PR	PO	PO	PO		PR	PO	PO
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR										
Icterus galbula	Baltimore Oriole	S4B						PR	PO			PO		PO				
Molothrus ater	Brown-headed Cowbird	S5						PO	PR		PR	PO	PO		PO			
Quiscalus quiscula	Common Grackle	S5						CO	CO		CO	PO	PO			PO		

Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	OB									OB
Parulidae	**Wood Warblers**																	
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR										
Geothlypis philadelphia	Mourning Warbler	S5B						PR	PO			PO			PO		PO	
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PO		PR		PR	PR		PR	OB
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO										
Mniotilta varia	Black-and-white Warbler	S5B						CO	PO	PO								
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR										
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO										
Seiurus aurocapilla	Ovenbird	S5B						PR	PR	PR			PO					
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO										
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO										
Setophaga fusca	Blackburnian Warbler	S5B						PR										
Setophaga magnolia	Magnolia Warbler	S5B						PO										
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO	PO	PO					PO			
Setophaga petechia	Yellow Warbler	S5B						PR	PO			PO			PO	PO		
Setophaga pinus	Pine Warbler	S5B,S3N						PR										
Setophaga ruticilla	American Redstart	S5B						PR	PR				PO	PR		PO	PO	
Setophaga virens	Black-throated Green Warbler	S5B						PR	PO	PO							PO	
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO										
Cardinalidae	**Cardinals, Grosbeaks & Allies**																	
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO					PO	PO			
Passerina cyanea	Indigo Bunting	S5B						PR	PR		PO	PO		PR		PO	PO	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO	PO								
Piranga olivacea	Scarlet Tanager	S5B						PO										
Spiza americana	Dickcissel	S2M						PR										
Total							**16**	**121**	**46**	**19**	**20**	**22**	**21**	**20**	**16**	**16**	**12**	**11**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-14 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	BMB-14A - 2021	BMB-14A - 2022	MBB-14B - 2021	MBB-14B - 2022	BMB-14C - 2022	BMB-14D - 2022	BMB-14E - 2022	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**																
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR									
Anas platyrhynchos	Mallard	S5					Low	CO									
Branta canadensis	Canada Goose	S5					Low	CO	OB								OB
Lophodytes cucullatus	Hooded Merganser	S5					High	CO									
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR									
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO									
Phasianidae	**Partridges, Grouse & Turkeys**																
Bonasa umbellus	Ruffed Grouse	S5						PO	OB								OB
Meleagris gallopavo	Wild Turkey	S5						CO									
Podicipediformes	**Grebes**																
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO									
Columbidae	**Pigeons & Doves**																
Columba livia	Rock Pigeon	SNA						PR									
Zenaida macroura	Mourning Dove	S5						PR	PO			PO			OB		
Cuculiformes	**Cuckoos & Anis**																
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO									
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO									
Apodidae	**Swifts**																
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR									
Trochilidae	**Hummingbirds**																
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO									
Rallidae	**Rails, Gallinules & Coots**																
Porzana carolina	Sora	S5B					Medium	PO									
Rallus limicola	Virginia Rail	S4S5B					Medium	PO									
Charadriidae	**Plovers & Lapwings**																
Charadrius vociferus	Killdeer	S4B						PR	PO			PO					PO
Scolopacidae	**Sandpipers & Allies**																
Actitis macularia	Spotted Sandpiper	S5B						PO									
Bartramia longicauda	Upland Sandpiper	S2B						PR									
Scolopax minor	American Woodcock	S4B						PO									
Ardeidae	**Herons & Bitterns**																
Ardea herodias	Great Blue Heron	S4					Low	CO									
Botaurus lentiginosus	American Bittern	S5B					High	PO									
Butorides virescens	Green Heron	S4B					Low	PO									
Cathartidae	**Vultures**																
Cathartes aura	Turkey Vulture	S5B,S3N						PR	PO	PO	PO	OB			PO		
Accipitridae	**Hawks, Kites, Eagles & Allies**																
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO									
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO									
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO	OB								OB
Buteo platypterus	Broad-winged Hawk	S5B						PR									
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR	OB								OB
Strigidae	**Typical Owls**																
Bubo virginianus	Great Horned Owl	S4						PO									
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO									
Strix varia	Barred Owl	S5						PO									
Alcedinidae	**Kingfishers**																
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PO			PO					OB
Picidae	**Woodpeckers**																
Colaptes auratus	Northern Flicker	S5						PO									
Dryobates pubescens	Downy Woodpecker	S5						PO	PO						PO		
Dryobates villosus	Hairy Woodpecker	S5						PO	PO			PO					
Dryocopus pileatus	Pileated Woodpecker	S5						PO									
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO									
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO									
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR									
Falconidae	**Caracaras & Falcons**																
Falco sparverius	American Kestrel	S4						PR									
Tyrannidae	**Tyrant Flycatchers**																
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PR					PR		PO	

Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PR		PO	PO	PR				
Empidonax minimus	Least Flycatcher	S5B						PO									
Empidonax traillii	Willow Flycatcher	S4B						PO									
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PO	PO	PO						
Sayornis phoebe	Eastern Phoebe	S5B						CO	PR					PR			PO
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR	PO		PO	PR	PO			PR
Vireonidae	**Vireos**																
Vireo flavifrons	Yellow-throated Vireo	S4B						PO									
Vireo gilvus	Warbling Vireo	S5B						PR	PO		PO						
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR			PO	PR	PR			
Vireo solitarius	Blue-headed Vireo	S5B						PO									
Corvidae	**Crows & Jays**																
Corvus brachyrhynchos	American Crow	S5						CO	PR	PR		PR	PO		PO	PO	OB
Cyanocitta cristata	Blue Jay	S5						PR	PR		PR	PR		PR	PR	PR	OB
Alaudidae	**Larks**																
Eremophila alpestris	Horned Lark	S4						CO									
Hirundinidae	**Swallows**																
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	PO	PO			PO		PO		
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO									
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO	PO				PO				
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO									
Tachycineta bicolor	Tree Swallow	S4S5B						CO	CO	CO	PO				PR	PO	
Paridae	**Chickadees & Titmice**																
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR	PO		PO	PO		PO	PR	OB
Sittidae	**Nuthatches**																
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PO	PO	PO						OB
Sitta carolinensis	White-breasted Nuthatch	S5						CO									
Troglodytidae	**Wrens**																
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO	PO				PO				
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO									
Troglodytes aedon	House Wren	S5B						PR	PR	PR	PR	PO		PO	PR	PR	
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PR	PO	PR				PO		
Regulidae	**Kinglets**																
Regulus satrapa	Golden-crowned Kinglet	S5						PO	OB								OB
Turdidae	**Thrushes**																
Catharus fuscescens	Veery	S5B						PR									
Catharus guttatus	Hermit Thrush	S5B,S4N						PO									
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR									
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO	PO						PO		
Turdus migratorius	American Robin	S5						CO	PR	PR		PO		PR	PR	PO	OB
Mimidae	**Mockingbirds, Thrashers & Allies**																
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PR			PR					
Toxostoma rufum	Brown Thrasher	S4B						PO									
Sturnidae	**Starlings**																
Sturnus vulgaris	European Starling	SNA						CO	PR		PO			PR	PR	PO	
Bombycillidae	**Waxwings**																
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PO						PO		
Passeridae	**Old World Sparrows**																
Passer domesticus	House Sparrow	SNA						CO									
Fringillidae	**Finches & Allies**																
Haemorhous mexicanus	House Finch	SNA						PO									
Haemorhous purpureus	Purple Finch	S5						PO	PO		PO						
Spinus tristis	American Goldfinch	S5						PR	PR	PO		PR	PO	PR		OB	OB
Emberizidae	**New World Sparrows & Allies**																
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO									
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO				PO				
Melospiza melodia	Song Sparrow	S5						CO	PR	PO	PO	PR	PR		PR	PO	OB
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PR						PR		
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO									
Pooecetes gramineus	Vesper Sparrow	S4B						PO									
Spizella pallida	Clay-colored Sparrow	S4B						PR									
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO	PO	PO	PO	PO	PO			PO
Spizella pusilla	Field Sparrow	S4B,S3N						PR									
Spizelloides arborea	American Tree Sparrow	S5							OB								OB
Zonotrichia albicollis	White-throated Sparrow	S5						PO									
Icteridae	**Troupials & Allies**																
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	CO	PO	PO	PR	CO		PR		PO
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR	OB		OB						
Icterus galbula	Baltimore Oriole	S4B						PR	PR	PO	PO				PR	PO	
Molothrus ater	Brown-headed Cowbird	S5						PO	PO			PO			PO		

Quiscalus quiscula	Common Grackle	S5						CO	PO	PO							
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR									
Parulidae	**Wood Warblers**																
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR									
Geothlypis philadelphia	Mourning Warbler	S5B						PR									
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PO	PO	PR	PR		PR		PO
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO									
Mniotilta varia	Black-and-white Warbler	S5B						CO	PR	PO						PR	
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR									
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	CO	CO	PR						
Seiurus aurocapilla	Ovenbird	S5B						PR									
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO									
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO	PR		PO	PO	PR				
Setophaga fusca	Blackburnian Warbler	S5B						PR									
Setophaga magnolia	Magnolia Warbler	S5B						PO									
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO									
Setophaga petechia	Yellow Warbler	S5B						PR	PR			PR					
Setophaga pinus	Pine Warbler	S5B,S3N						PR									
Setophaga ruticilla	American Redstart	S5B						PR	PR	PO	PR	PR	PR	PO	PO	PO	
Setophaga virens	Black-throated Green Warbler	S5B						PR	PR		PO			PR			
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO									
Cardinalidae	**Cardinals, Grosbeaks & Allies**																
Cardinalis cardinalis	Northern Cardinal	S5						CO	PR			PO	PO	PR		PO	OB
Passerina cyanea	Indigo Bunting	S5B						PR	PO				PO	PO	PO		
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO									
Piranga olivacea	Scarlet Tanager	S5B						PO									
Spiza americana	Dickcissel	S2M						PR									
Total							**16**	**121**	**54**	**21**	**21**	**24**	**18**	**14**	**22**	**14**	**21**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-15 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-15A (previously BMB) - 2021	MBB-15A (previously BMB) - 2022	MBB-15B - 2022	MBB-15C - 2022	MBB-15D - 2022	BMB-15E - 2022	MBB-15F - 2022	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA, 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**																
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	PO			PO					
Anas platyrhynchos	Mallard	S5					Low	CO	CO		PO	CO				PR	OB
Branta canadensis	Canada Goose	S5					Low	CO	PO			PO				PO	OB
Lophodytes cucullatus	Hooded Merganser	S5					High	CO									
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR									
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO									
Phasianidae	**Partridges, Grouse & Turkeys**																
Bonasa umbellus	Ruffed Grouse	S5						PO	OB								OB
Meleagris gallopavo	Wild Turkey	S5						CO									
Podicipediformes	**Grebes**																
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO									
Columbidae	**Pigeons & Doves**																
Columba livia	Rock Pigeon	SNA						PR									
Zenaida macroura	Mourning Dove	S5						PR	PO		PO	PO	PO			PO	OB
Cuculiformes	**Cuckoos & Anis**																
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO									
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO									
Apodidae	**Swifts**																
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR									
Trochilidae	**Hummingbirds**																
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO	PO		PO		PO				
Rallidae	**Rails, Gallinules & Coots**																
Porzana carolina	Sora	S5B					Medium	PO									
Rallus limicola	Virginia Rail	S4S5B					Medium	PO									
Charadriidae	**Plovers & Lapwings**																
Charadrius vociferus	Killdeer	S4B						PR	PR		PO					PR	
Scolopacidae	**Sandpipers & Allies**																
Actitis macularia	Spotted Sandpiper	S5B						PO	PO				PO				OB
Bartramia longicauda	Upland Sandpiper	S2B						PR									
Scolopax minor	American Woodcock	S4B						PO									
Ardeidae	**Herons & Bitterns**																
Ardea herodias	Great Blue Heron	S4					Low	CO									
Botaurus lentiginosus	American Bittern	S5B					High	PO									
Butorides virescens	Green Heron	S4B					Low	PO	CO								CO
Cathartidae	**Vultures**																
Cathartes aura	Turkey Vulture	S5B,S3N						PR	OB								OB
Accipitridae	**Hawks, Kites, Eagles & Allies**																
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO									
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO									
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO									
Buteo platypterus	Broad-winged Hawk	S5B						PR									
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR									
Strigidae	**Typical Owls**																
Bubo virginianus	Great Horned Owl	S4						PO									
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO									
Strix varia	Barred Owl	S5						PO									
Alcedinidae	**Kingfishers**																
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PR				PR			PO	
Picidae	**Woodpeckers**																
Colaptes auratus	Northern Flicker	S5						PO	PO	PO		PO					OB
Dryobates pubescens	Downy Woodpecker	S5						PO									
Dryobates villosus	Hairy Woodpecker	S5						PO	PO					PO			
Dryocopus pileatus	Pileated Woodpecker	S5						PO									
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO									
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO									
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR									
Falconidae	**Caracaras & Falcons**																

Falco sparverius	American Kestrel	S4						PR									
Tyrannidae	**Tyrant Flycatchers**																
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PO		PO			PO			
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR									
Empidonax minimus	Least Flycatcher	S5B						PO									
Empidonax traillii	Willow Flycatcher	S4B						PO									
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PR	PO	PR			PO	PO		
Sayornis phoebe	Eastern Phoebe	S5B						CO	OB								OB
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR	PO						PR	OB
Vireonidae	**Vireos**																
Vireo flavifrons	Yellow-throated Vireo	S4B						PO									
Vireo gilvus	Warbling Vireo	S5B						PR									
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PO	PO				PO	PO		
Vireo solitarius	Blue-headed Vireo	S5B						PO									
Corvidae	**Crows & Jays**																
Corvus brachyrhynchos	American Crow	S5						CO	PR	PO		PO	PR	PO	PO	PR	PO
Cyanocitta cristata	Blue Jay	S5						PR	PR	PR		PO		PR			
Alaudidae	**Larks**																
Eremophila alpestris	Horned Lark	S4						CO									
Hirundinidae	**Swallows**																
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	PO	PO		PO				PO	
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO									
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO									
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO									
Tachycineta bicolor	Tree Swallow	S4S5B						CO	PO	PO	PO	PO	OB			PO	
Paridae	**Chickadees & Titmice**																
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR	PR	PR	PR	PO	PO	PO		OB
Sittidae	**Nuthatches**																
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PR		PO			PR			OB
Sitta carolinensis	White-breasted Nuthatch	S5						CO									
Troglodytidae	**Wrens**																
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO									
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO									
Troglodytes aedon	House Wren	S5B						PR	PR	PO	PO	PR		PR		PO	
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO						PO		
Regulidae	**Kinglets**																
Regulus satrapa	Golden-crowned Kinglet	S5						PO									
Turdidae	**Thrushes**																
Catharus fuscescens	Veery	S5B						PR									
Catharus guttatus	Hermit Thrush	S5B,S4N						PO									
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR									
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO									
Turdus migratorius	American Robin	S5						CO	CO	PO	PO	PR	CO			PR	PO
Mimidae	**Mockingbirds, Thrashers & Allies**																
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PO	PO	PO	PO					
Toxostoma rufum	Brown Thrasher	S4B						PO	PO		PO						
Sturnidae	**Starlings**																
Sturnus vulgaris	European Starling	SNA						CO	CO	CO		PR	PR			PO	OB
Bombycillidae	**Waxwings**																
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PO	PO	PO	PO		PO			
Passeridae	**Old World Sparrows**																
Passer domesticus	House Sparrow	SNA						CO									
Fringillidae	**Finches & Allies**																
Haemorhous mexicanus	House Finch	SNA						PO	OB								OB
Haemorhous purpureus	Purple Finch	S5						PO	PO		PO			PO			
Spinus pinus	Pine Siskin	S5							PO							PO	
Spinus tristis	American Goldfinch	S5						PR	PR	PR		PO		PR		PR	
Emberizidae	**New World Sparrows & Allies**																
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO									
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PR	PR	PR	PO					
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PR	PR	PR	PR	PR	PR	OB
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PO						PO		
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO									
Pooecetes gramineus	Vesper Sparrow	S4B						PO									
Spizella pallida	Clay-colored Sparrow	S4B						PR									
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO						PO	PO	OB
Spizella pusilla	Field Sparrow	S4B,S3N						PR									
Zonotrichia albicollis	White-throated Sparrow	S5						PO									
Icteridae	**Troupials & Allies**																
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PR	PR	PO	PO				PR	

Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR	PO							PO	
Icterus galbula	Baltimore Oriole	S4B						PR	PO							PO	
Molothrus ater	Brown-headed Cowbird	S5						PO	PR	PR	PR	PR				PO	
Quiscalus quiscula	Common Grackle	S5						CO	PO		PO		PO			PO	OB
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PO		PO		PO			PO	
Parulidae	**Wood Warblers**																
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR									
Geothlypis philadelphia	Mourning Warbler	S5B						PR									
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	CO	PO	PO			PO		CO	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO									
Mniotilta varia	Black-and-white Warbler	S5B						CO	PR	PO	PO	PO		PR	PO		
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR									
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PR	PR				PR	PO		OB
Seiurus aurocapilla	Ovenbird	S5B						PR									
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO									
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO	PO			PO					OB
Setophaga fusca	Blackburnian Warbler	S5B						PR	PO					PO	PO		
Setophaga magnolia	Magnolia Warbler	S5B						PO									
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO	PO						PO		
Setophaga petechia	Yellow Warbler	S5B						PR	PO	PO							
Setophaga pinus	Pine Warbler	S5B,S3N						PR									
Setophaga ruticilla	American Redstart	S5B						PR	OB								OB
Setophaga virens	Black-throated Green Warbler	S5B						PR	PO		PO			PO			
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO									
Cardinalidae	**Cardinals, Grosbeaks & Allies**																
Cardinalis cardinalis	Northern Cardinal	S5						CO	PR	PR			PO	PO			OB
Passerina cyanea	Indigo Bunting	S5B						PR	PR			PO		PR			
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO							PO	
Piranga olivacea	Scarlet Tanager	S5B						PO									
Spiza americana	Dickcissel	S2M						PR									
Total							**16**	**121**	**57**	**24**	**24**	**23**	**13**	**20**	**12**	**24**	**23**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-16 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-16A 2021	MBB-16A - 2022	BMB-16B - 2021	BMB-16B - 2022	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA, 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**													
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	PO	PO				
Anas platyrhynchos	Mallard	S5					Low	CO	PR		PR			OB
Branta canadensis	Canada Goose	S5					Low	CO	CO	CO	PO			OB
Lophodytes cucullatus	Hooded Merganser	S5					High	CO	CO		CO			OB
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR						
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO						
Phasianidae	**Partridges, Grouse & Turkeys**													
Bonasa umbellus	Ruffed Grouse	S5						PO						
Meleagris gallopavo	Wild Turkey	S5						CO						
Podicipediformes	**Grebes**													
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO						
Columbidae	**Pigeons & Doves**													
Columba livia	Rock Pigeon	SNA						PR						
Zenaida macroura	Mourning Dove	S5						PR	PR	PR		PO	PO	
Cuculiformes	**Cuckoos & Anis**													
Coccyzus americanus	Yellow-billed Cuckoo	S4B							OB					OB
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO						
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO						
Apodidae	**Swifts**													
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR						
Trochilidae	**Hummingbirds**													
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO	PO				PO	
Rallidae	**Rails, Gallinules & Coots**													
Porzana carolina	Sora	S5B					Medium	OB	OB		OB			
Rallus limicola	Virginia Rail	S4S5B					Medium	PO						
Charadriidae	**Plovers & Lapwings**													
Charadrius vociferus	Killdeer	S4B						PR						
Scolopacidae	**Sandpipers & Allies**													
Actitis macularia	Spotted Sandpiper	S5B						PO						
Bartramia longicauda	Upland Sandpiper	S2B						PR						
Scolopax minor	American Woodcock	S4B						PO						
Ardeidae	**Herons & Bitterns**													
Ardea herodias	Great Blue Heron	S4					Low	CO						
Botaurus lentiginosus	American Bittern	S5B					High	PO						
Butorides virescens	Green Heron	S4B					Low	PO	PO		PO		OB	OB
Cathartidae	**Vultures**													
Cathartes aura	Turkey Vulture	S5B,S3N						PR						
Accipitridae	**Hawks, Kites, Eagles & Allies**													
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO						
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO						
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO						
Buteo platypterus	Broad-winged Hawk	S5B						PR						
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR						
Strigidae	**Typical Owls**													
Bubo virginianus	Great Horned Owl	S4						PO						
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO						
Strix varia	Barred Owl	S5						PO						
Alcedinidae	**Kingfishers**													

Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PR	PO	PR			
Picidae	**Woodpeckers**													
Colaptes auratus	Northern Flicker	S5						PO	PR	PR				
Dryobates pubescens	Downy Woodpecker	S5						PO						
Dryobates villosus	Hairy Woodpecker	S5						PO	PO		PO			
Dryocopus pileatus	Pileated Woodpecker	S5						PO						
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO						
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO						
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR						
Falconidae	**Caracaras & Falcons**													
Falco sparverius	American Kestrel	S4						PR						
Tyrannidae	**Tyrant Flycatchers**													
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO						
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PO			PO		
Empidonax minimus	Least Flycatcher	S5B						PO						
Empidonax traillii	Willow Flycatcher	S4B						PO						
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	CO	PO	CO			
Sayornis phoebe	Eastern Phoebe	S5B						CO	PO		PO	PO		
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR	PR	PO			
Vireonidae	**Vireos**													
Vireo flavifrons	Yellow-throated Vireo	S4B						PO						
Vireo gilvus	Warbling Vireo	S5B						PR						
Vireo olivaceus	Red-eyed Vireo	S5B						PR	CO	PO	CO	PR	PR	
Vireo solitarius	Blue-headed Vireo	S5B						PO						
Corvidae	**Crows & Jays**													
Corvus brachyrhynchos	American Crow	S5						CO	PR	PR	PR		PO	OB
Cyanocitta cristata	Blue Jay	S5						PR	PO	PO		PO	PO	
Alaudidae	**Larks**													
Eremophila alpestris	Horned Lark	S4						CO						
Hirundinidae	**Swallows**													
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO						
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO						
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO						
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO						
Tachycineta bicolor	Tree Swallow	S4S5B						CO						
Paridae	**Chickadees & Titmice**													
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR	PR	PO	PO	PR	
Sittidae	**Nuthatches**													
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PR	PR				
Sitta carolinensis	White-breasted Nuthatch	S5						CO						
Troglodytidae	**Wrens**													
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO						
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO						
Troglodytes aedon	House Wren	S5B						PR	PO	PO	PO			
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO		PO		PO	
Regulidae	**Kinglets**													
Regulus satrapa	Golden-crowned Kinglet	S5						PO						
Turdidae	**Thrushes**													
Catharus fuscescens	Veery	S5B						PR						
Catharus guttatus	Hermit Thrush	S5B,S4N						PO						
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR						
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO						
Turdus migratorius	American Robin	S5						CO	CO	PR	CO	PO	PR	OB
Mimidae	**Mockingbirds, Thrashers & Allies**													
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR						
Toxostoma rufum	Brown Thrasher	S4B						PO						
Sturnidae	**Starlings**													
Sturnus vulgaris	European Starling	SNA						CO	PO				PO	

