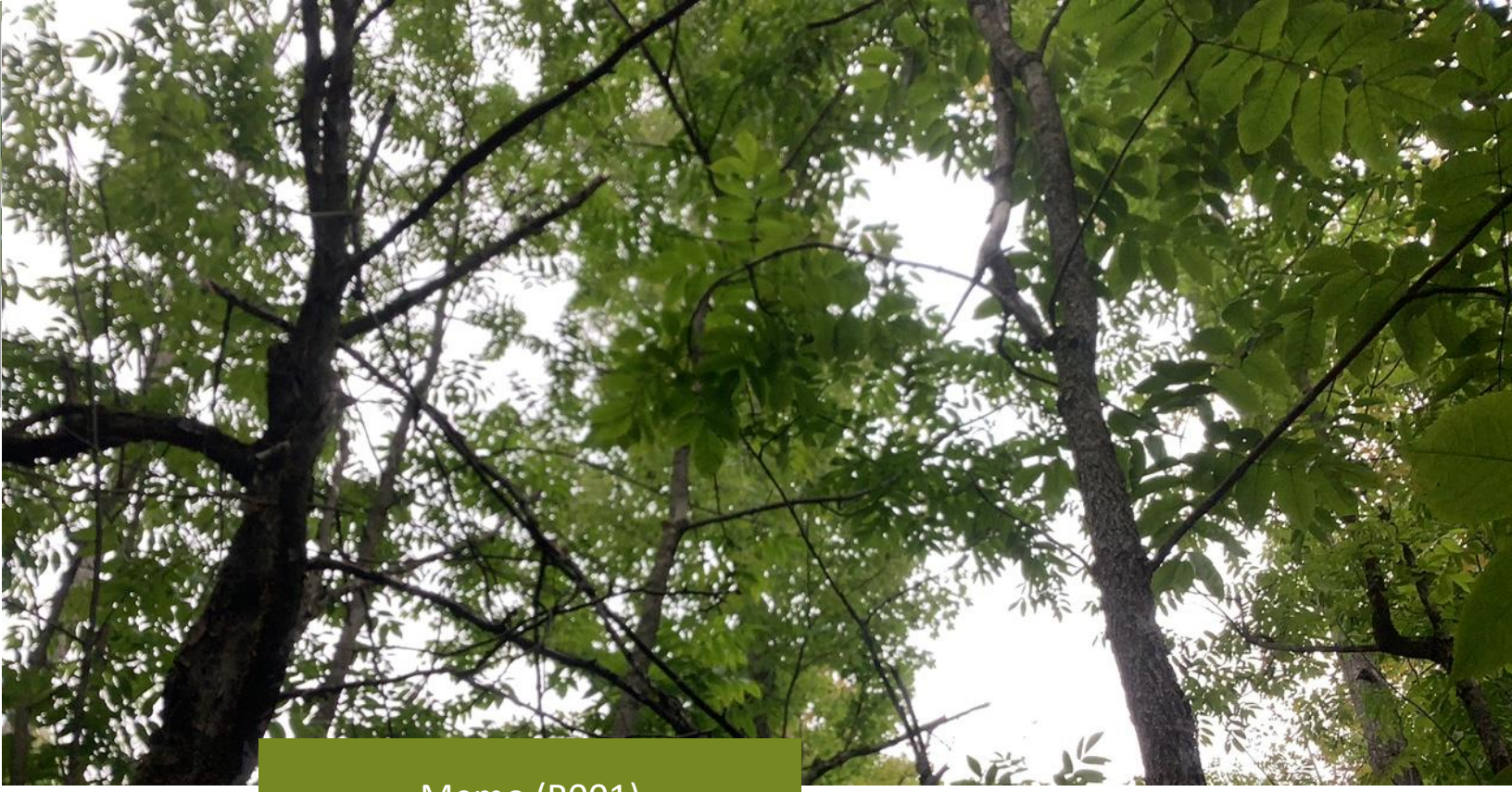

Memo (R001)