Bombycillidae	**Waxwings**													
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PO	PO	PO			
Passeridae	**Old World Sparrows**													
Passer domesticus	House Sparrow	SNA						CO						
Fringillidae	**Finches & Allies**													
Haemorhous mexicanus	House Finch	SNA						PO						
Haemorhous purpureus	Purple Finch	S5						PO						
Spinus tristis	American Goldfinch	S5						PR	PO	OB	PO	PO	PO	
Emberizidae	**New World Sparrows & Allies**													
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO						
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO	PO	PO			
Melospiza melodia	Song Sparrow	S5						CO	CO	PR	CO			OB
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR						
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO						
Pooecetes gramineus	Vesper Sparrow	S4B						PO						
Spizella pallida	Clay-colored Sparrow	S4B						PR						
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO		PO		PO	
Spizella pusilla	Field Sparrow	S4B,S3N						PR						
Zonotrichia albicollis	White-throated Sparrow	S5						PO	OB					OB
Icteridae	**Troupials & Allies**													
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PO	PO	PO			
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR						
Icterus galbula	Baltimore Oriole	S4B						PR	PO	PO				
Molothrus ater	Brown-headed Cowbird	S5						PO						
Quiscalus quiscula	Common Grackle	S5						CO	PR	PO	PR	PO	PO	
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR						
Parulidae	**Wood Warblers**													
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR	PO		PO			
Geothlypis philadelphia	Mourning Warbler	S5B						PR						
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PO		PO			
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO						
Mniotilta varia	Black-and-white Warbler	S5B						CO	PO		PO			
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR						
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PO		PO		PO	OB
Seiurus aurocapilla	Ovenbird	S5B						PR						
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO						
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO	OB					OB
Setophaga fusca	Blackburnian Warbler	S5B						PR						
Setophaga magnolia	Magnolia Warbler	S5B						PO						
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO						
Setophaga petechia	Yellow Warbler	S5B						PR						
Setophaga pinus	Pine Warbler	S5B,S3N						PR	PO	PO	PO		PO	
Setophaga ruticilla	American Redstart	S5B						PR	PO	PO				
Setophaga virens	Black-throated Green Warbler	S5B						PR	PO	PO		PO		
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO						
Cardinalidae	**Cardinals, Grosbeaks & Allies**													
Cardinalis cardinalis	Northern Cardinal	S5						CO	CO	PO	CO		PR	OB
Passerina cyanea	Indigo Bunting	S5B						PR						
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO		PO		PO	
Piranga olivacea	Scarlet Tanager	S5B						PO						
Spiza americana	Dickcissel	S2M						PR						
Total							**16**	**121**	**44**	**25**	**30**	**10**	**17**	**12**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Bird Species Reported from NAT-18 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	BMB-18A	BMB-18A	BMB-18B	BMB-18B	MBB-18C	MBB-18C	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA, 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	NRSI 2021	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**															
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	PO						PO	
Anas platyrhynchos	Mallard	S5					Low	CO	PO						PO	
Branta canadensis	Canada Goose	S5					Low	CO								
Lophodytes cucullatus	Hooded Merganser	S5					High	CO								PO
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR								
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO								
Phasianidae	**Partridges, Grouse & Turkeys**															
Bonasa umbellus	Ruffed Grouse	S5						PO								
Meleagris gallopavo	Wild Turkey	S5						CO								
Podicipediformes	**Grebes**															
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO								
Columbidae	**Pigeons & Doves**															
Columba livia	Rock Pigeon	SNA						PR								
Zenaida macroura	Mourning Dove	S5						PR	PO	OB	PO	PO	PO			
Cuculiformes	**Cuckoos & Anis**															
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO								
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO								
Apodidae	**Swifts**															
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR								
Trochilidae	**Hummingbirds**															
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO								
Rallidae	**Rails, Gallinules & Coots**															
Porzana carolina	Sora	S5B					Medium	PO								
Rallus limicola	Virginia Rail	S4S5B					Medium	PO								
Charadriidae	**Plovers & Lapwings**															
Charadrius vociferus	Killdeer	S4B						PR								
Scolopacidae	**Sandpipers & Allies**															
Actitis macularia	Spotted Sandpiper	S5B						PO								
Bartramia longicauda	Upland Sandpiper	S2B						PR								
Scolopax minor	American Woodcock	S4B						PO								
Laridae	**Gulls, Terns & Skimmers**															
Larus argentatus	Herring Gull	S4B,S5N							OB					OB		
Larus delawarensis	Ring-billed Gull	S5							OB					OB		
Ardeidae	**Herons & Bitterns**															
Ardea herodias	Great Blue Heron	S4					Low	CO								
Botaurus lentiginosus	American Bittern	S5B					High	PO								
Butorides virescens	Green Heron	S4B					Low	PO								
Cathartidae	**Vultures**															
Cathartes aura	Turkey Vulture	S5B,S3N						PR	PO	PO						
Accipitridae	**Hawks, Kites, Eagles & Allies**															
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO								
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO								
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO								
Buteo platypterus	Broad-winged Hawk	S5B						PR								
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR								
Strigidae	**Typical Owls**															
Bubo virginianus	Great Horned Owl	S4						PO								
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO								
Strix varia	Barred Owl	S5						PO								
Alcedinidae	**Kingfishers**															
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PO					PO		
Picidae	**Woodpeckers**															
Colaptes auratus	Northern Flicker	S5						PO	PO		PO					
Dryobates pubescens	Downy Woodpecker	S5						PO								

Dryobates villosus	Hairy Woodpecker	S5						PO								
Dryocopus pileatus	Pileated Woodpecker	S5						PO								
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO								
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO								
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR	PO			PO				
Falconidae	**Caracaras & Falcons**															
Falco sparverius	American Kestrel	S4						PR								
Tyrannidae	**Tyrant Flycatchers**															
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO								
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR								
Empidonax minimus	Least Flycatcher	S5B						PO								
Empidonax traillii	Willow Flycatcher	S4B						PO								
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PR			PO	PR		PO	
Sayornis phoebe	Eastern Phoebe	S5B						CO								
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PR		PO	PO		PR	PR	
Vireonidae	**Vireos**															
Vireo flavifrons	Yellow-throated Vireo	S4B						PO								
Vireo gilvus	Warbling Vireo	S5B						PR	PR			PO	PO	PR	PR	
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PO	PO	PO	PO			PO	
Vireo solitarius	Blue-headed Vireo	S5B						PO								
Corvidae	**Crows & Jays**															
Corvus brachyrhynchos	American Crow	S5						CO	PR	PR	PR		PO		PO	OB
Cyanocitta cristata	Blue Jay	S5						PR	PR	PO	PO	PR	PR	PR	PO	
Alaudidae	**Larks**															
Eremophila alpestris	Horned Lark	S4						CO								
Hirundinidae	**Swallows**															
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	PO	PO						
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO								
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO								
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO								
Tachycineta bicolor	Tree Swallow	S4S5B						CO	PO			PO			PO	
Paridae	**Chickadees & Titmice**															
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR				PR	PR	PR	PO
Sittidae	**Nuthatches**															
Sitta canadensis	Red-breasted Nuthatch	S5						CO								
Sitta carolinensis	White-breasted Nuthatch	S5						CO								
Troglodytidae	**Wrens**															
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO								
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO								
Troglodytes aedon	House Wren	S5B						PR	PR	PO			PO	PR	PO	OB
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO				PO			
Regulidae	**Kinglets**															
Regulus satrapa	Golden-crowned Kinglet	S5						PO								
Turdidae	**Thrushes**															
Catharus fuscescens	Veery	S5B						PR								
Catharus guttatus	Hermit Thrush	S5B,S4N						PO								
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR								
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO								
Turdus migratorius	American Robin	S5						CO	PR	PO	PO	PR	PR	PR	PR	
Mimidae	**Mockingbirds, Thrashers & Allies**															
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PO				PO			
Toxostoma rufum	Brown Thrasher	S4B						PO	PO				PO			

Sturnidae	**Starlings**															
Sturnus vulgaris	European Starling	SNA						CO	PO		PO					
Bombycillidae	**Waxwings**															
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PR	PO	PR				PO	
Passeridae	**Old World Sparrows**															
Passer domesticus	House Sparrow	SNA						CO								
Fringillidae	**Finches & Allies**															
Haemorhous mexicanus	House Finch	SNA						PO								
Haemorhous purpureus	Purple Finch	S5						PO								
Spinus tristis	American Goldfinch	S5						PR	PR	PR	PO			PR	PO	OB
Emberizidae	**New World Sparrows & Allies**															
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO	PR	PR	PO					
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR								
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PO	PO		PR	PR	
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PR		PR					
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO								
Pooecetes gramineus	Vesper Sparrow	S4B						PO								
Spizella pallida	Clay-colored Sparrow	S4B						PR								
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO	PO	PO	PO	PO	PO	PO	OB
Spizella pusilla	Field Sparrow	S4B,S3N						PR	PR	PO	PR					
Zonotrichia albicollis	White-throated Sparrow	S5						PO	OB							OB
Icteridae	**Troupials & Allies**															
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	CO	PO	PO	PO	PR	CO	PR	OB
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR	PO		PO					
Icterus galbula	Baltimore Oriole	S4B						PR	PR			PR	PO	PR	PO	OB
Molothrus ater	Brown-headed Cowbird	S5						PO	PR					PR	PO	PO
Quiscalus quiscula	Common Grackle	S5						CO	PR					PO	PR	
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PR		PR					OB
Parulidae	**Wood Warblers**															
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR								
Geothlypis philadelphia	Mourning Warbler	S5B						PR								
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR				PO	PR	PR	OB
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO								
Mniotilta varia	Black-and-white Warbler	S5B						CO	PR			PO	PR	PO	PR	
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR								
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO								
Seiurus aurocapilla	Ovenbird	S5B						PR								
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO								
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO								
Setophaga fusca	Blackburnian Warbler	S5B						PR								
Setophaga magnolia	Magnolia Warbler	S5B						PO								
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO								
Setophaga petechia	Yellow Warbler	S5B						PR	PO	PO				PO		
Setophaga pinus	Pine Warbler	S5B,S3N						PR	PO	PO	PO					
Setophaga ruticilla	American Redstart	S5B						PR	PR				PO	PR		
Setophaga virens	Black-throated Green Warbler	S5B						PR	PO	PO						
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO								
Cardinalidae	**Cardinals, Grosbeaks & Allies**															
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO			PO		PO	PO	
Passerina cyanea	Indigo Bunting	S5B						PR	PO	PO	PO		PO	PO	PO	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO								
Piranga olivacea	Scarlet Tanager	S5B						PO								
Spiza americana	Dickcissel	S2M						PR								
Total							**16**	**121**	**46**	**19**	**20**	**15**	**18**	**22**	**24**	**11**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from NAT-19 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-19A	BMB-19B	BMB-19C	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA, 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**												
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR					
Anas platyrhynchos	Mallard	S5					Low	CO					
Branta canadensis	Canada Goose	S5					Low	CO					
Lophodytes cucullatus	Hooded Merganser	S5					High	CO					
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR					
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO					
Phasianidae	**Partridges, Grouse & Turkeys**												
Bonasa umbellus	Ruffed Grouse	S5						PO					
Meleagris gallopavo	Wild Turkey	S5						CO					
Podicipediformes	**Grebes**												
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO					
Columbidae	**Pigeons & Doves**												
Columba livia	Rock Pigeon	SNA						PR					
Zenaida macroura	Mourning Dove	S5						PR	PO		PO		
Cuculiformes	**Cuckoos & Anis**												
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO					
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO					
Apodidae	**Swifts**												
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR					
Trochilidae	**Hummingbirds**												
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO					
Rallidae	**Rails, Gallinules & Coots**												
Porzana carolina	Sora	S5B					Medium	PO					
Rallus limicola	Virginia Rail	S4S5B					Medium	PO					
Charadriidae	**Plovers & Lapwings**												
Charadrius vociferus	Killdeer	S4B						PR					
Scolopacidae	**Sandpipers & Allies**												
Actitis macularia	Spotted Sandpiper	S5B						PO					
Bartramia longicauda	Upland Sandpiper	S2B						PR					
Scolopax minor	American Woodcock	S4B						PO					
Ardeidae	**Herons & Bitterns**												
Ardea herodias	Great Blue Heron	S4					Low	CO					
Botaurus lentiginosus	American Bittern	S5B					High	PO					
Butorides virescens	Green Heron	S4B					Low	PO					
Cathartidae	**Vultures**												
Cathartes aura	Turkey Vulture	S5B,S3N						PR	OB				OB
Accipitridae	**Hawks, Kites, Eagles & Allies**												
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PR					
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO					
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO					
Buteo platypterus	Broad-winged Hawk	S5B						PR					
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR					

Strigidae	**Typical Owls**												
Bubo virginianus	Great Horned Owl	S4						PO					
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO	OB				OB
Strix varia	Barred Owl	S5						PO					
Alcedinidae	**Kingfishers**												
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO					
Picidae	**Woodpeckers**												
Colaptes auratus	Northern Flicker	S5						PO					
Dryobates pubescens	Downy Woodpecker	S5						PO					
Dryobates villosus	Hairy Woodpecker	S5						PO					
Dryocopus pileatus	Pileated Woodpecker	S5						PO					
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO					
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO					
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR					
Falconidae	**Caracaras & Falcons**												
Falco sparverius	American Kestrel	S4						PR					
Tyrannidae	**Tyrant Flycatchers**												
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO					
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR					
Empidonax minimus	Least Flycatcher	S5B						PO					
Empidonax traillii	Willow Flycatcher	S4B						PO					
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO					
Sayornis phoebe	Eastern Phoebe	S5B						CO					
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PO	PO			
Vireonidae	**Vireos**												
Vireo flavifrons	Yellow-throated Vireo	S4B						PO					
Vireo gilvus	Warbling Vireo	S5B						PR					
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR		PO	PR	
Vireo solitarius	Blue-headed Vireo	S5B						PR					
Corvidae	**Crows & Jays**												
Corvus brachyrhynchos	American Crow	S5						CO	PO	PO	PO	PO	
Corvus corax	Common Raven	S5							PO	PO			
Cyanocitta cristata	Blue Jay	S5						PR					
Alaudidae	**Larks**												
Eremophila alpestris	Horned Lark	S4						CO					
Hirundinidae	**Swallows**												
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO					
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO					
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO					
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO					
Tachycineta bicolor	Tree Swallow	S4S5B						CO	PO				PO
Paridae	**Chickadees & Titmice**												
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR		PR	PO	
Sittidae	**Nuthatches**												
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PO			PO	
Sitta carolinensis	White-breasted Nuthatch	S5						CO					
Troglodytidae	**Wrens**												
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO					
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO					
Troglodytes aedon	House Wren	S5B						PR					
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO	PO	PO		OB
Regulidae	**Kinglets**												
Regulus satrapa	Golden-crowned Kinglet	S5						PO					
Turdidae	**Thrushes**												

Catharus fuscescens	Veery	S5B						PR					
Catharus guttatus	Hermit Thrush	S5B,S4N						PO					
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR					
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO					
Turdus migratorius	American Robin	S5						CO	PR	PR	PO	PO	
Mimidae	**Mockingbirds, Thrashers & Allies**												
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR					
Toxostoma rufum	Brown Thrasher	S4B						PO					
Sturnidae	**Starlings**												
Sturnus vulgaris	European Starling	SNA						CO					
Bombycillidae	**Waxwings**												
Bombycilla cedrorum	Cedar Waxwing	S5						PR					
Passeridae	**Old World Sparrows**												
Passer domesticus	House Sparrow	SNA						CO					
Fringillidae	**Finches & Allies**												
Haemorhous mexicanus	House Finch	SNA						PO					
Haemorhous purpureus	Purple Finch	S5						PO					
Spinus tristis	American Goldfinch	S5						PR	PO	PO	PO		
Emberizidae	**New World Sparrows & Allies**												
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO					
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO		PO		
Melospiza melodia	Song Sparrow	S5						CO	PR	PR			
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PO				PO
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO					
Pooecetes gramineus	Vesper Sparrow	S4B						PO					
Spizella pallida	Clay-colored Sparrow	S4B						PR					
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	OB				OB
Spizella pusilla	Field Sparrow	S4B,S3N						CO					
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PO		PO	PO	
Icteridae	**Troupials & Allies**												
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PO			PO	
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR					
Icterus galbula	Baltimore Oriole	S4B						PR	PO		PO		
Molothrus ater	Brown-headed Cowbird	S5						PO	OB				OB
Quiscalus quiscula	Common Grackle	S5						CO					
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PO	PO			
Parulidae	**Wood Warblers**												
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR					
Geothlypis philadelphia	Mourning Warbler	S5B						PR					
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PO		PO	PO	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO					
Mniotilta varia	Black-and-white Warbler	S5B						CO	PO		PO		
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR					
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO	PR		PR	PO	
Seiurus aurocapilla	Ovenbird	S5B						PR					
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO					
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO					
Setophaga fusca	Blackburnian Warbler	S5B						PR					
Setophaga magnolia	Magnolia Warbler	S5B						PO					
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO					
Setophaga petechia	Yellow Warbler	S5B						PR					
Setophaga pinus	Pine Warbler	S5B,S3N						PR					
Setophaga ruticilla	American Redstart	S5B						PR					
Setophaga virens	Black-throated Green Warbler	S5B						PR					

Vermivora cyanoptera	Blue-winged Warbler	S4B						PO					
Cardinalidae	**Cardinals, Grosbeaks & Allies**												
Cardinalis cardinalis	Northern Cardinal	S5						CO	PO		PO		
Passerina cyanea	Indigo Bunting	S5B						PR					
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO					
Piranga olivacea	Scarlet Tanager	S5B						PO	PO			PO	
Spiza americana	Dickcissel	S2M						PR					
Total							**16**	**121**	**27**	**8**	**14**	**10**	**7**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Bird Species Reported from NAT-20 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	MBB-20A	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**										
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	OB		OB
Anas platyrhynchos	Mallard	S5					Low	CO			
Branta canadensis	Canada Goose	S5					Low	CO	PO	PO	
Lophodytes cucullatus	Hooded Merganser	S5					High	CO			
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR			
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO			
Phasianidae	**Partridges, Grouse & Turkeys**										
Bonasa umbellus	Ruffed Grouse	S5						PO	OB		OB
Meleagris gallopavo	Wild Turkey	S5						CO			
Podicipediformes	**Grebes**										
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO			
Columbidae	**Pigeons & Doves**										
Columba livia	Rock Pigeon	SNA						PR			
Zenaida macroura	Mourning Dove	S5						PR			
Cuculiformes	**Cuckoos & Anis**										
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO			
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO			
Apodidae	**Swifts**										
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR			
Trochilidae	**Hummingbirds**										
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO			
Rallidae	**Rails, Gallinules & Coots**										
Porzana carolina	Sora	S5B					Medium	PO			
Rallus limicola	Virginia Rail	S4S5B					Medium	PO			
Charadriidae	**Plovers & Lapwings**										
Charadrius vociferus	Killdeer	S4B						PR	PO	PO	
Scolopacidae	**Sandpipers & Allies**								0		
Actitis sp.	Sandpiper Sp.								OB		OB
Actitis macularia	Spotted Sandpiper	S5B						PO			
Bartramia longicauda	Upland Sandpiper	S2B						PR			
Scolopax minor	American Woodcock	S4B						PO			
Ardeidae	**Herons & Bitterns**										
Ardea herodias	Great Blue Heron	S4					Low	CO			
Botaurus lentiginosus	American Bittern	S5B					High	PO			
Butorides virescens	Green Heron	S4B					Low	PO			
Cathartidae	**Vultures**										
Cathartes aura	Turkey Vulture	S5B,S3N						PR			
Accipitridae	**Hawks, Kites, Eagles & Allies**										
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO			
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO			
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO			
Buteo platypterus	Broad-winged Hawk	S5B						PR			
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR			

Strigidae	**Typical Owls**										
Bubo virginianus	Great Horned Owl	S4						PO			
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO			
Strix varia	Barred Owl	S5						PO			
Alcedinidae	**Kingfishers**										
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	PO	PO	OB
Picidae	**Woodpeckers**										
Colaptes auratus	Northern Flicker	S5						PO	OB		OB
Dryobates pubescens	Downy Woodpecker	S5						PO			
Dryobates villosus	Hairy Woodpecker	S5						PO			
Dryocopus pileatus	Pileated Woodpecker	S5						PO			
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO			
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO			
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR	OB		OB
Falconidae	**Caracaras & Falcons**										
Falco sparverius	American Kestrel	S4						PR			
Tyrannidae	**Tyrant Flycatchers**										
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PR	PR	
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR			
Empidonax minimus	Least Flycatcher	S5B						PO			
Empidonax traillii	Willow Flycatcher	S4B						PO			
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO			
Sayornis phoebe	Eastern Phoebe	S5B						CO			
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	OB		OB
Vireonidae	**Vireos**										
Vireo flavifrons	Yellow-throated Vireo	S4B						PO			
Vireo gilvus	Warbling Vireo	S5B						PR			
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR	PR	
Vireo solitarius	Blue-headed Vireo	S5B						PO			
Corvidae	**Crows & Jays**										
Corvus brachyrhynchos	American Crow	S5						CO	PO	PO	
Corvus ossifragus	Fish Crow	S1B,S3N							PO	PO	
Cyanocitta cristata	Blue Jay	S5						PR			
Alaudidae	**Larks**										
Eremophila alpestris	Horned Lark	S4						CO			
Hirundinidae	**Swallows**										
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	OB		OB
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO			
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO	OB		OB
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO			
Tachycineta bicolor	Tree Swallow	S4S5B						CO			
Paridae	**Chickadees & Titmice**										
Poecile atricapillus	Black-capped Chickadee	S5						CO			
Sittidae	**Nuthatches**										
Sitta canadensis	Red-breasted Nuthatch	S5						CO			
Sitta carolinensis	White-breasted Nuthatch	S5						CO			
Troglodytidae	**Wrens**										
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO			
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO			
Troglodytes aedon	House Wren	S5B						PR	PO	PO	
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO			
Regulidae	**Kinglets**										
Regulus satrapa	Golden-crowned Kinglet	S5						PO			
Turdidae	**Thrushes**										

Catharus fuscescens	Veery	S5B						PR			
Catharus guttatus	Hermit Thrush	S5B,S4N						PO			
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR			
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO			
Turdus migratorius	American Robin	S5						CO	PO	PO	
Mimidae	**Mockingbirds, Thrashers & Allies**										
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PO	PO	
Toxostoma rufum	Brown Thrasher	S4B						PO			
Sturnidae	**Starlings**										
Sturnus vulgaris	European Starling	SNA						CO			
Bombycillidae	**Waxwings**										
Bombycilla cedrorum	Cedar Waxwing	S5						PR			
Passeridae	**Old World Sparrows**										
Passer domesticus	House Sparrow	SNA						CO			
Fringillidae	**Finches & Allies**										
Haemorhous mexicanus	House Finch	SNA						PO			
Haemorhous purpureus	Purple Finch	S5						PO			
Spinus tristis	American Goldfinch	S5						PR	OB		OB
Emberizidae	**New World Sparrows & Allies**										
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO	OB		OB
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO	PO	
Melospiza melodia	Song Sparrow	S5						CO	PO	PO	
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR			
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO			
Pooecetes gramineus	Vesper Sparrow	S4B						PO			
Spizella pallida	Clay-colored Sparrow	S4B						PR			
Spizella passerina	Chipping Sparrow	S5B,S3N						PR			
Spizella pusilla	Field Sparrow	S4B,S3N						PR			
Zonotrichia albicollis	White-throated Sparrow	S5						PO			
Icteridae	**Troupials & Allies**										
Agelaius phoeniceus	Red-winged Blackbird	S5						CO			
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR			
Icterus galbula	Baltimore Oriole	S4B						PR	PO	PO	
Molothrus ater	Brown-headed Cowbird	S5						PO	PO	PO	
Quiscalus quiscula	Common Grackle	S5						CO			
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	OB		OB
Parulidae	**Wood Warblers**										
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR			
Geothlypis philadelphia	Mourning Warbler	S5B						PR	PO	PO	
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PO	PO	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO			
Mniotilta varia	Black-and-white Warbler	S5B						CO			
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR			
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO			
Seiurus aurocapilla	Ovenbird	S5B						PR			
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO			
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO	OB		OB
Setophaga fusca	Blackburnian Warbler	S5B						PR			
Setophaga magnolia	Magnolia Warbler	S5B						PO			
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO			
Setophaga petechia	Yellow Warbler	S5B						PR	PO	PO	
Setophaga pinus	Pine Warbler	S5B,S3N						PR			
Setophaga ruticilla	American Redstart	S5B						PR	PR	PR	
Setophaga virens	Black-throated Green Warbler	S5B						PR			

Vermivora cyanoptera	Blue-winged Warbler	S4B						PO			
Cardinalidae	**Cardinals, Grosbeaks & Allies**										
Cardinalis cardinalis	Northern Cardinal	S5						CO			
Passerina cyanea	Indigo Bunting	S5B						PR			
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO	PO	
Piranga olivacea	Scarlet Tanager	S5B						PO	PO	PO	
Spiza americana	Dickcissel	S2M						PR			
Total							**16**	**121**	**32**	**20**	**13**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Bird Species Reported from NAT-21 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	
Anatidae	**Ducks, Geese & Swans**									
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR		
Anas platyrhynchos	Mallard	S5					Low	CO		
Branta canadensis	Canada Goose	S5					Low	CO		
Lophodytes cucullatus	Hooded Merganser	S5					High	CO		
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR		
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO		
Phasianidae	**Partridges, Grouse & Turkeys**									
Bonasa umbellus	Ruffed Grouse	S5						PO		
Meleagris gallopavo	Wild Turkey	S5						CO		
Podicipediformes	**Grebes**									
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO		
Columbidae	**Pigeons & Doves**									
Columba livia	Rock Pigeon	SNA						PR		
Zenaida macroura	Mourning Dove	S5						PR		
Cuculiformes	**Cuckoos & Anis**									
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO		
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO		
Apodidae	**Swifts**									
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR		
Trochilidae	**Hummingbirds**									
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO		
Rallidae	**Rails, Gallinules & Coots**									
Porzana carolina	Sora	S5B					Medium	PO		
Rallus limicola	Virginia Rail	S4S5B					Medium	PO		
Charadriidae	**Plovers & Lapwings**									
Charadrius vociferus	Killdeer	S4B						PR		
Scolopacidae	**Sandpipers & Allies**									
Actitis macularia	Spotted Sandpiper	S5B						PO		
Bartramia longicauda	Upland Sandpiper	S2B						PR		
Scolopax minor	American Woodcock	S4B						PO		
Ardeidae	**Herons & Bitterns**									
Ardea herodias	Great Blue Heron	S4					Low	CO		
Botaurus lentiginosus	American Bittern	S5B					High	PO		
Butorides virescens	Green Heron	S4B					Low	PO		
Cathartidae	**Vultures**									
Cathartes aura	Turkey Vulture	S5B,S3N						PR		
Accipitridae	**Hawks, Kites, Eagles & Allies**									
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PR		
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO		
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO		
Buteo platypterus	Broad-winged Hawk	S5B						PR		
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR		

Strigidae	**Typical Owls**									
Bubo virginianus	Great Horned Owl	S4						PO		
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO		
Strix varia	Barred Owl	S5						PO		
Alcedinidae	**Kingfishers**									
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO		
Picidae	**Woodpeckers**									
Colaptes auratus	Northern Flicker	S5						PO		
Dryobates pubescens	Downy Woodpecker	S5						PO		
Dryobates villosus	Hairy Woodpecker	S5						PO		
Dryocopus pileatus	Pileated Woodpecker	S5						PO		
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO		
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO		
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR		
Falconidae	**Caracaras & Falcons**									
Falco sparverius	American Kestrel	S4						PR		
Tyrannidae	**Tyrant Flycatchers**									
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO		
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR		
Empidonax minimus	Least Flycatcher	S5B						PO		
Empidonax traillii	Willow Flycatcher	S4B						PO		
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO		
Sayornis phoebe	Eastern Phoebe	S5B						CO		
Tyrannus tyrannus	Eastern Kingbird	S4B						PR		
Vireonidae	**Vireos**									
Vireo flavifrons	Yellow-throated Vireo	S4B						PO		
Vireo gilvus	Warbling Vireo	S5B						PR		
Vireo olivaceus	Red-eyed Vireo	S5B						PR		
Vireo solitarius	Blue-headed Vireo	S5B						PR		
Corvidae	**Crows & Jays**									
Corvus brachyrhynchos	American Crow	S5						CO		
Cyanocitta cristata	Blue Jay	S5						PR		
Alaudidae	**Larks**									
Eremophila alpestris	Horned Lark	S4						CO		
Hirundinidae	**Swallows**									
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO		
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO		
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO		
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO		
Tachycineta bicolor	Tree Swallow	S4S5B						CO		
Paridae	**Chickadees & Titmice**									
Poecile atricapillus	Black-capped Chickadee	S5						CO		
Sittidae	**Nuthatches**									
Sitta canadensis	Red-breasted Nuthatch	S5						CO		
Sitta carolinensis	White-breasted Nuthatch	S5						CO		
Troglodytidae	**Wrens**									
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO		
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO		
Troglodytes aedon	House Wren	S5B						PR		
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO		
Regulidae	**Kinglets**									
Regulus satrapa	Golden-crowned Kinglet	S5						PO		
Turdidae	**Thrushes**									
Catharus fuscescens	Veery	S5B						PR	OB	OB

Catharus guttatus	Hermit Thrush	S5B,S4N						PO		
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR		
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO		
Turdus migratorius	American Robin	S5						CO	OB	OB
Mimidae	**Mockingbirds, Thrashers & Allies**									
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR		
Toxostoma rufum	Brown Thrasher	S4B						PO		
Sturnidae	**Starlings**									
Sturnus vulgaris	European Starling	SNA						CO		
Bombycillidae	**Waxwings**									
Bombycilla cedrorum	Cedar Waxwing	S5						PR		
Passeridae	**Old World Sparrows**									
Passer domesticus	House Sparrow	SNA						CO		
Fringillidae	**Finches & Allies**									
Haemorhous mexicanus	House Finch	SNA						PO		
Haemorhous purpureus	Purple Finch	S5						PO		
Spinus tristis	American Goldfinch	S5						PR		
Emberizidae	**New World Sparrows & Allies**									
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO		
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR		
Melospiza melodia	Song Sparrow	S5						CO	OB	OB
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR		
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO		
Pooecetes gramineus	Vesper Sparrow	S4B						PO		
Spizella pallida	Clay-colored Sparrow	S4B						PR		
Spizella passerina	Chipping Sparrow	S5B,S3N						PR		
Spizella pusilla	Field Sparrow	S4B,S3N						CO		
Zonotrichia albicollis	White-throated Sparrow	S5						PO		
Icteridae	**Troupials & Allies**									
Agelaius phoeniceus	Red-winged Blackbird	S5						CO		
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR		
Icterus galbula	Baltimore Oriole	S4B						PR		
Molothrus ater	Brown-headed Cowbird	S5						PO		
Quiscalus quiscula	Common Grackle	S5						CO		
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR		
Parulidae	**Wood Warblers**									
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR		
Geothlypis philadelphia	Mourning Warbler	S5B						PR		
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO		
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO		
Mniotilta varia	Black-and-white Warbler	S5B						CO		
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR		
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO		
Seiurus aurocapilla	Ovenbird	S5B						PR		
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO		
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO		
Setophaga fusca	Blackburnian Warbler	S5B						PR		
Setophaga magnolia	Magnolia Warbler	S5B						PO		
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO		
Setophaga petechia	Yellow Warbler	S5B						PR		
Setophaga pinus	Pine Warbler	S5B,S3N						PR		
Setophaga ruticilla	American Redstart	S5B						PR		
Setophaga virens	Black-throated Green Warbler	S5B						PR		
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO		

Cardinalidae	**Cardinals, Grosbeaks & Allies**									
Cardinalis cardinalis	Northern Cardinal	S5						CO		
Passerina cyanea	Indigo Bunting	S5B						PR		
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO		
Piranga olivacea	Scarlet Tanager	S5B						PO		
Spiza americana	Dickcissel	S2M						PR		
Total							**16**	**121**	**3**	**3**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Bird Studies Canada (BSC), Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists and Ontario Ministry of Natural Resources. 2006. Ontario Breeding Bird Atlas Database, 31 January 2008. https://www.birdsontario.org/jsp/datasummaries.jsp

Bird Species Reported from the Former Prince Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	Prince BMB-01	Prince BMB-02	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**											
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR				
Anas platyrhynchos	Mallard	S5					Low	CO				
Branta canadensis	Canada Goose	S5					Low	CO				
Lophodytes cucullatus	Hooded Merganser	S5					High	CO				
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR				
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO				
Phasianidae	**Partridges, Grouse & Turkeys**											
Bonasa umbellus	Ruffed Grouse	S5						PO	OB			OB
Meleagris gallopavo	Wild Turkey	S5						CO	OB			OB
Podicipediformes	**Grebes**											
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO				
Columbidae	**Pigeons & Doves**											
Columba livia	Rock Pigeon	SNA						PR				
Zenaida macroura	Mourning Dove	S5						PR				
Cuculiformes	**Cuckoos & Anis**											
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO				
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO				
Apodidae	**Swifts**											
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR				
Trochilidae	**Hummingbirds**											
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO				
Rallidae	**Rails, Gallinules & Coots**											
Porzana carolina	Sora	S5B					Medium	PO				
Rallus limicola	Virginia Rail	S4S5B					Medium	PO				
Charadriidae	**Plovers & Lapwings**											
Charadrius vociferus	Killdeer	S4B						PR	OB			OB
Scolopacidae	**Sandpipers & Allies**											
Actitis macularia	Spotted Sandpiper	S5B						PO				
Bartramia longicauda	Upland Sandpiper	S2B						PR				
Scolopax minor	American Woodcock	S4B						PO				
Ardeidae	**Herons & Bitterns**											
Ardea herodias	Great Blue Heron	S4					Low	CO				
Botaurus lentiginosus	American Bittern	S5B					High	PO				
Butorides virescens	Green Heron	S4B					Low	PO				
Cathartidae	**Vultures**											
Cathartes aura	Turkey Vulture	S5B,S3N						PR				
Accipitridae	**Hawks, Kites, Eagles & Allies**											
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PR				
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO				
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO				
Buteo platypterus	Broad-winged Hawk	S5B						PR				

Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR				
Strigidae	**Typical Owls**											
Bubo virginianus	Great Horned Owl	S4						PO				
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO				
Strix varia	Barred Owl	S5						PO				
Alcedinidae	**Kingfishers**											
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	OB			OB
Picidae	**Woodpeckers**											
Colaptes auratus	Northern Flicker	S5						PO				
Dryobates pubescens	Downy Woodpecker	S5						PO				
Dryobates villosus	Hairy Woodpecker	S5						PO				
Dryocopus pileatus	Pileated Woodpecker	S5						PO				
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO				
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO				
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR				
Falconidae	**Caracaras & Falcons**											
Falco sparverius	American Kestrel	S4						PR	OB			OB
Tyrannidae	**Tyrant Flycatchers**											
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PO	PO	PO	PO
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR				
Empidonax minimus	Least Flycatcher	S5B						PO				
Empidonax traillii	Willow Flycatcher	S4B						PO	OB			OB
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO				
Sayornis phoebe	Eastern Phoebe	S5B						CO				
Tyrannus tyrannus	Eastern Kingbird	S4B						PR				
Vireonidae	**Vireos**											
Vireo flavifrons	Yellow-throated Vireo	S4B						PO				
Vireo gilvus	Warbling Vireo	S5B						PR				
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR	PR	PR	
Vireo solitarius	Blue-headed Vireo	S5B						PR				
Corvidae	**Crows & Jays**											
Corvus brachyrhynchos	American Crow	S5						CO	PO	PO	PO	OB
Cyanocitta cristata	Blue Jay	S5						PR	PO	PO		OB
Alaudidae	**Larks**											
Eremophila alpestris	Horned Lark	S4						CO				
Hirundinidae	**Swallows**											
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO				
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO				
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO				
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO				
Tachycineta bicolor	Tree Swallow	S4S5B						CO				
Paridae	**Chickadees & Titmice**											
Poecile atricapillus	Black-capped Chickadee	S5						CO	PO			PO
Sittidae	**Nuthatches**											
Sitta canadensis	Red-breasted Nuthatch	S5						CO				
Sitta carolinensis	White-breasted Nuthatch	S5						CO				
Troglodytidae	**Wrens**											
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO				
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO				
Troglodytes aedon	House Wren	S5B						PR	PO		PO	PO
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO			PO
Regulidae	**Kinglets**											

Regulus satrapa	Golden-crowned Kinglet	S5						PO				
Turdidae	**Thrushes**											
Catharus fuscescens	Veery	S5B						PR				
Catharus guttatus	Hermit Thrush	S5B,S4N						PO				
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR				
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO				
Turdus migratorius	American Robin	S5						CO	PR	PR	PR	
Mimidae	**Mockingbirds, Thrashers & Allies**											
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR				
Toxostoma rufum	Brown Thrasher	S4B						PO				
Sturnidae	**Starlings**											
Sturnus vulgaris	European Starling	SNA						CO				
Bombycillidae	**Waxwings**											
Bombycilla cedrorum	Cedar Waxwing	S5						PR				
Passeridae	**Old World Sparrows**											
Passer domesticus	House Sparrow	SNA						CO				
Fringillidae	**Finches & Allies**											
Haemorhous mexicanus	House Finch	SNA						PO				
Haemorhous purpureus	Purple Finch	S5						PO				
Spinus tristis	American Goldfinch	S5						PR	OB			OB
Emberizidae	**New World Sparrows & Allies**											
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO				
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR				
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PR	PO
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR				
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO				
Pooecetes gramineus	Vesper Sparrow	S4B						PO				
Spizella pallida	Clay-colored Sparrow	S4B						PR				
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO			PO
Spizella pusilla	Field Sparrow	S4B,S3N						CO				
Spizelloides arborea	American Tree Sparrow	S5							OB			OB
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PO	PO	PO	
Icteridae	**Troupials & Allies**											
Agelaius phoeniceus	Red-winged Blackbird	S5						CO				
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR				
Icterus galbula	Baltimore Oriole	S4B						PR	PO	PO		
Molothrus ater	Brown-headed Cowbird	S5						PO				
Quiscalus quiscula	Common Grackle	S5						CO	PO		PO	
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR				
Parulidae	**Wood Warblers**											
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR				
Geothlypis philadelphia	Mourning Warbler	S5B						PR				
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO				
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO				
Mniotilta varia	Black-and-white Warbler	S5B						CO				
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR				
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO				
Seiurus aurocapilla	Ovenbird	S5B						PR				
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO				
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO				
Setophaga fusca	Blackburnian Warbler	S5B						PR				
Setophaga magnolia	Magnolia Warbler	S5B						PO				

Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO	PO		PO	
Setophaga petechia	Yellow Warbler	S5B						PR	PO		PO	
Setophaga pinus	Pine Warbler	S5B,S3N						PR				
Setophaga ruticilla	American Redstart	S5B						PR	PO	PO	PO	
Setophaga virens	Black-throated Green Warbler	S5B						PR				
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO				
Cardinalidae	**Cardinals, Grosbeaks & Allies**											
Cardinalis cardinalis	Northern Cardinal	S5						CO				
Passerina cyanea	Indigo Bunting	S5B						PR	PR		PR	
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO	PO	PO	
Piranga olivacea	Scarlet Tanager	S5B						PO				
Spiza americana	Dickcissel	S2M						PR				
Total							**16**	**121**	**26**	**10**	**13**	**16**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from the Former Bonnefield Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	Bonnefield BMB-01	Bonnefield BMB-01	Bonnefield BMB-04	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**												
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	OB				OB
Anas platyrhynchos	Mallard	S5					Low	CO					
Branta canadensis	Canada Goose	S5					Low	CO					
Lophodytes cucullatus	Hooded Merganser	S5					High	CO					
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR					
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO					
Phasianidae	**Partridges, Grouse & Turkeys**												
Bonasa umbellus	Ruffed Grouse	S5						PO	OB				OB
Meleagris gallopavo	Wild Turkey	S5						CO	OB				OB
Podicipediformes	**Grebes**												
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO					
Columbidae	**Pigeons & Doves**												
Columba livia	Rock Pigeon	SNA						PR					
Zenaida macroura	Mourning Dove	S5						PR					
Cuculiformes	**Cuckoos & Anis**												
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO					
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO					
Apodidae	**Swifts**												
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR					
Trochilidae	**Hummingbirds**												
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO					
Rallidae	**Rails, Gallinules & Coots**												
Porzana carolina	Sora	S5B					Medium	PO					
Rallus limicola	Virginia Rail	S4S5B					Medium	PO					
Charadriidae	**Plovers & Lapwings**												
Charadrius vociferus	Killdeer	S4B						PR	OB				OB
Scolopacidae	**Sandpipers & Allies**												
Actitis macularia	Spotted Sandpiper	S5B						PO					
Bartramia longicauda	Upland Sandpiper	S2B						PR					
Scolopax minor	American Woodcock	S4B						PO					
Ardeidae	**Herons & Bitterns**												
Ardea herodias	Great Blue Heron	S4					Low	CO					
Botaurus lentiginosus	American Bittern	S5B					High	PO					
Butorides virescens	Green Heron	S4B					Low	PO					
Cathartidae	**Vultures**												
Cathartes aura	Turkey Vulture	S5B,S3N						PR					
Accipitridae	**Hawks, Kites, Eagles & Allies**												
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO					
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO					
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO					
Buteo platypterus	Broad-winged Hawk	S5B						PR					
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR					
Strigidae	**Typical Owls**												

Bubo virginianus	Great Horned Owl	S4						PO					
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO					
Strix varia	Barred Owl	S5						PO					
Alcedinidae	**Kingfishers**												
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	OB				OB
Picidae	**Woodpeckers**												
Colaptes auratus	Northern Flicker	S5						PO	PO		PO		
Dryobates pubescens	Downy Woodpecker	S5						PO					
Dryobates villosus	Hairy Woodpecker	S5						PO	OB				OB
Dryocopus pileatus	Pileated Woodpecker	S5						PO					
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO					
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO					
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR					
Falconidae	**Caracaras & Falcons**												
Falco sparverius	American Kestrel	S4						PR	OB				OB
Tyrannidae	**Tyrant Flycatchers**												
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO	PO	PO	PO	PO	PO
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR					
Empidonax minimus	Least Flycatcher	S5B						PO	PR	PR			
Empidonax traillii	Willow Flycatcher	S4B						PO	OB				OB
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO	PO		PO		
Sayornis phoebe	Eastern Phoebe	S5B						CO					
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PO		PO		
Vireonidae	**Vireos**												
Vireo flavifrons	Yellow-throated Vireo	S4B						PO					
Vireo gilvus	Warbling Vireo	S5B						PR	PO	PO			OB
Vireo olivaceus	Red-eyed Vireo	S5B						PR	PR	PR	PO	PO	
Vireo solitarius	Blue-headed Vireo	S5B						PO					
Corvidae	**Crows & Jays**												
Corvus brachyrhynchos	American Crow	S5						CO	PO		PO	OB	OB
Cyanocitta cristata	Blue Jay	S5						PR	PO		PO	PO	OB
Alaudidae	**Larks**												
Eremophila alpestris	Horned Lark	S4						CO					
Hirundinidae	**Swallows**												
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO					
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO					
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO					
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO					
Tachycineta bicolor	Tree Swallow	S4S5B						CO					
Paridae	**Chickadees & Titmice**												
Poecile atricapillus	Black-capped Chickadee	S5						CO	PO			PO	PO
Sittidae	**Nuthatches**												
Sitta canadensis	Red-breasted Nuthatch	S5						CO					
Sitta carolinensis	White-breasted Nuthatch	S5						CO					
Troglodytidae	**Wrens**												
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO					
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO					
Troglodytes aedon	House Wren	S5B						PR	PO	PO	PO	PO	PO
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO				PO
Regulidae	**Kinglets**												
Regulus satrapa	Golden-crowned Kinglet	S5						PO					
Turdidae	**Thrushes**												
Catharus fuscescens	Veery	S5B						PR					
Catharus guttatus	Hermit Thrush	S5B,S4N						PO					

Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR					
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO					
Turdus migratorius	American Robin	S5						CO	PR	PR	PR	PO	
Mimidae	**Mockingbirds, Thrashers & Allies**												
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PO	PO			
Toxostoma rufum	Brown Thrasher	S4B						PO					
Sturnidae	**Starlings**												
Sturnus vulgaris	European Starling	SNA						CO					
Bombycillidae	**Waxwings**												
Bombycilla cedrorum	Cedar Waxwing	S5						PR	PO		PO		
Passeridae	**Old World Sparrows**												
Passer domesticus	House Sparrow	SNA						CO					
Fringillidae	**Finches & Allies**												
Haemorhous mexicanus	House Finch	SNA						PO					
Haemorhous purpureus	Purple Finch	S5						PO					
Spinus tristis	American Goldfinch	S5						PR	PO			PO	OB
Emberizidae	**New World Sparrows & Allies**												
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO					
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR					
Melospiza melodia	Song Sparrow	S5						CO	PR	PO	PR	PO	PO
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR					
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO					
Pooecetes gramineus	Vesper Sparrow	S4B						PO					
Spizella pallida	Clay-colored Sparrow	S4B						PR					
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO				PO
Spizella pusilla	Field Sparrow	S4B,S3N						PR	OB				OB
Spizelloides arborea	American Tree Sparrow	S5							OB				OB
Zonotrichia albicollis	White-throated Sparrow	S5						PO	PO		PO		
Icteridae	**Troupials & Allies**												
Agelaius phoeniceus	Red-winged Blackbird	S5						CO					
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR					
Icterus galbula	Baltimore Oriole	S4B						PR					
Molothrus ater	Brown-headed Cowbird	S5						PO	OB				OB
Quiscalus quiscula	Common Grackle	S5						CO					
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR					
Parulidae	**Wood Warblers**												
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR					
Geothlypis philadelphia	Mourning Warbler	S5B						PR					
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PO	PO			
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO					
Mniotilta varia	Black-and-white Warbler	S5B						CO					
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR					
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO					
Seiurus aurocapilla	Ovenbird	S5B						PR					
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO					
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO					
Setophaga fusca	Blackburnian Warbler	S5B						PR					
Setophaga magnolia	Magnolia Warbler	S5B						PO					
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO					
Setophaga petechia	Yellow Warbler	S5B						PR	PO	PO			
Setophaga pinus	Pine Warbler	S5B,S3N						PR					
Setophaga ruticilla	American Redstart	S5B						PR	PO	PO		PO	
Setophaga virens	Black-throated Green Warbler	S5B						PR					
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO					