File Name: NWMO_2022_Change Assessment Memo_SB (R001)

BIODIVERSITY IMPACT STUDIES – SOUTHWESTERN ONTARIO REGION: 2022 CHANGE ASSESSMENT MEMORANDUM

December 14, 2022

PREPARED BY Zoetica Environmental Consulting Services

SUBMITTED TO Michelle Nearing
Nuclear Waste Management Organization
22 St. Clair Avenue East
Fourth Floor, Toronto, ON
M4T 2S3, Canada

ZOETICA
ENVIRONMENTAL CONSULTING SERVICES

OFFICE 102-22351 ST ANNE AVE, MAPLE RIDGE, BC, V2X 2E7
PHONE 604 467 1111
WEBSITE WWW.ZOETICAENVIRONMENTAL.COM

Cover Image: from TEM 2022 field work in SON-South Bruce.

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R001	14-Dec-2022	First submission to NWMO	C. Warbington, A. Buckman, C. Chui, A. Hamilton, D. MacKinnon	H. Bears	H. Bears

Signature Page

Section	Written By	Reviewed By	Senior Reviewed and Approved by
1.0	H. Bears, A. Buckman	C. Chui	C. Chui
2.0	A. Buckman, D. MacKinnon	H. Bears	H. Bears
3.0	H. Bears	A. Buckman	A. Buckman
4.0	H. Bears, A. Buckman, C. Warbington	C. Chui	C. Chui
5.0	C. Warbington, A. Buckman, C. Chui	H. Bears	H. Bears
6.0	H. Bears, A. Hamilton	A. Buckman	A. Buckman
7.0	H. Bears	A. Buckman	A. Buckman
8.0	H. Bears	A. Buckman	A. Buckman

Signatures:

Heather Bears

Principal, Senior Ecologist (M.Sc., Ph.D., R.P.Bio.)

Andrea Buckman

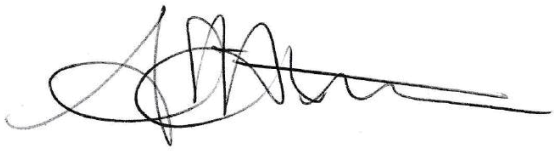
Senior Ecologist (Ph.D., R.P.Bio.)

Celia Chui

Wildlife Biologist (M.Sc., R.P.Bio.)

Camille Warbington

Quantitative Ecologist & Large Mammal Specialist (B.Sc., M.Sc., Ph.D.)



Amanda Hamilton

Wildlife Biologist (B.Sc., M.Sc., M.F.)

Deanna MacKinnon

GIS Specialist (B.Sc. Phys. Geog.)

EXECUTIVE SUMMARY

The Nuclear Waste Management Organization (NWMO) is responsible for implementing the Adaptive Phased Management (APM) Deep Geological Repository (DGR) (hereafter 'APM Project'), which is Canada's plan for the safe, long-term management of used nuclear fuel, in a manner that protects both people and the environment. Zoetica™ was retained by the NWMO to undertake Biodiversity Impact Studies (BIS) for the APM Project within two potential locations that are both being considered for the DGR. This document focuses on the Saugeen Ojibway Nation (SON)-South Bruce siting area located within the southwestern Ontario region surrounding the Municipality of South Bruce and in the traditional territory of Saugeen Ojibway Nation.