Cardinalidae	**Cardinals, Grosbeaks & Allies**												
Cardinalis cardinalis	Northern Cardinal	S5						CO					
Passerina cyanea	Indigo Bunting	S5B						PR	PO		PO	PO	OB
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO	PO	PO			
Piranga olivacea	Scarlet Tanager	S5B						PO					
Spiza americana	Dickcissel	S2M						PR					
Total							**16**	**121**	**35**	**12**	**13**	**11**	**22**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Bird Species Reported from Melancthon Pit #2 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	OBBA*	NRSI Observed: Highest Level of Breeding Evidence	Melancthon MBB-02	Melancthon MBB-02	Melancthon BMB-03	Other Observations
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	BSC et al. 2006	NRSI Results from 2021 & 2022	NRSI 2021	NRSI 2022	NRSI 2022	
Anatidae	**Ducks, Geese & Swans**												
Aix sponsa	Wood Duck	S5B,S3N					Medium	PR	OB				OB
Anas platyrhynchos	Mallard	S5					Low	CO	OB				OB
Branta canadensis	Canada Goose	S5					Low	CO					
Lophodytes cucullatus	Hooded Merganser	S5					High	CO					
Oxyura jamaicensis	Ruddy Duck	S3B,S4N,S5M						PR					
Spatula discors	Blue-winged Teal	S3B,S4M					Medium	PO					
Phasianidae	**Partridges, Grouse & Turkeys**												
Bonasa umbellus	Ruffed Grouse	S5						PO	OB				OB
Meleagris gallopavo	Wild Turkey	S5						CO	OB				OB
Podicipediformes	**Grebes**												
Podilymbus podiceps	Pied-billed Grebe	S4B,S2N					High	CO					
Columbidae	**Pigeons & Doves**												
Columba livia	Rock Pigeon	SNA						PR					
Zenaida macroura	Mourning Dove	S5						PR	CO	CO			
Cuculiformes	**Cuckoos & Anis**												
Coccyzus erythropthalmus	Black-billed Cuckoo	S4S5B						CO					
Coccyzus sp.	Black/Yellow-billed Cuckoo	NP						PO					
Apodidae	**Swifts**												
Chaetura pelagica	Chimney Swift	S3B	THR	T	T	Schedule 1		PR					
Trochilidae	**Hummingbirds**												
Archilochus colubris	Ruby-throated Hummingbird	S5B						PO					
Rallidae	**Rails, Gallinules & Coots**												
Porzana carolina	Sora	S5B					Medium	PO					
Rallus limicola	Virginia Rail	S4S5B					Medium	PO					
Charadriidae	**Plovers & Lapwings**												
Charadrius vociferus	Killdeer	S4B						PR	PO		PO		OB
Scolopacidae	**Sandpipers & Allies**												
Actitis macularia	Spotted Sandpiper	S5B						PO	PO	PO	PO		
Bartramia longicauda	Upland Sandpiper	S2B						PR					
Scolopax minor	American Woodcock	S4B						PO					
Ardeidae	**Herons & Bitterns**												
Ardea herodias	Great Blue Heron	S4					Low	CO					
Botaurus lentiginosus	American Bittern	S5B					High	PO					
Butorides virescens	Green Heron	S4B					Low	PO					
Cathartidae	**Vultures**												
Cathartes aura	Turkey Vulture	S5B,S3N						PR	OB		OB		
Accipitridae	**Hawks, Kites, Eagles & Allies**												
Accipiter cooperii	Cooper's Hawk	S4	NAR	NAR	NS	No schedule		PO					
Accipiter striatus	Sharp-shinned Hawk	S5	NAR	NAR	NS	No schedule		CO					
Buteo jamaicensis	Red-tailed Hawk	S5	NAR	NAR	NS	No schedule		PO					
Buteo platypterus	Broad-winged Hawk	S5B						PR					
Circus hudsonius	Northern Harrier	S5B,S4N	NAR	NAR	NS	No schedule		PR					

Strigidae	**Typical Owls**												
Bubo virginianus	Great Horned Owl	S4						PO					
Megascops asio	Eastern Screech-Owl	S4	NAR	NAR	NS	No schedule		PO					
Strix varia	Barred Owl	S5						PO					
Alcedinidae	**Kingfishers**												
Megaceryle alcyon	Belted Kingfisher	S5B,S4N						CO	CO	PR	CO	PO	OB
Picidae	**Woodpeckers**												
Colaptes auratus	Northern Flicker	S5						PO					
Dryobates pubescens	Downy Woodpecker	S5						PO					
Dryobates villosus	Hairy Woodpecker	S5						PO					
Dryocopus pileatus	Pileated Woodpecker	S5						PO					
Melanerpes carolinus	Red-bellied Woodpecker	S5						PO					
Melanerpes erythrocephalus	Red-headed Woodpecker	S3	END	E	E	Schedule 1		PO					
Sphyrapicus varius	Yellow-bellied Sapsucker	S5B,S3N						PR					
Falconidae	**Caracaras & Falcons**												
Falco sparverius	American Kestrel	S4						PR	OB				OB
Tyrannidae	**Tyrant Flycatchers**												
Contopus virens	Eastern Wood-Pewee	S4B	SC	SC	SC	Schedule 1		PO					
Empidonax alnorum	Alder Flycatcher	S5B					Low	PR	PR	PR			
Empidonax minimus	Least Flycatcher	S5B						PO					
Empidonax traillii	Willow Flycatcher	S4B						PO	OB				OB
Myiarchus crinitus	Great Crested Flycatcher	S5B						PO					
Sayornis phoebe	Eastern Phoebe	S5B						CO					
Tyrannus tyrannus	Eastern Kingbird	S4B						PR	PO		PO	PO	OB
Vireonidae	**Vireos**												
Vireo flavifrons	Yellow-throated Vireo	S4B						PO					
Vireo gilvus	Warbling Vireo	S5B						PR	PO	PO			OB
Vireo olivaceus	Red-eyed Vireo	S5B						PR					
Vireo solitarius	Blue-headed Vireo	S5B						PO					
Corvidae	**Crows & Jays**												
Corvus brachyrhynchos	American Crow	S5						CO	PR	PR		PO	OB
Corvus corax	Common Raven	S5							OB				OB
Cyanocitta cristata	Blue Jay	S5						PR	PO		PO		OB
Alaudidae	**Larks**												
Eremophila alpestris	Horned Lark	S4						CO					
Hirundinidae	**Swallows**												
Hirundo rustica	Barn Swallow	S4B	SC	SC	T	Schedule 1		CO	OB	OB			
Petrochelidon pyrrhonota	Cliff Swallow	S4S5B						CO					
Riparia riparia	Bank Swallow	S4B	THR	T	T	Schedule 1		CO	PO		PO	PO	PO
Stelgidopteryx serripennis	Northern Rough-winged Swallow	S4B						CO					
Tachycineta bicolor	Tree Swallow	S4S5B						CO	PR		PR	PO	
Paridae	**Chickadees & Titmice**												
Poecile atricapillus	Black-capped Chickadee	S5						CO	PR	PO		PR	PO
Sittidae	**Nuthatches**												
Sitta canadensis	Red-breasted Nuthatch	S5						CO	PO	PO			
Sitta carolinensis	White-breasted Nuthatch	S5						CO					
Troglodytidae	**Wrens**												
Cistothorus palustris	Marsh Wren	S4B,S3N					Medium	PO					
Cistothorus stellaris	Sedge Wren	S4B	NAR	NAR	NS	No schedule		PO					
Troglodytes aedon	House Wren	S5B						PR	PO				PO
Troglodytes hiemalis	Winter Wren	S5B,S4N						PO	PO	PO			PO
Regulidae	**Kinglets**												
Regulus satrapa	Golden-crowned Kinglet	S5						PO					
Turdidae	**Thrushes**												

Catharus fuscescens	Veery	S5B						PR					
Catharus guttatus	Hermit Thrush	S5B,S4N						PO					
Hylocichla mustelina	Wood Thrush	S4B	SC	T	T	Schedule 1		PR	PO	PO			
Sialia sialis	Eastern Bluebird	S5B,S4N	NAR	NAR	NS	No schedule		CO					
Turdus migratorius	American Robin	S5						CO	PR	PR	PR	PO	
Mimidae	**Mockingbirds, Thrashers & Allies**												
Dumetella carolinensis	Gray Catbird	S5B,S3N						PR	PR	PR			
Toxostoma rufum	Brown Thrasher	S4B						PO					
Sturnidae	**Starlings**												
Sturnus vulgaris	European Starling	SNA						CO	PR			PR	
Bombycillidae	**Waxwings**												
Bombycilla cedrorum	Cedar Waxwing	S5						PR					
Passeridae	**Old World Sparrows**												
Passer domesticus	House Sparrow	SNA						CO					
Fringillidae	**Finches & Allies**												
Haemorhous mexicanus	House Finch	SNA						PO					
Haemorhous purpureus	Purple Finch	S5						PO					
Spinus tristis	American Goldfinch	S5						PR	PO	PO	PO	PO	OB
Emberizidae	**New World Sparrows & Allies**												
Ammodramus savannarum	Grasshopper Sparrow	S4B	SC	SC	SC	Schedule 1		PO					
Melospiza georgiana	Swamp Sparrow	S5B,S4N					Low	PR	PO			PO	
Melospiza melodia	Song Sparrow	S5						CO	PR	PR	PR	PR	PO
Passerculus sandwichensis	Savannah Sparrow	S5B,S3N						PR	PO	PO	PO		
Pipilo erythrophthalmus	Eastern Towhee	S4B,S3N						PO					
Pooecetes gramineus	Vesper Sparrow	S4B						PO					
Spizella pallida	Clay-colored Sparrow	S4B						PR					
Spizella passerina	Chipping Sparrow	S5B,S3N						PR	PO				PO
Spizella pusilla	Field Sparrow	S4B,S3N						PR	PO			PO	
Spizelloides arborea	American Tree Sparrow	S5							OB				OB
Zonotrichia albicollis	White-throated Sparrow	S5						PO					
Icteridae	**Troupials & Allies**												
Agelaius phoeniceus	Red-winged Blackbird	S5						CO	PO	PO	PO		
Dolichonyx oryzivorus	Bobolink	S4B	THR	SC	T	Schedule 1		PR					
Icterus galbula	Baltimore Oriole	S4B						PR	PO			PO	
Molothrus ater	Brown-headed Cowbird	S5						PO					
Quiscalus quiscula	Common Grackle	S5						CO	PO	PO		PO	
Sturnella magna	Eastern Meadowlark	S4B,S3N	THR	T	T	Schedule 1		PR	PO	PO	PO	PO	PO
Parulidae	**Wood Warblers**												
Cardellina canadensis	Canada Warbler	S5B	SC	SC	T	Schedule 1		PR					
Geothlypis philadelphia	Mourning Warbler	S5B						PR					
Geothlypis trichas	Common Yellowthroat	S5B,S3N					Low	CO	PR	PR		PO	
Leiothlypis ruficapilla	Nashville Warbler	S5B						PO					
Mniotilta varia	Black-and-white Warbler	S5B						CO					
Parkesia motacilla	Louisiana Waterthrush	S2B	THR	T	T	Schedule 1		PR					
Parkesia noveboracensis	Northern Waterthrush	S5B					Medium	PO					
Seiurus aurocapilla	Ovenbird	S5B						PR					
Setophaga caerulescens	Black-throated Blue Warbler	S5B						PO					
Setophaga coronata	Yellow-rumped Warbler	S5B,S4N						CO					
Setophaga fusca	Blackburnian Warbler	S5B						PR					
Setophaga magnolia	Magnolia Warbler	S5B						PO					
Setophaga pensylvanica	Chestnut-sided Warbler	S5B						PO					
Setophaga petechia	Yellow Warbler	S5B						PR	PR	PR			
Setophaga pinus	Pine Warbler	S5B,S3N						PR					
Setophaga ruticilla	American Redstart	S5B						PR	PO	PO			

Setophaga virens	Black-throated Green Warbler	S5B						PR					
Vermivora cyanoptera	Blue-winged Warbler	S4B						PO					
Cardinalidae	**Cardinals, Grosbeaks & Allies**												
Cardinalis cardinalis	Northern Cardinal	S5						CO					
Passerina cyanea	Indigo Bunting	S5B						PR	PR		PR		
Pheucticus ludovicianus	Rose-breasted Grosbeak	S5B						PO					
Piranga olivacea	Scarlet Tanager	S5B						PO					
Spiza americana	Dickcissel	S2M						PR					
Total							**16**	**121**	**43**	**22**	**15**	**16**	**22**

*OBBA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Appendix VII
Herpetofauna Species Reported from the Study Area and Vicinity

Reptile and Amphibian Species Reported from NAT-01 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Salamander Minnow Trapping	Anuran Call Survey	Turtle Basking Survey	Egg Mass Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021	NRSI 2021
Turtles															
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X	X		X				
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X							
Snakes															
Storeria occipitomaculata	Red-bellied Snake	S5						X							
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X	X						
Salamanders															
Ambystoma maculatum	Spotted Salamander	S4					High	X	X			X			
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X							
Plethodon cinereus	Eastern Red-backed Salamander	S5						X							
Frogs and Toads															
Anaxyrus americanus	American Toad	S5					Medium	X	X	X					
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X			X		
Pseudacris triseriata pop. 2	Western Chorus Frog (Great Lakes / St. La	S4	NAR	T	T	Schedule 1	High		X	X					
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X			X		
Lithobates catesbeianus	American Bullfrog	S4					High		X						
Lithobates clamitans	Green Frog	S5					Medium	X	X	X					
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X							
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X							
Lithobates septentrionalis	Mink Frog	S5					High	X							
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X					
Total							**14**	**15**	**10**	**6**	**1**	**1**	**2**	**0**	**0**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Reptile and Amphibian Species Reported from NAT-02 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Anuran Call Survey	Turtle Basking Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X					
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X	X			X	
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X		X	
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X		X	
Lithobates clamitans	Green Frog	S5					Medium	X	X	X		X	
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X	X			
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X			
Total							**12**	**15**	**6**	**5**	**0**	**4**	**0**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-03 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Salamander Minnow Trapping	Anuran Call Survey	Turtle Basking Survey	Egg Mass Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021	NRSI 2021
Turtles															
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X	X		X				
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X	X		X				
Glyptemys insculpta	Wood Turtle	S2	END	T	T	Schedule 1			X		X				
Snakes															
Storeria occipitomaculata	Red-bellied Snake	S5						X							
Thamnophis sauritus septentrionalis	Northern Ribbonsnake	S4	SC	SC	SC	Schedule 1			X						
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X	X						
Salamanders															
Ambystoma maculatum	Spotted Salamander	S4					High	X							
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X							
Plethodon cinereus	Eastern Red-backed Salamander	S5						X							
Frogs and Toads															
Anaxyrus americanus	American Toad	S5					Medium	X	X	X			X		
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X					
Pseudacris triseriata pop. 2	Western Chorus Frog (Great Lakes / St. La	S4	NAR	T	T	Schedule 1	High		X						
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X			X		X
Lithobates clamitans	Green Frog	S5					Medium	X	X	X			X		
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X							
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X	X			X		
Lithobates septentrionalis	Mink Frog	S5					High	X							
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X					X
Total							**13**	**15**	**12**	**6**	**3**	**0**	**4**	**0**	**2**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-04 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Salamander Minnow Trapping	Anuran Call Survey	Turtle Basking Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021
Turtles														
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X						
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X	X		X			X
Snakes														
Storeria occipitomaculata	Red-bellied Snake	S5						X						
Thamnophis sauritus septentrionalis	Northern Ribbonsnake	S4	SC	SC	SC	Schedule 1			X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X						
Salamanders														
Ambystoma maculatum	Spotted Salamander	S4					High	X						
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X						
Plethodon cinereus	Eastern Red-backed Salamander	S5						X						
Frogs and Toads														
Anaxyrus americanus	American Toad	S5					Medium	X	X	X			X	
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X				
Pseudacris triseriata pop. 2	Western Chorus Frog (Great Lakes / St. L	S4	NAR	T	T	Schedule 1	High		X					
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X			X	
Lithobates clamitans	Green Frog	S5					Medium	X	X	X				
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X						
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X				X	
Lithobates septentrionalis	Mink Frog	S5					High	X						
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X				
Total							**13**	**15**	**9**	**5**	**1**	**0**	**3**	**1**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-14 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Salamander Minnow Trapping	Anuran Call Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X					
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X	X	X			X
Dryophytes versicolor	Gray Treefrog	S5					High	X	X				X
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X			X
Lithobates clamitans	Green Frog	S5					Medium	X	X	X			X
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X	X			
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X			
Total							**12**	**15**	**6**	**5**	**0**	**0**	**4**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-15 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Salamander Minnow Trapping	Anuran Call Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2022	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X	X		X		
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X	X	X			X
Dryophytes versicolor	Gray Treefrog	S5					High	X					
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X			X
Lithobates clamitans	Green Frog	S5					Medium	X					
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X	X			
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X	X				
Total							**12**	**15**	**5**	**3**	**1**	**0**	**2**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Reptile and Amphibian Species Reported from NAT-16 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Anuran Call Survey	Turtle Basking Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X	X				X
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X					
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X	X	X		X	
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X			
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X		X	
Lithobates clamitans	Green Frog	S5					Medium	X	X	X			
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X					
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X					
Total							**12**	**15**	**5**	**4**	**0**	**2**	**1**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-18 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Turtle Basking Survey	Anuran Call Survey 2021
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2021
Turtles												
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X				
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X				
Snakes												
Storeria occipitomaculata	Red-bellied Snake	S5						X				
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X				
Salamanders												
Ambystoma maculatum	Spotted Salamander	S4					High	X				
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X				
Plethodon cinereus	Eastern Red-backed Salamander	S5						X				
Frogs and Toads												
Anaxyrus americanus	American Toad	S5					Medium	X	X			X
Dryophytes versicolor	Gray Treefrog	S5					High	X	X			X
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X		X
Lithobates clamitans	Green Frog	S5					Medium	X	X	X		
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X				
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X				
Lithobates septentrionalis	Mink Frog	S5					High	X				
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X		
Total							**12**	**15**	**5**	**3**	**0**	**3**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Reptile and Amphibian Species Reported from NAT-19 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022
Turtles										
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X		
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X		
Snakes										
Storeria occipitomaculata	Red-bellied Snake	S5						X		
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X		
Salamanders										
Ambystoma maculatum	Spotted Salamander	S4					High	X		
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X		
Plethodon cinereus	Eastern Red-backed Salamander	S5						X		
Frogs and Toads										
Anaxyrus americanus	American Toad	S5					Medium	X		
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X
Lithobates clamitans	Green Frog	S5					Medium	X		
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X		
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X		
Lithobates septentrionalis	Mink Frog	S5					High	X		
Lithobates sylvaticus	Wood Frog	S5					High	X		
Total							**12**	**15**	**2**	**2**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Reptile and Amphibian Species Reported from NAT-21 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022
Turtles										
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X		
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X		
Snakes										
Storeria occipitomaculata	Red-bellied Snake	S5						X		
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X		
Salamanders										
Ambystoma maculatum	Spotted Salamander	S4					High	X		
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X		
Plethodon cinereus	Eastern Red-backed Salamander	S5						X		
Frogs and Toads										
Anaxyrus americanus	American Toad	S5					Medium	X		
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X
Lithobates clamitans	Green Frog	S5					Medium	X	X	X
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X		
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X		
Lithobates septentrionalis	Mink Frog	S5					High	X		
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X
Total							**12**	**15**	**4**	**4**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Reptile and Amphibian Species Reported from the Former Prince Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022
Turtles									
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X	
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X	
Snakes									
Lampropeltis triangulum	Milksnake	S4	NAR	SC	SC	Schedule 1			
Storeria occipitomaculata	Red-bellied Snake	S5						X	
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X	
Salamanders									
Ambystoma maculatum	Spotted Salamander	S4					High	X	
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X	
Plethodon cinereus	Eastern Red-backed Salamander	S5						X	
Frogs and Toads									
Anaxyrus americanus	American Toad	S5					Medium	X	
Dryophytes versicolor	Gray Treefrog	S5					High	X	
Pseudacris crucifer	Spring Peeper	S5					High	X	
Lithobates clamitans	Green Frog	S5					Medium	X	
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X	
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	
Lithobates septentrionalis	Mink Frog	S5					High	X	
Lithobates sylvaticus	Wood Frog	S5					High	X	
Total							**12**	**15**	**0**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Reptile and Amphibian Species Reported from the Former Bonnefield Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Salamander Minnow Trapping	Anuran Call Survey	Egg Mass Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X					
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X	X		X		
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X					
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X			
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X		X	
Lithobates clamitans	Green Frog	S5					Medium	X	X	X			
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X					
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X	X			X	X
Total							**12**	**15**	**5**	**3**	**1**	**2**	**1**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Reptile and Amphibian Species Reported from Melancthon Pit #2 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	ORAA*	NRSI Observed	Anuran Call Survey	Salamander Minnow Trapping	Anuran Call Survey	Egg Mass Survey
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Ontario Nature 2019	NRSI Results from 2021 and 2022	NRSI 2022	NRSI 2022	NRSI 2021	NRSI 2021
Turtles													
Chelydra serpentina	Snapping Turtle	S4	SC	SC	SC	Schedule 1	High	X					
Chrysemys picta marginata	Midland Painted Turtle	S4		SC	SC	Schedule 1	High	X					
Snakes													
Storeria occipitomaculata	Red-bellied Snake	S5						X					
Thamnophis sirtalis sirtalis	Eastern Gartersnake	S5						X					
Salamanders													
Ambystoma maculatum	Spotted Salamander	S4					High	X	X		X		
Notophthalmus viridescens viridescens	Red-spotted Newt	S5					High	X					
Plethodon cinereus	Eastern Red-backed Salamander	S5						X					
Frogs and Toads													
Anaxyrus americanus	American Toad	S5					Medium	X	X		X	X	
Dryophytes versicolor	Gray Treefrog	S5					High	X	X	X			
Pseudacris crucifer	Spring Peeper	S5					High	X	X	X	X	X	
Lithobates clamitans	Green Frog	S5					Medium	X	X		X	X	
Lithobates palustris	Pickerel Frog	S4	NAR	NAR	NS	No schedule	High	X					
Lithobates pipiens	Northern Leopard Frog	S5	NAR	NAR	NS	No schedule	High	X	X	X	X	X	
Lithobates septentrionalis	Mink Frog	S5					High	X					
Lithobates sylvaticus	Wood Frog	S5					High	X	X	X	X	X	X
Total							**12**	**15**	**7**	**4**	**1**	**5**	**1**

*ORAA Atlas Squares: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Ontario Nature. 2019. Ontario Reptile and Amphibian Atlas Program: Interactive Range Maps. Accessed October 2019.

Appendix VIII
Mammal Species Reported from the Study Area and Vicinity

Mammal Species Reported from NAT-01 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	X
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	X
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	X
Vulpes vulpes	Red Fox	S5						X	X
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	X
Total							**4**	**46**	**5**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Mammal Species Reported from NAT-02 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	X
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from NAT-03 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								X
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	X
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	X
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	X
Total							**4**	**46**	**4**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from NAT-04 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	X
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	X
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	X
Total							**4**	**46**	**3**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Mammal Species Reported from NAT-14 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	X
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Mammal Species Reported from NAT-15 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	X
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	X
Tamiasciurus hudsonicus	Red Squirrel	S5						X	X
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	X
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	X
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**5**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information
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Mammal Species Reported from NAT-16 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	X
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	X
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**2**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Mammal Species Reported from NAT-18 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	X
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Mammal Species Reported from NAT-19 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	X
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario p	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information
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Mammal Species Reported from NAT-20 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	X
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	

Canidae	**Canines**								
Canis latrans	Coyote	S5						X	X
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario p	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**2**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from NAT-21 - Shelburne Quary Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**0**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Toronto and Region Conservation Authority (TRCA). 2017. Wetland Water Balance Risk Evaluation: Appendix 3. November 2017

Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from the Former Prince Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	X
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from the Former Bonnefield Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**0**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Toronto and Region Conservation Authority (TRCA). 2017. Wetland Water Balance Risk Evaluation: Appendix 3. November 2017
Dobbyn, J.S. 1994. Atlas of the Mammals of Ontario. Don Mills, Federation of Ontario Naturalists. 120p.

Mammal Species Reported from Melancthon Pit #2 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	TRCA Hydrosensitivity	Ontario Mammal Atlas	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			TRCA 2017	Dobbyn 1994	NRSI Results from 2021 & 2022
Didelphimorphia	**Opossums**								
Didelphis virginiana	Virginia Opossum	S4						X	
Eulipotyphla	**Shrews, Moles, Hedgehogs, and Allies**								
Blarina brevicauda	Northern Short-tailed Shrew	S5						X	
Condylura cristata	Star-nosed Mole	S5					Low	X	
Parascalops breweri	Hairy-tailed Mole	S4						X	
Sorex cinereus	Masked Shrew	S5						X	
Sorex fumeus	Smoky Shrew	S5						X	
Sorex palustris	Water Shrew	S5						X	
Chiroptera	**Bats**								
Eptesicus fuscus	Big Brown Bat	S4						X	
Lasionycteris noctivagans	Silver-haired Bat	S4		E	NS	No schedule		X	
Lasiurus borealis	Eastern Red Bat	S4		E	NS	No schedule		X	
Lasiurus cinereus	Hoary Bat	S4		E	NS	No schedule		X	
Myotis leibii	Eastern Small-footed Myotis	S2S3	END					X	
Myotis lucifugus	Little Brown Myotis	S3	END	E	E	Schedule 1		X	
Myotis septentrionalis	Northern Myotis	S3	END	E	E	Schedule 1		X	
Perimyotis subflavus	Tri-colored Bat	S3?	END	E	E	Schedule 1		X	
Lagomorpha	**Rabbits and Hares**								
Lepus americanus	Snowshoe Hare	S5						X	
Lepus europaeus	European Hare	SNA						X	
Sylvilagus floridanus	Eastern Cottontail	S5						X	
Rodentia	**Rodents**								
Castor canadensis	Beaver	S5					Low	X	
Erethizon dorsatum	Porcupine	S5						X	
Glaucomys sabrinus	Northern Flying Squirrel	S5						X	
Marmota monax	Woodchuck	S5						X	
Microtus pennsylvanicus	Meadow Vole	S5						X	
Microtus pinetorum	Woodland Vole	S3?	SC	SC	SC	Schedule 1		X	
Mus musculus	House Mouse	SNA						X	
Napaeozapus insignis	Woodland Jumping Mouse	S5						X	
Ondatra zibethicus	Muskrat	S5					High	X	
Peromyscus leucopus	White-footed Mouse	S5						X	
Peromyscus maniculatus	Deer Mouse	S5						X	
Rattus norvegicus	Norway Rat	SNA						X	
Sciurus carolinensis	Eastern Gray Squirrel	S5						X	
Synaptomys cooperi	Southern Bog Lemming	S4						X	
Tamias striatus	Eastern Chipmunk	S5						X	
Tamiasciurus hudsonicus	Red Squirrel	S5						X	
Zapus hudsonius	Meadow Jumping Mouse	S5						X	
Canidae	**Canines**								
Canis latrans	Coyote	S5						X	X
Vulpes vulpes	Red Fox	S5						X	
Felidae	**Felines**								
Lynx rufus	Bobcat	S4						X	
Mephitidae	**Skunks and Stink Badgers**								
Mephitis mephitis	Striped Skunk	S5						X	
Mustelidae	**Weasels and Allies**								
Mustela richardsonii	American Ermine	S5						X	
Neogale frenata	Long-tailed Weasel	S4						X	
Neogale vison	American Mink	S4					Low	X	
Taxidea taxus jacksoni	American Badger (Southwestern Ontario	S1	END	E	E	Schedule 1		X	
Procyonidae	**Raccoons and Allies**								
Procyon lotor	Northern Raccoon	S5						X	
Ursidae	**Bears**								
Ursus americanus	American Black Bear	S5	NAR	NAR	NS	No schedule		X	
Artiodactyla	**Deer and Bison**								
Odocoileus virginianus	White-tailed Deer	S5						X	
Total							**4**	**46**	**1**

*Mammal Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Appendix IX

Butterfly and Odonate Species Reported from the Study Area and Vicinity

Butterfly Species Reported from NAT-01 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	X
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**1**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-02 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Cupido comyntas	Eastern Tailed Blue	S5						X
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	X
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**2**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information
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Macnaughton A., Layberry R., Cavasin R., Edwards B., and C. Jones. 2023. Ontario Butterfly Atlas. Updated January 2023. Available: https://www.ontarioinsects.org/atlas/index.html

Butterfly Species Reported from NAT-03 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Cupido comyntas	Eastern Tailed Blue	S5						X
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**1**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-04 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Pyrgus communis	Common Checkered Skipper	SNA						X
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina ladon	Spring Azure	SU						X
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	X
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	X
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**4**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-14 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	X
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**1**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Butterfly Species Reported from NAT-15 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Cupido comyntas	Eastern Tailed Blue	S5						X
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	X
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	X
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**3**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-16 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-18 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Butterfly Species Reported from NAT-19 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from NAT-20 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

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Butterfly Species Reported from NAT-21 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

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Butterfly Species Reported from the Former Prince Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information
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Butterfly Species Reported from the Former Bonnefield Property - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	E	Schedule 1	X	
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**0**

*TEA Atlas Square: 17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Butterfly Species Reported from Melancthon Pit #2 - Shelburne Quarry Pre-Extraction NEA (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Ontario Butterfly Atlas*	NRSI Observed
		MNRF 2024	MECP 2024	Government of Canada 2023			Macnaughton et al. 2023	NRSI Results from 2021 & 2022
Hesperiidae	**Skippers**							
Epargyreus clarus	Silver-spotted Skipper	S4					X	
Erynnis baptisiae	Wild Indigo Duskywing	S4					X	
Erynnis icelus	Dreamy Duskywing	S5					X	
Erynnis juvenalis	Juvenal's Duskywing	S5					X	
Hesperia leonardus	Leonard's Skipper	S4					X	
Polites mystic	Long Dash Skipper	S5					X	
Polites origenes	Crossline Skipper	S4					X	
Polites themistocles	Tawny-edged Skipper	S5					X	
Thorybes pylades	Northern Cloudywing	S5					X	
Thymelicus lineola	European Skipper	SNA					X	
Papilionidae	**Swallowtails**							
Papilio polyxenes	Black Swallowtail	S5					X	
Pieridae	**Whites and Sulphurs**							
Colias eurytheme	Orange Sulphur	S5					X	
Colias philodice	Clouded Sulphur	S5					X	
Pieris oleracea	Mustard White	S4					X	
Pieris rapae	Cabbage White	SNA					X	
Lycaenidae	**Harvesters, Coppers, Hairstreaks, Blues**							
Celastrina lucia	Northern Spring Azure	S5					X	
Celastrina sp.	Azure species	SNA					X	
Glaucopsyche lygdamus	Silvery Blue	S5					X	
Satyrium titus	Coral Hairstreak	S5					X	
Nymphalidae	**Brush-footed Butterflies**							
Aglais milberti	Milbert's Tortoiseshell	S5					X	
Boloria selene	Silver-bordered Fritillary	S5					X	
Cercyonis pegala	Common Wood-Nymph	S5					X	
Coenonympha california	Common Ringlet	S5					X	
Danaus plexippus	Monarch	S2N,S4B	SC	E	SC	Schedule 1	X	X
Lethe anthedon	Northern Pearly-Eye	S5					X	
Lethe eurydice	Eyed Brown	S5					X	
Limenitis archippus	Viceroy	S5					X	
Limenitis arthemis arthemis	White Admiral	S5					X	
Megisto cymela	Little Wood-Satyr	S5					X	
Nymphalis antiopa	Mourning Cloak	S5					X	
Nymphalis l-album	Compton Tortoiseshell	S5					X	
Phyciodes cocyta	Northern Crescent	S5					X	
Phyciodes tharos	Pearl Crescent	S4					X	
Polygonia comma	Eastern Comma	S5					X	
Polygonia interrogationis	Question Mark	S5					X	
Vanessa atalanta	Red Admiral	S5B					X	
Vanessa cardui	Painted Lady	S5B					X	
Vanessa virginiensis	American Lady	S5					X	
Total							**38**	**1**

*TEA Atlas Square: Square #17NJ58, 17NJ68, 17NJ59, 17NJ69

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information

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Odonate Species Reported from the Study Area - Shelburne Quarry Pre-Extraction (Project #2473A)

Scientific Name	Common Name	SRANK	SARO	COSEWIC	SARA	SARA Schedule	Odonate Atlas*
		MNRF 2024	MECP 2024	Government of Canada 2023			OOAD 2023
Calopterygidae	**Broadwinged Damselflies**						
Calopteryx aequabilis	River Jewelwing	S5					X
Calopteryx maculata	Ebony Jewelwing	S5					X
Lestidae	**Spreadwings**						
Lestes dryas	Emerald Spreadwing	S5					X
Coenagrionidae	**Narrow-winged Damselflies**						
Amphiagrion saucium	Eastern Red Damsel	S4					X
Argia fumipennis violacea	Violet Dancer	S5					X
Argia moesta	Powdered Dancer	S5					X
Enallagma boreale	Boreal Bluet	S5					X
Enallagma carunculatum	Tule Bluet	S5					X
Enallagma civile	Familiar Bluet	S5					X
Enallagma exsulans	Stream Bluet	S5					X
Enallagma hageni	Hagen's Bluet	S5					X
Ischnura posita	Fragile Forktail	S4					X
Ischnura verticalis	Eastern Forktail	S5					X
Nehalennia irene	Sedge Sprite	S5					X
Aeshnidae	**Darners**						
Aeshna canadensis	Canada Darner	S5					X
Aeshna eremita	Lake Darner	S5					X
Aeshna umbrosa	Shadow Darner	S5					X
Anax junius	Common Green Darner	S5					X
Gomphidae	**Clubtails**						
Ophiogomphus carolus	Riffle Snaketail	S3					X
Cordulegasteridae	**Spiketails**						
Cordulegaster maculata	Twin-spotted Spiketail	S4					X
Corduliidae	**Emeralds**						
Cordulia shurtleffii	American Emerald	S5					X
Epitheca canis	Beaverpond Baskettail	S5					X
Somatochlora williamsoni	Williamson's Emerald	S4					X
Libellulidae	**Skimmers**						
Leucorrhinia proxima	Belted Whiteface	S5					X
Libellula pulchella	Twelve-spotted Skimmer	S5					X
Sympetrum costiferum	Saffron-winged Meadowhawk	S4					X
Sympetrum obtrusum	White-faced Meadowhawk	S5					X
Sympetrum vicinum	Autumn Meadowhawk	S5					X
Total							**28**

**Odonate Atlas Square Numbers: 17NJ58, 17NJ68, 17NJ59, 17NJ69*

References

Ministry of Natural Resources and Forestry (MNRF). 2024. Natural Heritage Information Centre (NHIC): Species List for Ontario. Published: 2014-07-17. All Species List Updated: 2024-05-27. Available: https://www.ontario.ca/page/get-natural-heritage-information
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Ontario Odonata Atlas Database (OOAD). 2023. Natural Heritage Information Centre, Ontario Ministry of Natural Resources and Forestry. Species data by 10x10 km square accessed on June 8, 2023

Appendix X
Salamander Trap Check Results

Survey Round	NAT complex	Station ID	Trap Check Date	Salamander Species	Number of Individuals
1	NAT-01	N1-1	April 5, 2022	N/A	-
		N1-2			
		N1-3			
		N1-4			
		N1-5			
		N1-6			
		N1-7			
		N1-8			
		N1-9			
		N1-10			
	NAT-03	N3-1	April 5, 2022	N/A	-
		N3-2			
		N3-3			
		N3-4			
		N3-5			
	NAT-04	N4-1	April 5, 2022	N/A	-
		N4-2			
		N4-3			
		N4-4			
		N4-5			
	NAT-14	N14-1	April 5, 2022	N/A	-
		N14-2			
	NAT-15	N15-1	April 5, 2022	N/A	-
	NAT-20	N20-1	April 5, 2022	N/A	-
		N20-2			
	Melancthon Pit #2	S1	April 5, 2022	N/A	-
		S2			
	Former Bonnefield	S3	April 5, 2022	N/A	-
		S4			
		S5			
		S6			
		S7			
		S8			
		S9			
		S10	April 5, 2022	N/A	-
2	NAT-01	N1-1	April 6, 2022	N/A	-
		N1-2			
		N1-3			
		N1-4			
		N1-5			
		N1-6			
		N1-7			
		N1-8			
		N1-9			
		N1-10			
	NAT-03	N3-1	April 6, 2022	N/A	-
		N3-2			
		N3-3			
		N3-4			
		N3-5			
	NAT-04	N4-1	April 6, 2022	N/A	-
		N4-2			
		N4-3			
		N4-4			
		N4-5			
	NAT-14	N14-1	April 6, 2022	N/A	-
		N14-2			

	NAT-15	N15-1	April 6, 2022	N/A	-
	NAT-20	N20-1	April 6, 2022	N/A	-
		N20-2			
	Melancthon Pit #2	S1	April 6, 2022	N/A	-
		S2			
	Former Bonnefield	S3	April 6, 2022	N/A	-
		S4			
		S5			
		S6			
		S7			
		S8			
		S9			
		S10	April 6, 2022	N/A	-
3	NAT-01	N1-1	April 14, 2022	N/A	-
		N1-2		N/A	-
		N1-3		Spotted Salamander	9
		N1-4		Spotted Salamander	7
		N1-5		N/A	-
		N1-6		Spotted Salamander	8
		N1-7		Spotted Salamander	3
		N1-8		Spotted Salamander	27
		N1-9		Spotted Salamander	2
		N1-10	-	-	-
	NAT-03	N3-1	-		
		N3-2			
		N3-3			
		N3-4			
		N3-5			
	NAT-04	N4-1	April 14, 2022	N/A	-
		N4-2			
		N4-3			
		N4-4			
		N4-5			
	NAT-14	N14-1	April 14, 2022	N/A	-
		N14-2			
	NAT-15	N15-1	April 14, 2022	N/A	-
	NAT-20	N20-1	April 14, 2022	Spotted Salamander	1
		N20-2		N/A	-
	Melancthon Pit #2	S1	April 14, 2022	Spotted Salamander	1
		S2			6
	Former Bonnefield	S3	April 14, 2022	Spotted Salamander	24
		S4		Spotted Salamander	6
		S5		Spotted Salamander	6
		S6		Spotted Salamander	23
		S7		N/A	-
		S8		Spotted Salamander	9
		S9		Spotted Salamander	5

		S10	April 14, 2022	Spotted Salamander	5
4	NAT-01	N1-1	April 15, 2022	N/A	-
		N1-2		N/A	-
		N1-3		N/A	-
		N1-4		N/A	-
		N1-5		N/A	-
		N1-6		N/A	-
		N1-7		Spotted Salamander	1
		N1-8		Spotted Salamander	15
		N1-9		Spotted Salamander	4
		N1-10		Spotted Salamander	3
	NAT-03	N3-1	-		
		N3-2			
		N3-3			
		N3-4			
		N3-5			
	NAT-04	N4-1	April 15, 2022	N/A	-
		N4-2			
		N4-3			
		N4-4			
		N4-5			
	NAT-14	N14-1	April 15, 2022	N/A	-
		N14-2			
	NAT-15	N15-1	April 15, 2022	N/A	-
	NAT-20	N20-1	April 15, 2022	Spotted Salamander	8
		N20-2		N/A	-
	Melancthon Pit #2	S1	April 15, 2022	Spotted Salamander	2
		S2		Spotted Salamander	4
	Former Bonnefield	S3			
		S4	April 15, 2022	N/A	-
		S5		Spotted Salamander	3
		S6		Spotted Salamander	1
		S7		N/A	-
		S8		N/A	-
		S9		N/A	-
		S10	April 15, 2022	Spotted Salamander	10
5	NAT-01	N1-1	April 16, 2022	N/A	-
		N1-2			
		N1-3			
		N1-4			
		N1-5			
		N1-6			
		N1-7			
		N1-8			
		N1-9			
		N1-10			
	NAT-03	N3-1	-		
		N3-2			
		N3-3			

		N3-4			
		N3-5			
	NAT-04	N4-1	April 16, 2022	N/A	-
		N4-2			
		N4-3			
		N4-4			
		N4-5			
	NAT-14	N14-1	April 16, 2022	N/A	-
		N14-2			
	NAT-15	N15-1	April 16, 2022	N/A	-
	NAT-20	N20-1	April 16, 2022	N/A	-
		N20-2			
	Melancthon Pit #2	S1	April 16, 2022	N/A	-
		S2			
	Former Bonnefield	S3	April 16, 2022	N/A	-
		S4		N/A	-
		S5		Spotted Salamander	1
		S6		N/A	-
		S7		Spotted Salamander	1
		S8		N/A	-
		S9		N/A	-
		S10	April 16, 2022	N/A	-

Appendix XI
Aquatic Photolog

Photo 1a/b. AHP-057 (NAT-01), facing south in November 2020 (1a). Brook Trout captured in July 2022 (1b) at EMS-011.

Photo 2a/b. AHP-071 (NAT-02), facing west in February 2021 (2a) and July 2021 (2b).

Photo 3a/b. AHP-072 (NAT-02), facing west in November 2020 (3a) and July 2022 (3b).

Photo 4. AHP-151 and EMS-002 (NAT-03) at downstream extent, facing upstream in July 2022.

Photo 5. AHP-152 and EMS-003 (NAT-03) at downstream extent, facing upstream in July 2022.

Photo 6a/b. AHP-156 and EMS-007 (NAT-03), facing upstream (6a) and downstream (6b) in July 2022.

Photo 7a/b. AHP-073 (NAT-03), facing northwest in November 2020 (7a) and July 2022 (7b).

Photo 8a/b. AHP-150 (NAT-04), facing south in July 2022 (8a). Brook Trout captured in July 2022 (8b) at EMS-001.

Photo 10a/b/c. AHP-018 (NAT-14), facing northeast (downstream) in February 2021 (10a). Brook Trout captured at EMS-008 in July 2022 (10b and 10c).

Photo 11a/b. AHP-017 (NAT-14), facing north (downstream) in November 2020 (11a) and July 2021 (11b).

Photo 12a/b. AHP-016 (NAT-14), facing downstream (southeast) in November 2020 (12a) and July 2021 (12b).

Photo 13. AHP-009/AHP-160 (NAT-15), facing downstream (east) in July 2021.

Photo 14a/b. AHP-012 (NAT-15), facing downstream (southeast) in November 2020 (14a) and July 2021 (14b).

Photo 15a/b/c. AHP-153 (NAT-15), facing southwest (downstream) (10a) and Brook Trout captured at EMS-004 in July 2022 (10b and 10c).

Photo 16a/b. AHP-011 (NAT-15), facing downstream (southeast) in November 2020 (16a) and July 2021 (16b).

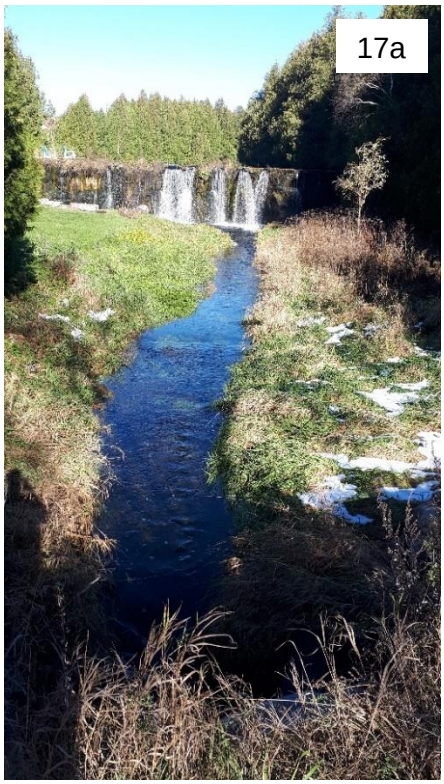


Photo 17a/b. AHP-013/AHP-154 (NAT-15), facing upstream (north) from Mill Lane in November 2020 (17a) and downstream (south) mid-reach in July 2022 (17b).

Photo 18a/b. Brook Trout captured at EMS-005 (NAT-15) in July 2022.

Photo 19a/b. AHP-022 (NAT-16), facing downstream (east) in November 2020 (19a) and July 2022 (19b).

Photo 20a/b. Brook Trout captured at EMS-009 (NAT-16) in July 2022.

Photo 21. AHP-023/AHP-164 (NAT-15), facing downstream (northeast) in July 2021.

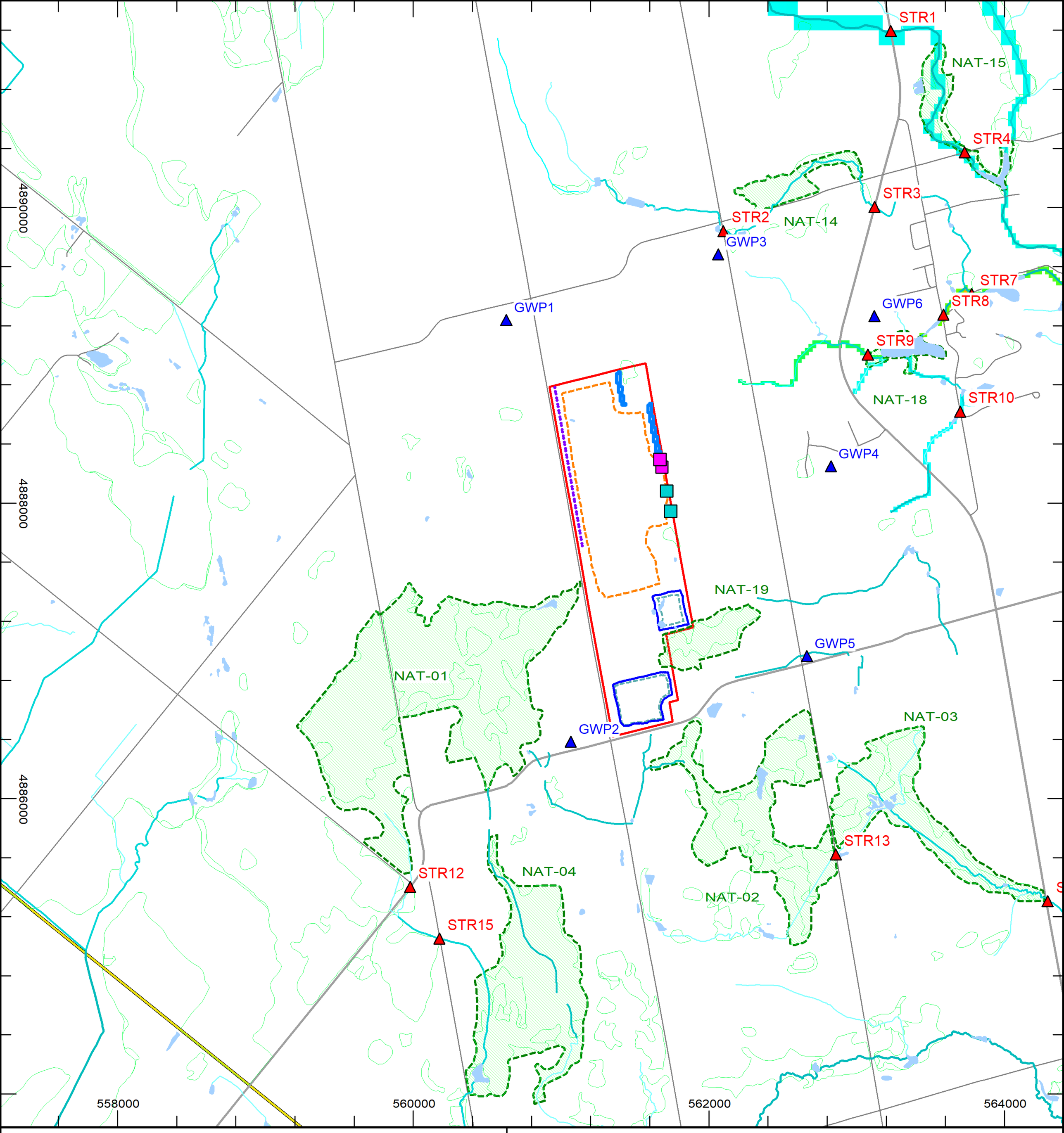
Photo 22a/b. AHP-163 (NAT-18) at upstream (west) end of culvert (22a) and downstream (east) end of culvert (22b) in July 2022.

Photo 23a/b. AHP-076 (NAT-18) facing southeast from Main Street (23a) in November 2020 and July 2021.

Photo 24. AHP-165 (NAT-18) at downstream end of culvert facing west (24a) in July 2022.

Photo 25a/b. Roadside tributary along west side of Main Street at origin, facing downstream (25a) and mid-reach, facing upstream (25b) in July 2022.

Appendix XII
Selected Figures from Earthfx Impact Assessment Report (2024a)



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Decrease in Streamflow (m^3/s)

-0.05 -0.05 -0.04 -0.03 -0.02 -0.01 0.00

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

Data Sources:
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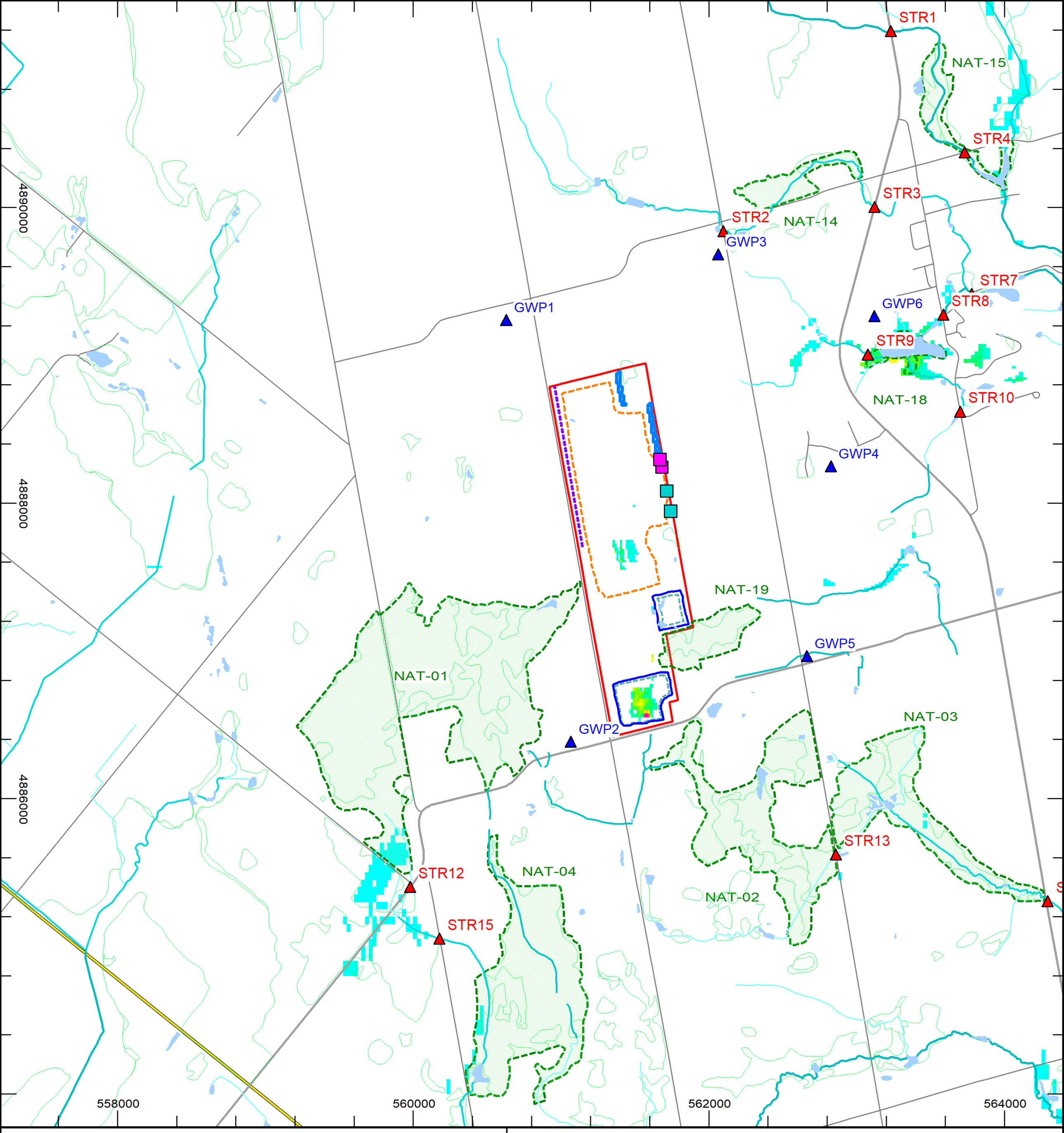
Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A Decrease in Streamflow

STRADA

EARTHfx INCORPORATED



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport

Decrease in L1 Surface Leakage (m3/d)

0.01 2 4 6 8 10

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A Decrease in Surface Leakage

STRADA

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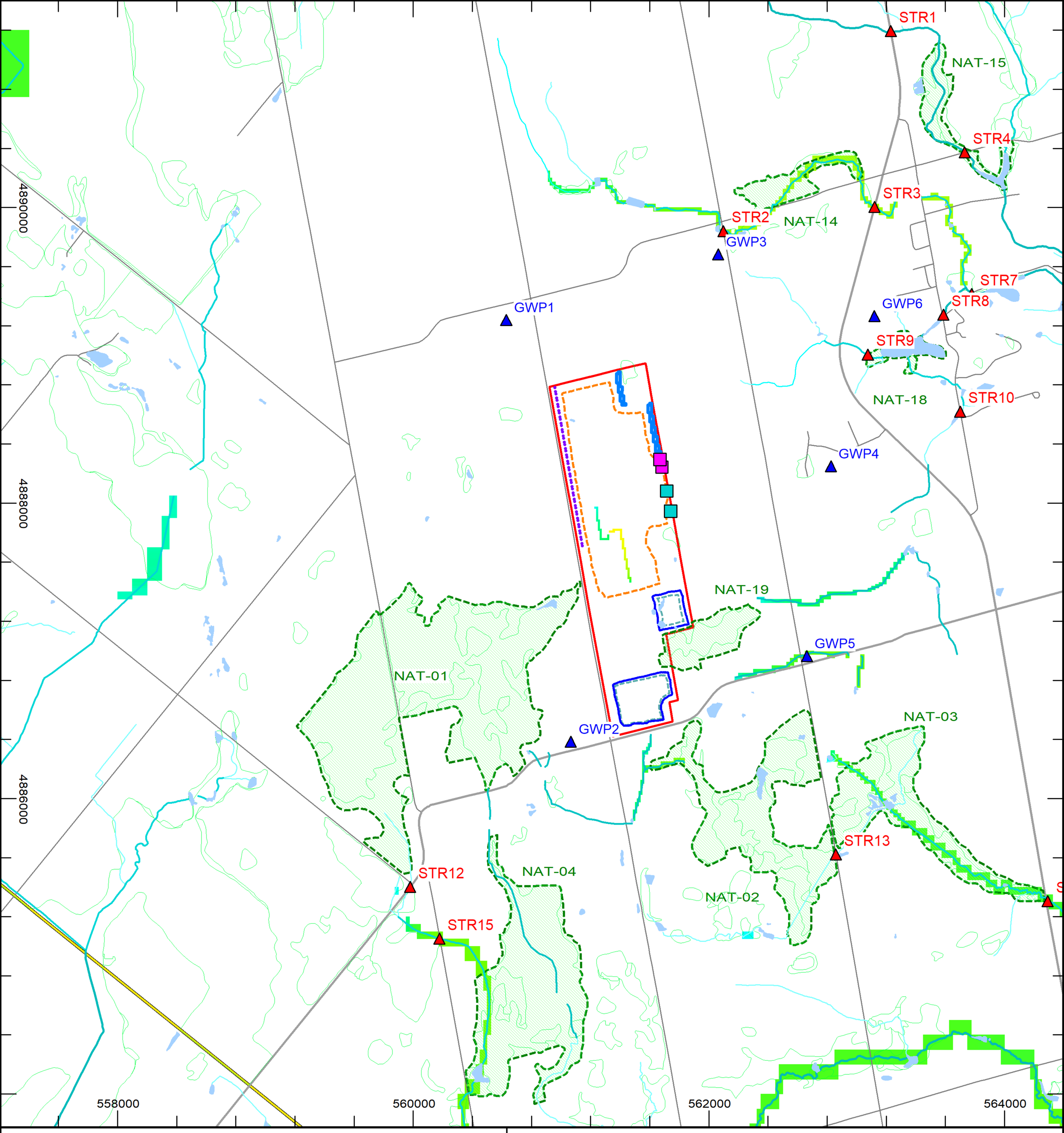

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport

Increase in Streamflow (m^3/s)

0.00001 0.0001 0.001 0.01 0.1 1 5

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A Increase in Streamflow

STRADA

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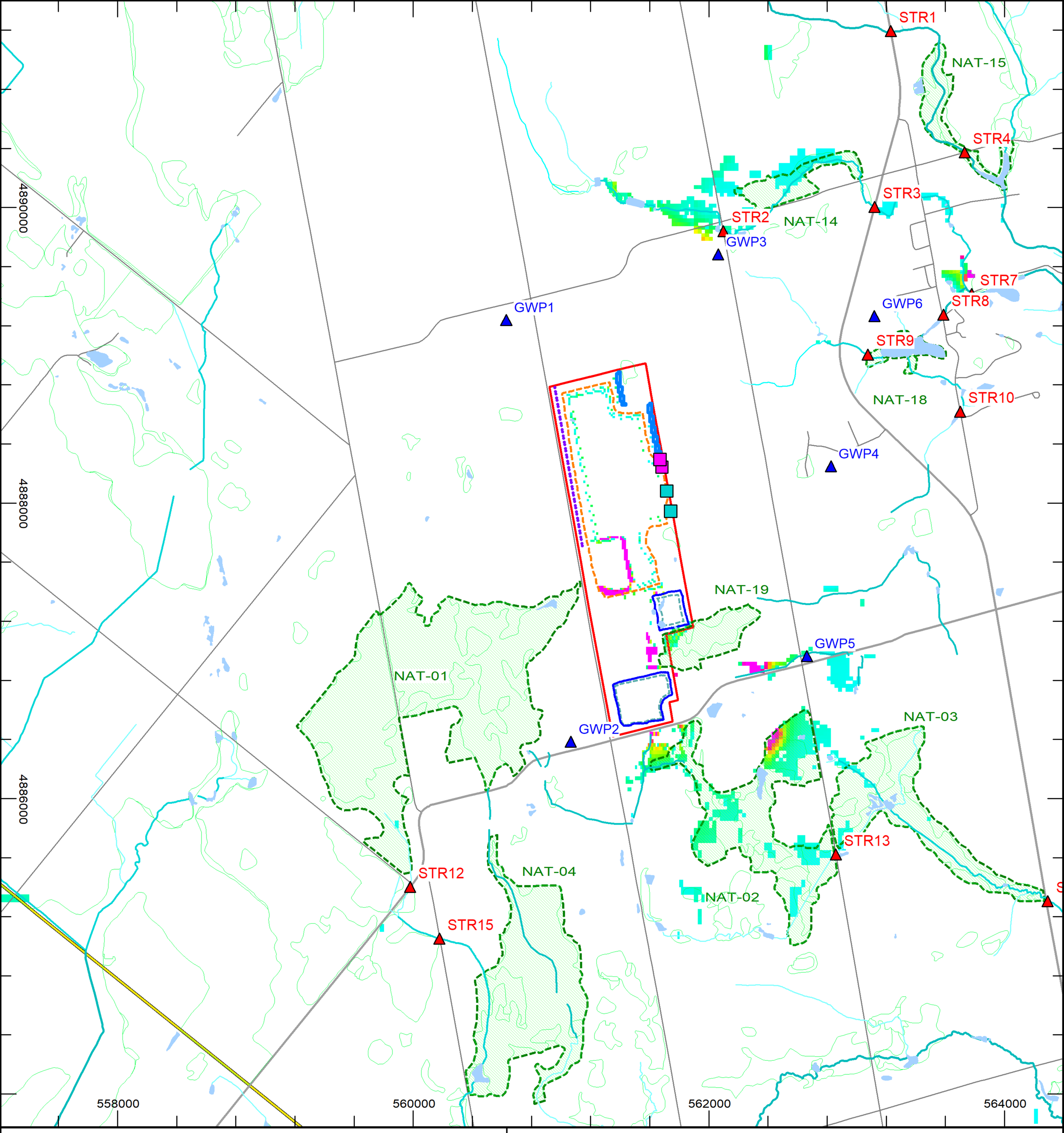

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport

Increase in L1 Surface Leakage (m3/d)

0.01 0.2 0.4 0.6 0.8 1

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A
Increase in Surface Leakage

STRADA

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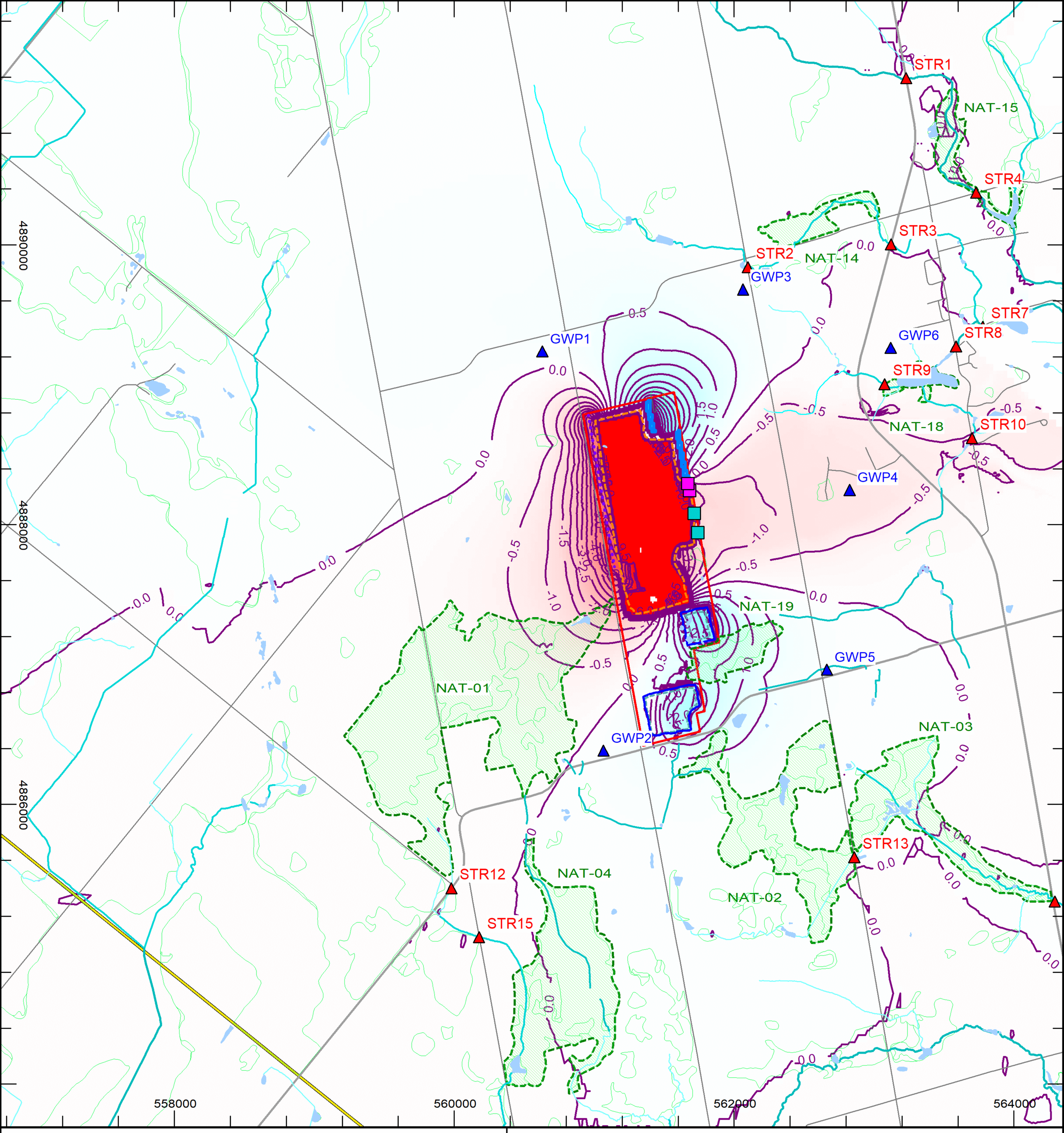

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Ph4A BND L1 Drawdown - SS

Contour Line Start: -10.0 Step: 0.5 Stop: 10.0

-10.0 -5.0 0.0 5.0 10.0

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

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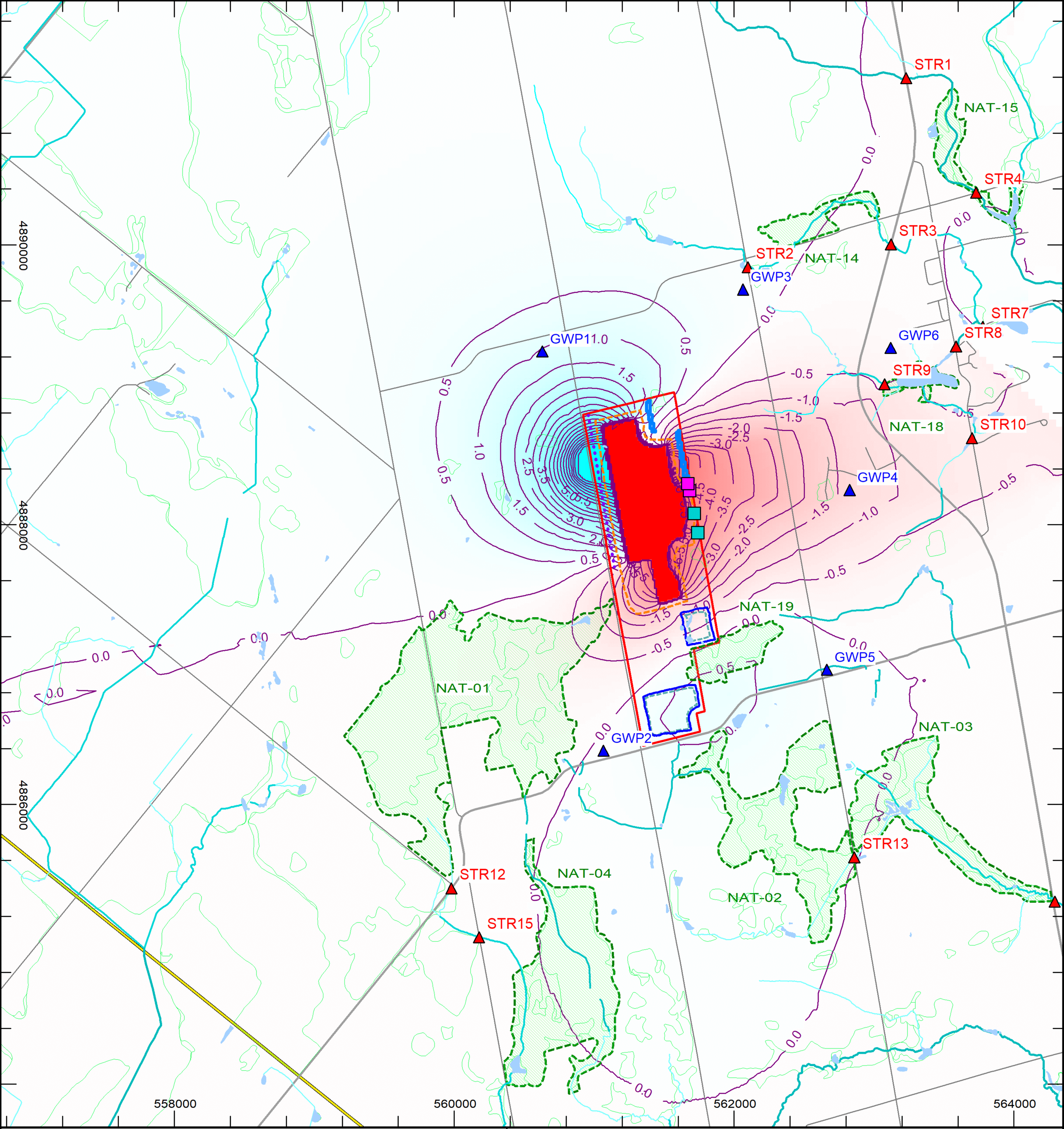
Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A
Layer 1 Drawdown

STRADA

EARTHfx INCORPORATED



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams
- NRSI Stream Points
- GWP Locations
- Injection Well Locations - Guelph
- Injection Well Locations - Gasport

Ph4A BND L6 Gasport Drawdown (m) - SS

Contour Line Start: -10.0 Step: 0.5 Stop: 10.0

-10.0 -5.0 0.0 5.0 10.0

Drawing prepared 10/15/2024

0 500 1000 1500

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Phase 4A
Layer 6 Gasport Drawdown

STRADA

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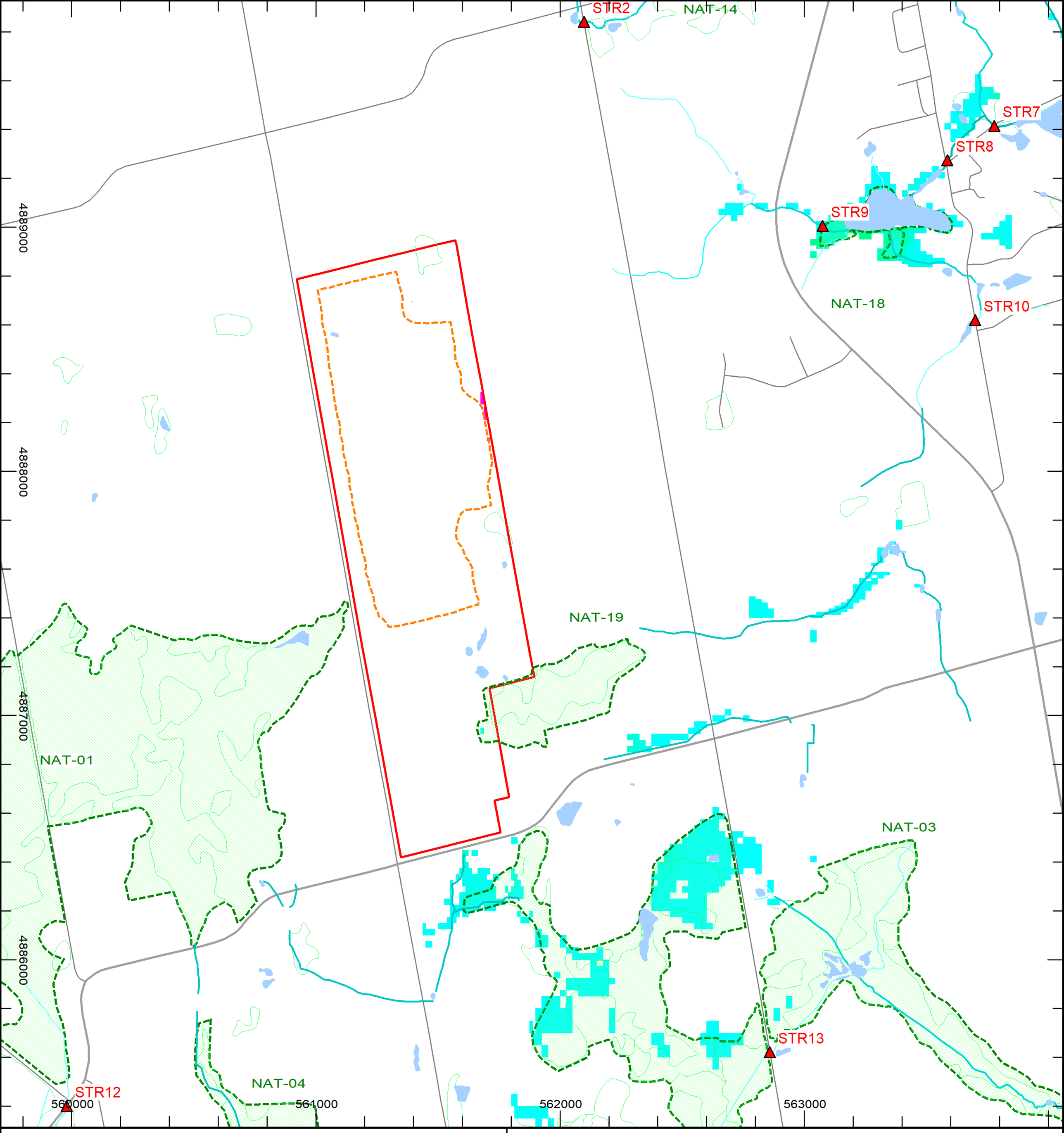

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Increase in L1 Surface Leakage (m3/d)

0.01 2 4 6 8 10

0 400 800

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab
Increase in Surface Discharge

STRADA

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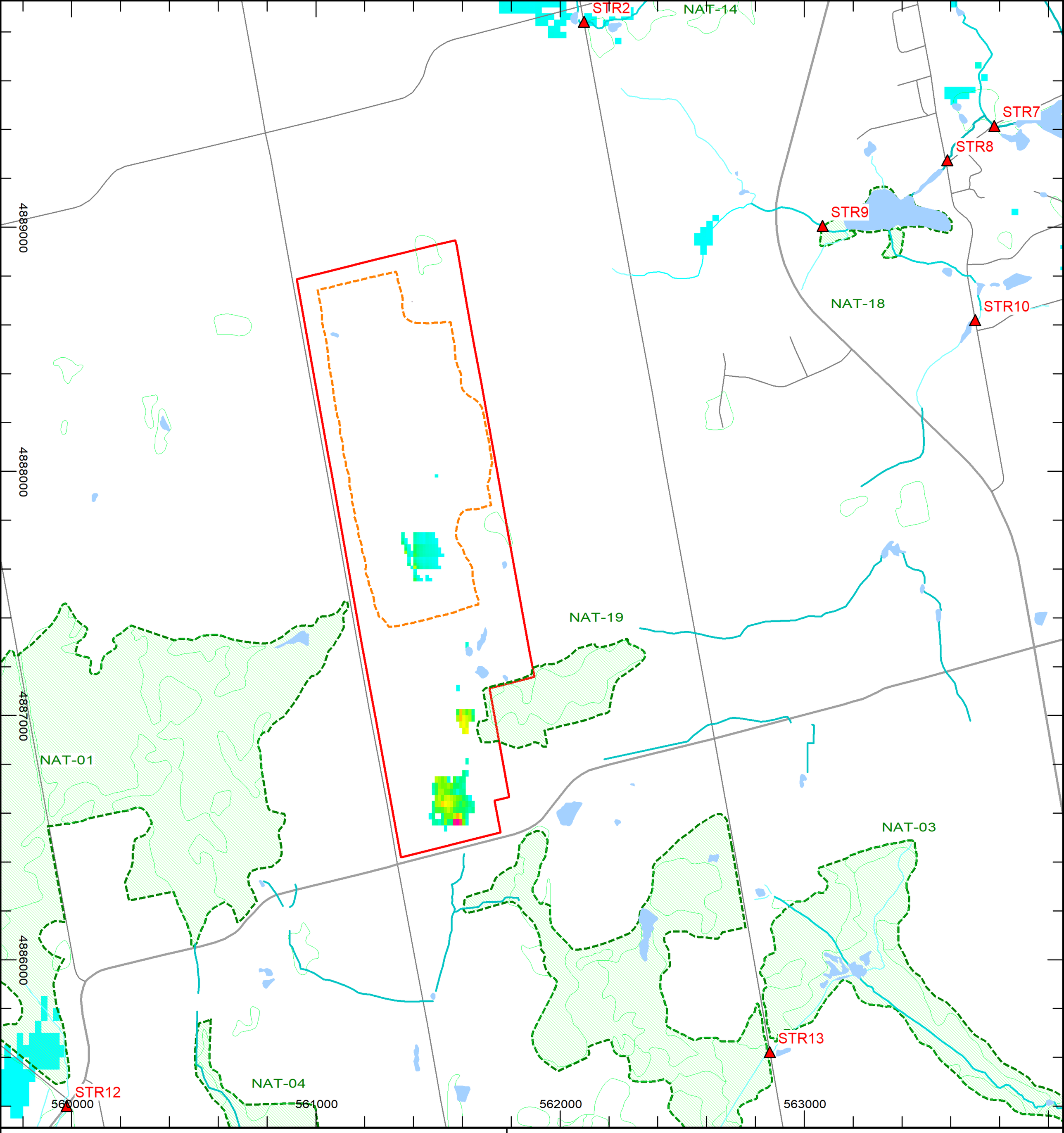
Drawing prepared 10/10/2024



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Decrease in L1 Surface Leakage (m^3/d)

0.01 2 4 6 8 10

0 400 800

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab
Decrease in Surface Leakage

STRADA

EARTHfx INCORPORATED

Drawing prepared 10/10/2024

STR2
NAT-14
STR7
STR8
STR9
NAT-18
STR10
NAT-19
NAT-01
NAT-03
NAT-04
STR12
STR13
4889000
4888000
4887000
4886000
560000
561000
562000
563000

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Increase in Streamflow (m^3/s)

0.00001 0.0001 0.001 0.01 0.1 1

0 400 800

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab Increase in Streamflow

STRADA

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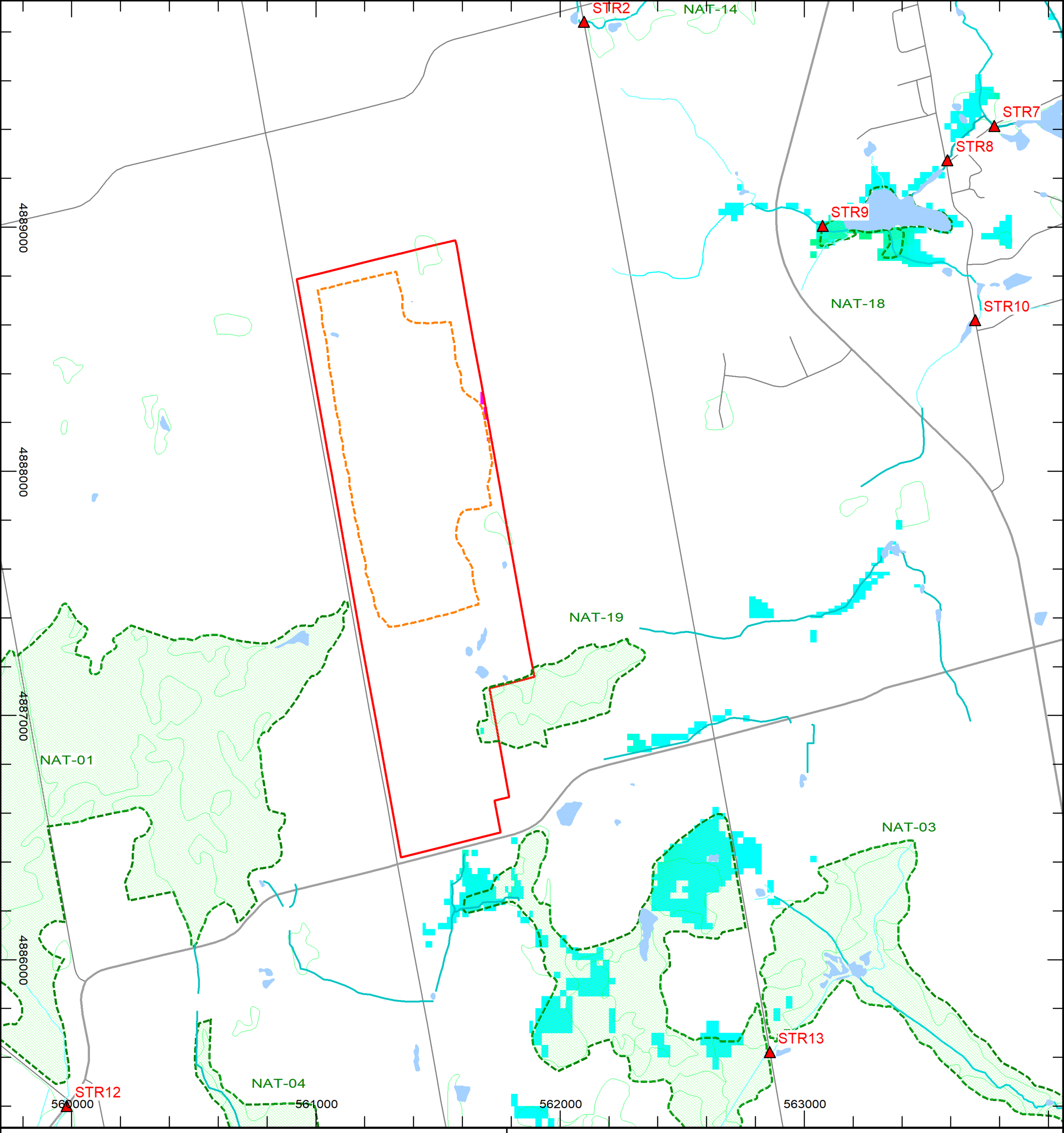
Drawing prepared 10/10/2024



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Increase in L1 Surface Leakage (m^3/d)

0.01 2 4 6 8 10

0 400 800

Units: UTM NAD83 Zone 17

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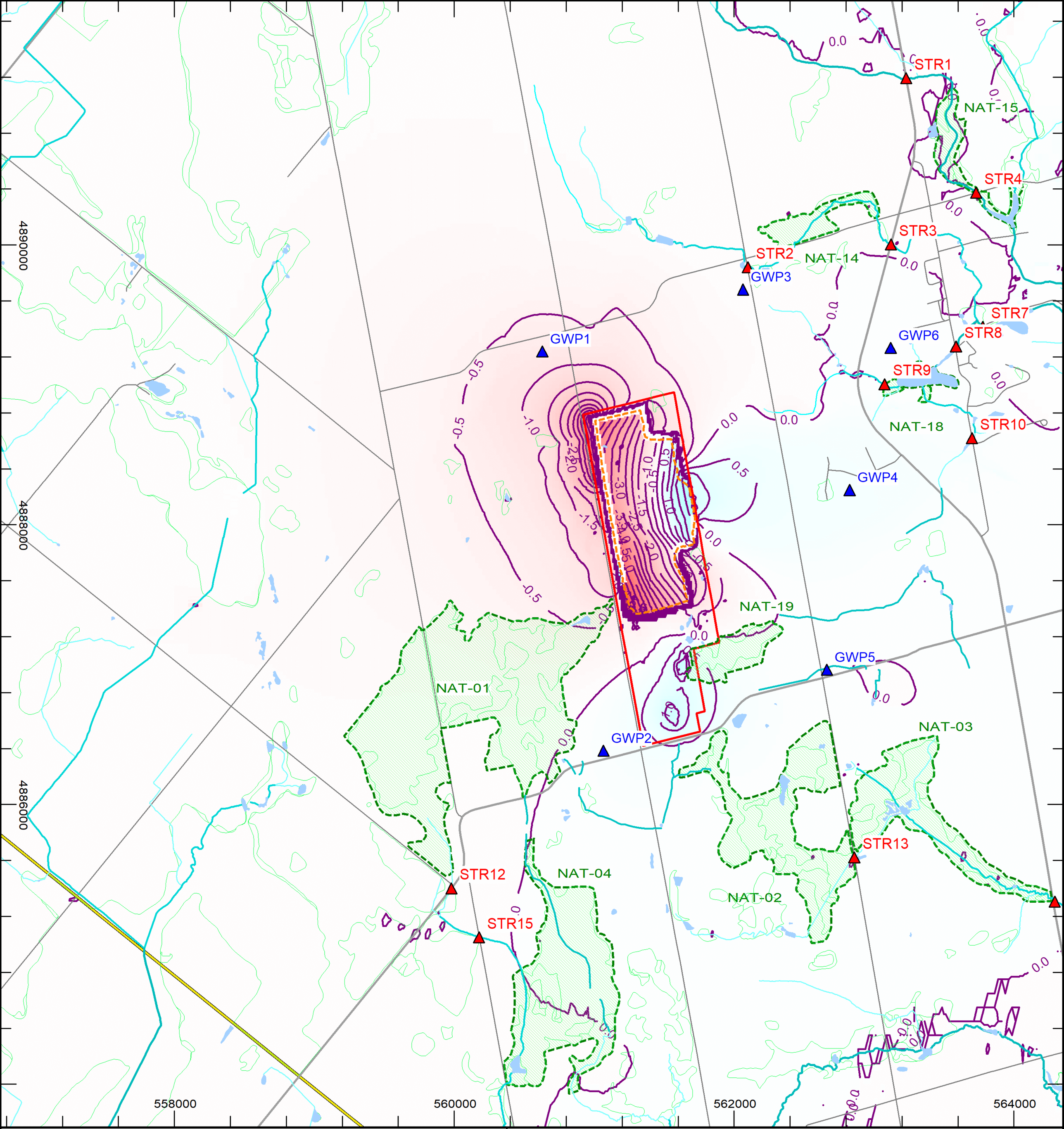
Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab
Increase in Surface Leakage

STRADA

EARTHfx INCORPORATED

Drawing prepared 10/10/2024



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- GWP Locations
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Rehab L1 Drawdown - SS

Contour Line Start: -10.0 Step: 0.5 Stop: 10.0

-10.0 -5.0 0.0 5.0 10.0

0 500 1000 1500

Units: UTM NAD83 Zone 17

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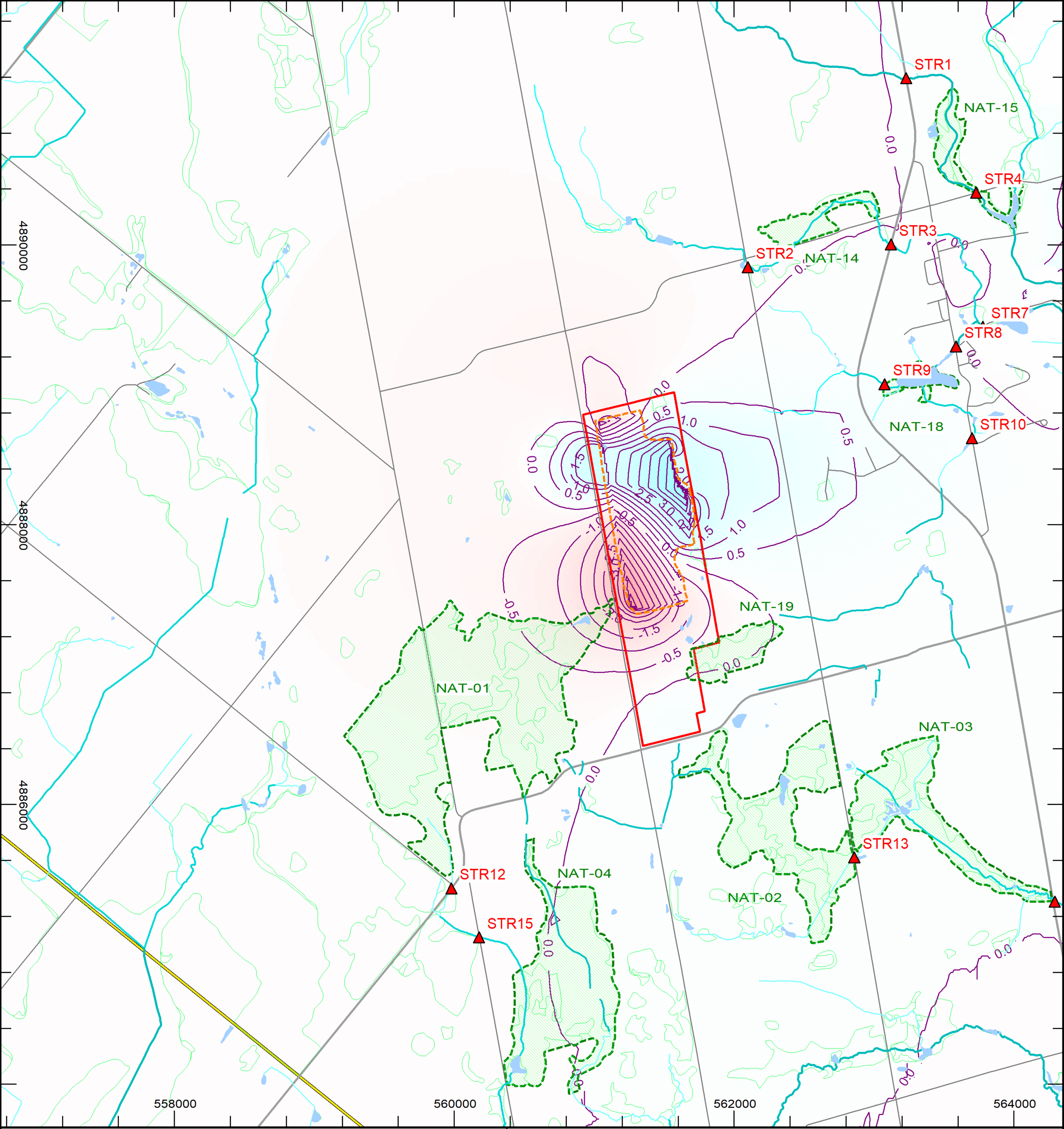
Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab
Layer 1 Drawdown

STRADA

EARTHfx INCORPORATED

Drawing prepared 10/10/2024



Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Strada Property Limit
- Proposed Quarry Limit
- NRSI Stream Points
- GWP Locations
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

Rehab L6 Gasport Drawdown (m) - SS

Contour Line Start: -15.0 Step: 0.5 Stop: 15.0

-15.0 -10.0 -5.0 0.0 5.0 10.0 15.0

0 500 1000 1500

Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

Average Rehab
Layer 6 Gasport Drawdown

STRADA

EARTHfx INCORPORATED

Drawing prepared 10/10/2024

STR1
NAT-15
STR4
STR3
STR2
NAT-14
GWP3
Horning's Mills
STR7
GWP6
STR8
GWP1
STR9
NAT-18
STR10
GWP4
NAT-19
GWP5
NAT-01
NAT-03
GWP2
STR13
STR12
NAT-04
NAT-02
STR14
STR15

4890000
4888000
4886000
4884000
558000
560000
562000
564000

Legend:

- Roads
- Express/Highway
- Freeway
- Municipal Boundary
- Approved Pit Excavation Limit
- NAT Wetlands
- NRSI Stream Points
- GWP Locations
- River/Stream
- Lake
- Wetland
- Model Boundary
- Escarpment Brow
- NRSI Mapped Streams

0 500 1000 1500
Units: UTM NAD83 Zone 17

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Strada Aggregates Proposed Shelburne Pit/Quarry

NAT Wetlands, Stream and GW Assessment Locations

STRADA

EARTHfx INCORPORATED

Drawing prepared 8/21/2024

Appendix XIII
CVs

RYAN ARCHER, M.Sc.
SENIOR TERRESTRIAL AND WETLAND BIOLOGIST

EDUCATION

- Masters of Science, Biology (2004), University of Waterloo, Waterloo, Ontario
- Bachelor of Science, Honours Biology (2001), University of Waterloo, Waterloo, Ontario

CERTIFICATIONS AND MEMBERSHIPS

- Certifications:
  - Ontario Nature Reptile and Amphibian Field Survey Training Course, 2014
  - MNRF Ecological Land Classification for Southern Ontario, 2012

- Memberships:
  - Region of Waterloo Ecological and Environmental Advisory Committee
  - Ontario Nature

AREAS OF PROFESSIONAL EXPERIENCE

Ryan is a terrestrial and wetland biologist and project manager with over 19 years of experience developing and coordinating ecological studies and monitoring programs, 13 of which have been in the field of ecological consulting. Ryan specializes in natural resource inventories and evaluations, research and impact studies as part of Environmental Impact Studies, Environmental Assessments, Natural Environment Assessments and other natural heritage studies. He routinely completes natural area inventories, and has conducted studies on breeding and migrating birds, amphibians, reptiles, mammals, and evaluations of their significance and sensitivity. Ryan routinely characterizes natural environment features and habitats through review of background information sources, field survey implementation and data analysis and interpretation.

Ryan provides expertise in the following areas:

- Inventories of terrestrial and wetland biological resources
- Identification of significant and sensitive natural resources and wildlife species
- Species at Risk, and associated permitting, mitigation and compensation requirements
- Evaluation of natural resource policies and guidelines and their application to development
- Analysis of environmental impacts on wetland and terrestrial resources
- Development of implementation guidelines and monitoring programs
- Peer reviews of natural environment technical reports

Terrestrial and Wetland Ecosystem Studies
Ryan's primary area of expertise is the assessment of wetland and terrestrial ecosystems. He has conducted a wide range of wildlife monitoring surveys, and routinely conducts inventories of breeding bird, amphibian, reptile and mammal species. Ryan is trained and experienced in applying the Ecological Land Classification system for southern Ontario, and in the use of aerial and orthographic photographs for use in vegetation community delineation. Ryan has also completed transect monitoring of vegetation to track long-term changes, as well as characterization and mapping of vegetation communities. Ryan is

experienced in researching and applying natural heritage policies for various jurisdictional levels to evaluate the significance and sensitivity of natural features and species. He is also familiar with completing impact assessments and recommending associated measures to avoid, mitigate, and monitor potential impacts for a range of development types.

Ryan's specific expertise includes:

- Wildlife and vegetation habitat mapping, evaluations and research
- Delineation and characterization of terrestrial and wetland vegetation communities
- Short- and long-term monitoring of natural features and species habitats
- Surveys of birds, amphibians, reptiles, mammals and vegetation
- Identification and evaluation of significant natural features and species
- Assessment of environmental impacts

Aggregate Resources Natural Environment Assessments

Ryan has managed multiple projects associated with natural heritage assessments and monitoring programs for above- and below-water table aggregate extraction operations. This includes management of a multi-year, large-scale ecological study to assess the potential for impacts associated with the proposed below-water table Strada Pit/Quarry in Melancthon Township. Prior to that, Ryan also managed the Natural Environment Assessment for the proposed expansion of above-water table aggregate extraction at Strada Aggregates' Melancthon operation. Through this work and other examples, he is very experienced with undertaking ecological impact assessments associated with aggregate operations. In completing these assessments, he routinely works closely with engineering and hydrogeological firms to determine the potential for hydrogeological and hydrological effects, such as on wetland water balance, to determine impact to the features and their functions. Ryan's experience includes designing and managing long-term ecological studies to track the occurrence of negative biological effects of aggregate extraction on natural features and habitats. He has also completed peer reviews of aggregate project Natural Environment Assessments on behalf of municipal review agencies.

Ryan's specific expertise includes:

- Management and implementation of terrestrial and aquatic characterization studies
- Assessment of water balance, and other hydrological/hydrogeological effects on natural features
- Impact assessments and recommendations to avoid or mitigate natural feature and species impacts
- Preparation of Natural Environment Assessment technical reporting
- Designing, implementing and managing long-term ecological monitoring programs for aggregate operations

Species at Risk

Ryan has a strong working knowledge of Species at Risk in Ontario including the provincial *Endangered Species Act* (ESA), and its policies and regulations. He is experienced in the acquisition of permits and authorizations under the ESA for multiple species. Effective strategies to provide Overall Benefit to protected species in support of permit applications are generated through collaborative consultations between agency staff and proponent. He routinely completes habitat screening exercises to inform fieldwork programs and impact assessments, has led several species-specific surveys and has completed habitat mapping for Species at Risk.

Ryan's specific expertise includes:

- Strong working knowledge of the MECP's ESA permit application process, including the completion of Information Gathering Forms, Alternative Assessments, and C-Permit Application
- Familiarity with ESA regulations and mitigation requirements for registering activities exempt from permitting, including completion of Notices of Activity, Mitigation Records and Monitoring Plans

- Direct experience with habitat mapping, surveys, permitting, mitigation and monitoring plans for Species at Risk such as Eastern Hog-nosed Snake, Common Five-lined Skink, Bobolink, Eastern Meadowlark, Barn Swallow, Butternut, and Gray Ratsnake
- Provision of technical advice and recommendations regarding the protection of habitats, conformance with policies and regulations, and need for additional studies.

EMPLOYMENT HISTORY

Terrestrial and Wetland Biologist
Natural Resource Solutions Inc., Waterloo, Ontario 2011 to present

Aquatic Survey Programs Coordinator
Bird Studies Canada, Port Rowan, Ontario 2008 to 2011

Marsh Monitoring Program Assistant Coordinator
Bird Studies Canada, Port Rowan, Ontario 2005 to 2008

PUBLICATIONS

Archer, R.W. P.C. Lorenz and K.E. Jones. 2010. Monitoring and Assessing Marsh Habitat Health in the Niagara River Area of Concern. Report for Environment Canada – Great Lakes Sustainability Fund. 29 pp.

Harrison, K.E. and R.W. Archer. 2008. Natural Sciences Research Gap Analysis and Annotated Bibliography for Long Point Bay and the Greater Long Point Area. Report for the Ontario Ministry of Natural Resources. 210 pp.

Archer, R.W. and S.T.A. Timmermans. 2008. Belted Kingfisher (*Ceyle alcyon*). Atlas of the Breeding Birds of Ontario 2001-2005. M.D. Cadman, D.A. Sutherland, G.G. Beck, D. LePage, and A.R. Coutuier. 728 pp.

Archer, R.W. and S.T.A. Timmermans. 2006. Marsh Habitat and Vegetation Guide: The Marsh Monitoring Program. 43 pp.

PATRICK W. DEACON, B.E.S.
TERRESTRIAL AND WETLAND BIOLOGIST

EDUCATION

- Honours Bachelor of Environmental Studies, Environment and Resource Studies (2008), University of Waterloo, Waterloo, Ontario.

CERTIFICATIONS AND MEMBERSHIPS

- Certifications:
  - Ontario Reptile and Amphibian Survey Course, 2015
  - MNRF Certified Butternut Health Assessor, 2014
  - MNRF Ontario Wetland Evaluation Training Course, 2012
  - Northeastern Ecological Land Classification Training, 2011
  - Environmental Monitoring for Construction, Vancouver Island University, 2011
  - Prescribed Burn Worker Certification (RX-100), 2009
  - Ontario Exterminator License (Landscape Class), 2009
  - Diploma of Excellence in Ecological Restoration and Rehabilitation, University of Waterloo, 2008

- Memberships:
  - Field Botanists of Ontario (President) and New York Flora Association
  - Long Point Walsingham Forest Collaborative
  - Tallgrass Ontario and Waterloo Stewardship Council (10+ year board terms served)

AREAS OF PROFESSIONAL EXPERIENCE

Patrick has fifteen years of experience completing botanical inventories and preparing habitat management plans and impact studies. He is knowledgeable in the vascular flora of Ontario and is familiar with the vegetation communities of southern and central Ontario. Patrick regularly manages Environmental Impact Studies ranging from lot severances to serviced subdivision developments. He works closely with agency staff, clients, engineers and hydrogeologists to develop effective solutions to natural heritage issues.

His ongoing involvement in tallgrass prairie management has allowed him to work extensively with a number of Species at Risk and conservation organizations throughout southern Ontario.

Patrick's specific expertise includes:

- inventories of terrestrial, wetland and aquatic communities
- application of Ecological Land Classification for vegetation community mapping
- identification of significant vegetation communities
- management of tallgrass prairie, savanna and woodland ecosystems
- invasive species management
- development, implementation and monitoring of more than 50 habitat restoration plans

Terrestrial and Wetland Ecosystem Studies
Patrick routinely conducts vegetation inventories in urban, rural and remote settings. While his expertise lies in botany, he has a strong knowledge of reptiles, amphibians and mammals as well. Both professionally and through group affiliations Patrick has ongoing involvement in Species at Risk plant monitoring and habitat stewardship, most recently for Bird's-foot Violet, Spotted Wintergreen, American Ginseng and American Columbo. He is adept in the application of vegetation survey protocols and techniques including transect and quadrat monitoring as well as air photo interpretation. As a personal project, Patrick manages a database to track historic and extant populations of significant flora in the Region of Waterloo as a precursor to updating the county flora. He regularly contributes vascular plant collections to Ontario herbaria.

Patrick's specific expertise includes:

- project management
- field and laboratory identification of vascular plants
- field and desktop completion of wetland evaluations using the Ontario Wetland Evaluation System
- development of ecological restoration plans and invasive species management plans

Wildlife Studies
Patrick has experience conducting wildlife population surveys and assessments of terrestrial and wetland wildlife habitats. Each spring he is involved with salamander mark-recapture studies, amphibian egg mass surveys and anuran call surveys. In addition, Patrick supports project work through the completion of bird surveys (general breeding birds, marsh birds, nocturnal birds) and is skilled in winter mammal track identification.

Patrick's specific expertise includes:

- wildlife population surveys
- identification of rare and sensitive species
- visual and auditory identification of amphibian and bird species

PUBLICATIONS

Deacon, P.W. 2024. COSEWIC Status report on Prairie Rosinweed (*Silphium terebinthinaceum*). Prepared for the Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario.

Lance, J.M. and P.W. Deacon. 2021. COSEWIC Status Report on Kentucky Coffee-tree (*Gymnocladus dioicus*). Prepared for the Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario. 28p.

Deacon, P.W. and A. Heagy. 2024. Bird's-foot Violet (*Viola pedata*) Re-introduction Feasibility Assessment. Prepared for Environment and Climate Change Canada – Canadian Wildlife Service.

Deacon, P.W. *In Prep*. COSEWIC Status report on Cleland's Evening-primrose (*Oenothera clelandii*). Prepared for the Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario.

EMPLOYMENT HISTORY

Terrestrial and Wetland Biologist
Natural Resource Solutions Inc., Waterloo, Ontario 2010 to present

Ecological Restoration Technician
Waterloo Stewardship Council / Independent 2008 to present

STEPHEN BURGIN, F.W.T., B.Sc.
AQUATIC BIOLOGIST

EDUCATION

- Fish and Wildlife Technologist (2008), Sir Sandford Fleming College, Lindsay, Ontario
- B.Sc. (Honours) Biology (2010), Trent University, Peterborough, Ontario

CERTIFICATIONS AND MEMBERSHIPS

Certifications:

- Swift Water Rescue Operations, 2018
- Class 1 Electrofishing Certification, 2015
- Society for Freshwater Science, Taxonomic Certification for Identification of Aquatic Insects to Family Level, 2014
- Trout Unlimited Canada Aquatic Renewal Program Workshops 1, 2, 3 (2013), 4, and 5 (2014)
- DFO Mussel Identification Workshop, 2012
- Royal Ontario Museum Species at Risk Workshop, 2012
- Royal Ontario Museum Fish Identification Workshop, 2011
- Environmental Monitoring for Construction Projects, Vancouver Island University, 2011
- MOE Technical Workshop – Draft Water Assessment and Water Body Reports Guidance, 2011

Memberships:

- American Fisheries Society, Southern Ontario Chapter
- Trout Unlimited Canada, Speed Valley Chapter (Executive Committee Vice President)

AREAS OF PROFESSIONAL EXPERIENCE

Stephen is an Aquatic Biologist with over 16 years of diverse expertise in aquatic and fisheries ecology, including over 13 years of combined field lead and project management experience directly related to environmental consulting with Natural Resource Solutions Inc. He specializes in the characterization and multi-year monitoring of aquatic habitats, fish and benthic communities, in addition to aquatic species at risk, permitting and authorizations, and environmental reporting for a range of project types including hydroelectric and residential developments and municipal infrastructure. He works regularly on multidisciplinary project teams where he provides guidance on environmental constraints and opportunities, and recommendations for mitigation relating to the aquatic environment. Stephen regularly contributes to reports including environmental assessments (EAs) and environmental impact studies (EIS) and routinely reviews scientific literature and supporting background information in support of projects.

Stephen provides expertise in the following areas:

- project management, staff supervision, and field lead.
- mark-recapture and telemetry studies, including for Lake Sturgeon and Brook Trout.
- fish community sampling for lake and river habitats including boat and backpack electrofishing, gill netting, and trap netting.
- fisheries habitat inventories including spawning surveys, detailed aquatic habitat mapping, and fish passage analysis.

- monitoring of streams and rivers using invertebrate bio-assessment protocols.
- permitting and authorization processes for the *Endangered Species Act, Species at Risk Act* and the *Fisheries Act*, including for Lake Sturgeon (*Acipenser fulvescens*) and Redside Dace (*Clinostomus elongatus*).
- environmental assessments and environmental impact studies.
- Development and implementation of multi-year aquatic monitoring programs through pre-, during-, and post-construction for a variety of developments including residential and commercial, linear and hydroelectric.

Project Management
Stephen is a project manager with experience managing multiple projects simultaneously. He has experience in managing multifaceted projects including Class EAs and EISs, multi-year ecological monitoring for hydroelectric developments and residential developments, and construction support including fish relocations and SAR compliance. He regularly participates in meetings including Public Meetings, agency and landowner site tours, and meetings with agency staff to develop workplans and site-specific mitigations. Stephen provides staff support through in-office and field supervision in addition to report and proposal review.

Permitting and Authorizations
Stephen is experienced in federal and provincial legislation and has worked on many projects involving the *Fisheries Act* and the *Species at Risk Act*, specifically relating to Lake Sturgeon and Redside Dace. He regularly conducts background screening activities for aquatic Species at Risk and has experience with the preparation and submission of *Fisheries Act* Request for Reviews and the *Species at Risk Act* Information Gathering Form and Avoidance Alternatives Form.

Stephen's specific expertise includes:
- screening for aquatic Species at Risk fish and freshwater mussels under the *Fisheries Act* and *Species at Risk Act*
- authorization and permitting under the federal *Fisheries Act* and provincial *Species at Risk Act*.
- conducting surveys for SAR fish and freshwater mussel.

Aquatic Habitat Assessments
As an Aquatic Biologist, Stephen has carried out many aquatic habitat assessments in order to determine the existing conditions as well as the impacts of development on natural and human-altered aquatic features. He is trained in the Ontario Stream Assessment Protocol (OSAP) and proficient in other assessment methods. He has worked on different habitat types (ie. lakes, reservoirs, large rivers, and streams with warm and coldwater fish assemblages) and has a comprehensive understanding of the physical features and processes that affect aquatic species.

Stephen's specific expertise includes:
- visual aquatic habitat characterization and habitat mapping.
- OSAP methodologies for channel structure, substrate and bank conditions.
- water quality measurements.
- habitat compensation and mitigation measures for authorizations under the federal *Fisheries Act.*
- aquatic habitat assessments for land use planning projects such as environmental impact studies and subwatershed studies.
- lake and stream habitat assessments in southern and northern Ontario for hydro and wind development projects.

Fish Community Studies
Stephen has been involved in a number of fish community studies in streams, rivers, ponds, and lakes. He has used a variety of active and passive methods of fish capture in the context of biological monitoring studies, population and biomass estimates, and fish community assessments, including aquatic Species at Risk. He has also been involved in several mark-recapture programs and spawning assessments specifically relating to Brook Trout and Lake Trout.

Stephen's specific expertise includes:

- backpack and punt electrofishing in streams and other wadeable habitats.
- boat electrofishing in non-wadeable habitats.
- passive fish sampling gear (gill nets, trap nets, fyke nets etc.).
- removal sampling for population and biomass estimates.
- fish salvage operations for construction and restoration projects in northern and southern Ontario.
- spawning surveys and dispersion studies of Brook Trout and Lake Trout in northern Ontario lakes, utilizing a variety of passive sampling methods and fish tagging.

Environmental Reporting
Stephen has reported existing aquatic habitat, mussel, and fish community characteristics for a variety of environmental impact studies, environmental assessments, baseline studies, and pre- and post-construction monitoring of aquatic conditions, including the preparation of annual technical reports as part of multi-year monitoring programs. Stephen has experience in gathering the required background and field information necessary to characterize existing conditions and conduct impact assessments.

Stephen's specific expertise includes:

- review of agency files, planning and engineering reports, and fisheries management plans.
- field studies of aquatic habitats and fish and benthic communities.
- discernment of significance and sensitivity of aquatic habitats and biota.
- summarizing environmental constraints and opportunities.
- recommending mitigation measures
- preparation of environmental impact study reports, environmental assessment reports, and annual technical reports for multi-year monitoring programs.

EMPLOYMENT HISTORY

Aquatic Biologist
Natural Resource Solutions Inc., Waterloo, Ontario 2010 to Present

Electrofishing Technician
Credit Valley Conservation Authority, Mississauga, Ontario 2010

Fisheries Technician (Summer Contract)
Algonquin Fisheries Assessment Unit, Whitney, Ontario 2008/2009

NYSSA HARDIE, M.Sc., E.P.
ECOHYDROLOGIST & PROJECT MANAGER

EDUCATION

- Honours Bachelor of Environmental Studies, Physical Geography, Biophysical Systems specialization, English Minor (2008), University of Waterloo, Waterloo, Ontario
- Master of Science, Physical Geography (2010), University of Toronto, Toronto, Ontario

CERTIFICATIONS AND MEMBERSHIPS

- Certifications:
    - Erosion and Sediment Control Practitioner (ESCP), 2017
    - Ontario Stream Assessment Protocol (OSAP) Instream Crossing and Barrier Attribution, 2013
    - Ontario Stream Assessment Protocol (OSAP) Assessing Headwater Drainage Features, 2013

- Memberships:
    - Ontario Headwater Steering Committee, member since 2015

AREAS OF PROFESSIONAL EXPERIENCE

Nyssa is an Ecohydrologist specializing in the assessment of ecological function and impacts to hydrologic systems, including wetlands, watercourses, headwater drainage features, ponds, and lakes. Nyssa provides expertise in managing natural freshwater hydrologic systems to protect their form and function while balancing sustainable development, recreation, restoration, and other important land uses. She is an experienced headwater drainage feature evaluator, and has identified, assessed, and managed these systems throughout southern Ontario.

Nyssa is experienced in evaluating site and feature-based water balance analyses to identify and mitigate impacts to wetlands, watercourses, ponds, lakes, and riparian areas based on development applications of various size. She works with multidisciplinary teams, including surface water engineers, hydrogeologists, civil engineers, geotechnical engineers, and urban planners, to identify potential constraints and impacts to natural heritage features based on pre- and post-development water balance models.

Nyssa is a highly experienced project manager. She executes a wide variety of project and program types efficiently to meet the client's goals and objectives in a timely manner. She frequently works with and manages multi-disciplinary team to solve complex ecological issues, providing effective and creative solutions to her clients. Nyssa designs, implements, and manages natural feature, stormwater management, and water quality monitoring programs and provides expertise in the analysis of impacts to aquatic and terrestrial life based on the results.

Nyssa provides expertise in the following areas:

- Management of significant and sensitive natural features, surface water systems, and wildlife habitats
- Analysis of impacts to natural and artificial water bodies, wetlands, and aquatic and terrestrial habitats
- Assessment of ecohydrological function of natural features to determine sustainability following localized disturbances
- Designing and executing natural feature and ecohydrological monitoring programs
- Project management for a wide variety and scale of projects
- Multidisciplinary team coordination, and effective communication amongst multidisciplinary teams to

achieve project goals and approvals
- Interpretation and implementation of natural resource policies, procedures, and guidelines
- Ecological review of site and feature-based water balance analyses
- Environmental Impact Studies/Assessments, due diligence studies, natural heritage characterization and constraints analyses, cumulative impact analyses, peer reviews, Secondary Plans and Subwatershed Studies, Permit to Take Water impact assessments and monitoring programs, OLT support.

Ecohydrology
Ecohydrology is an interdisciplinary field in the physical and applied sciences that focuses on the inter-relationship between the hydrological cycle and ecosystems, as well as their dependences. Ecohydrology balances these relationships to manage water systems, natural features, and wildlife habitats effectively.

Nyssa works with multidisciplinary teams to evaluate existing hydrological conditions and ecological form and function of natural features and wildlife habitats. She identifies potential impacts from hydrologic changes to the system as a whole. She regularly works with a variety of engineers and fluvial geomorphologists to balance the requirements of these systems with wildlife needs and ecological function to create sustainable solutions. She provides recommendations for the protection of hydrologic and ecological function of water systems, and where needed, provides mitigation recommendations for unavoidable impacts. She focuses on reducing the unavoidable impacts and assessing the specific sensitivities of wildlife and vegetation present in the impacted area. Nyssa is solution oriented, working with project teams to identify and assess mitigation measures that creatively manage surface water and groundwater, while protecting and enhance natural features and habitats.

Nyssa provides expertise in the management of surface water systems and wetlands with competing land uses such as residential and industrial development, recreation, and stormwater management. She works with project teams to assess the feasibility of restoration or compensation plans for natural features, and identifies hydrological constraints or opportunities for natural feature enhancement.

Nyssa provides expertise in the following areas:
- assessments of wetland hydrological function
- identification of species-specific hydrologic requirements, sensitivities, and thresholds of impact
- integration of the results from multidisciplinary studies to evaluate hydrologic and ecological impacts
- determination of impacts to natural features through ecological assessments of water balance
- management of hydrologic and ecological function for small and large catchment areas
- management of headwater, watercourse, pond, and lake systems

Multidisciplinary Integration
Nyssa's background in physical geography and her experience with surface water, and habitat and natural feature management provide a unique set of skills. Her ability to integrate information and data from various fields (e.g., hydrology, fluvial geomorphology, aquatic and terrestrial biology, hydrogeology, etc.) provides clients with creative and effective solutions to a wide variety of potential and actual environmental issues. She integrates data collected by experienced terrestrial and aquatic biologists with groundwater and surface water monitoring, and erosion assessments from engineers and fluvial geomorphologists to identify potential environmental impacts. She is experienced in detailed cumulative impact analyses, where she integrates data from multiple sources to assess impacts to the environment at a landscape scale and over long-term periods.

Nyssa's specific expertise includes:
- interpretation and consolidation of multidisciplinary data (geomorphology, aquatic and terrestrial biology, hydrology, geotechnical and hydrogeological engineering) into clear and concise assessments of natural feature impacts
- Identification and communication of environmental impacts from potential stressors
- Creative solutions to environmental issues related to surface water and natural heritage systems

- Integration of species and feature thresholds and targets into stormwater management plans, permits to take water impact analyses, water balance assessments, monitoring programs, and wildlife movement studies
- identification of environmental constraints, restoration, and enhancement opportunities of natural features and habitats to protect and improve natural feature, hydrological, and ecological function

EMPLOYMENT HISTORY

Ecohydrologist & Project Manager
Natural Resource Solutions Inc., Waterloo, Ontario 2018 to present

Project Biologist
Natural Resource Solutions Inc., Waterloo Ontario 2012 to 2017

Intermediate Fluvial Geomorphologist
PARISH Geomorphic Ltd., Mississauga, Ontario 2010 to 2012

Fluvial Geomorphologist Intern
McCormick Rankin Corporation, a Member of MMM Group, Kitchener, Ontario 2009