The 2022 BIS Change Assessment Memorandum, along with its future iterations, examines potential interactions between the APM Project and biodiversity values (BVs) that could result in changes to those BVs, based on information available at the time of writing. The Change Assessment Memo outlines any known biodiversity sensitivities within and surrounding the Area of Interest (AOI) based on existing data and data collected as part of Tier 1 studies. The change assessment should not be interpreted as an initial impact assessment (IA). As such, impacts and benefits due to the APM Project and cumulative effects in the surrounding area are not assessed in this document; rather potential project interactions are outlined. Impacts and benefits to biodiversity resulting from the APM Project and cumulative effects will be assessed for extent of significance during the formal IA process. The early information based on successive findings presented in Change Assessment memos will facilitate the timely application of the mitigation hierarchy[1] and flag important potential effects for consideration by communities. The change assessment herein is not meant to replace a formal IA that draws from multiple years of multidisciplinary field data and a formalized Project Description. The 2022 BIS Change Assessment Memo draws from Tier 1 desk-based and limited field-based studies conducted to date (focused on foundational habitat and species presence information) within relevant BIS study areas: an Area of Interest (AOI) where project infrastructure will be placed, terrestrial and aquatic local study areas (LSAs), and BV-specific regional study areas (RSAs). Biodiversity information was considered alongside the updated Conceptual Site Model (CSM; CanNorth 2022) to identify potential interactions. This Change Assessment Memo outlines all areas within the AOI that need to be considered when designing the APM Project, as the locations of infrastructure within the AOI are not yet finalized. Potential effects outlined within this report are hypothetical as it is assumed that infrastructure could be located anywhere within the AOI. Commonly utilized mitigation measures and best practices to manage potential negative changes to biodiversity are also presented.

A formal IA will be conducted if-and-when community willingness has been achieved and a site has been selected for ongoing investigation, and after the completion of more focused Tier 2 and 3 studies on relevant BVs at that site. The formal IA, conducted following the federal *Impact Assessment Act*, will assess the magnitude and extent of significance of potential changes to BVs that are selected as valued components (VCs), along with relevant cumulative effects based on other activities in the SON-South Bruce siting area.

[1] The Mitigation Hierarchy is a set of guidelines that are nationally and internationally accepted as best practices and provide a framework to follow a series of mitigation options in the order of avoidance, minimization, restoration, and offset to reduce development impacts and aim to achieve no net loss of biodiversity (BBOP 2012, IFC 2012, CSBI 2015).

Regulatory Considerations and Community Feedback

Zoetica's BIS is designed to comply with regulatory requirements, and with consideration of community concerns and feedback received through engagement conducted to date. Based on these regulatory and community considerations, the following sections summarize baseline information on potential APM Project x biodiversity interactions for BVs that are likely to be scoped as part of VCs for the APM Project IA; namely, species of interest, important wildlife and fish habitats, wetland and riparian areas, and ecosystem functions and services.

Species of Interest

Several types of species of interest were considered during baseline work and the preparation of the 2022 BIS Change Assessment Memo: i) species of conservation concern, ii) species of interest to stakeholders and rights-holders, and iii) invasive species.

Species of conservation concern include federally and provincially listed species at risk (SAR) and provincially rare species and are protected through various federal and provincial regulations. A total of 59 species of conservation concern, including 35 SAR and 24 provincially rare species, have been identified within relevant BIS study areas. Of the species detected, six at-risk birds (bobolink, eastern meadowlark, barn swallow, bank swallow, lesser yellowlegs, bald eagle), one at-risk reptile (snapping turtle), and two rare birds (white-crowned sparrow, upland sandpiper) have been detected within the AOI. Four additional species of conservation concern may have been observed within the AOI; however, due to Ontario Natural Heritage Information Centre (NHIC) data sensitivity standards for these 'restricted species', their names and locations cannot be disclosed.

Species of interest to stakeholders and rights-holders include those that have been mentioned during engagement as important to include in the BIS (see Appendix B in Zoetica's Best Practices and Preferred Approach [BPPA] Report (Zoetica 2021a)). One species of interest to stakeholders and rights-holders that was not a species of concern, lake whitefish, was detected within the aquatic RSA developed for fish but was not detected within the AOI or local study area for fish.

Invasive species are those that are not native to Ontario, or to a part of Ontario, where their introduction or spread threatens the natural environment, human health, or socio-economic values. A total of four invasive fish species (rainbow smelt, threespine stickleback, round goby, and white perch), one invasive aquatic invertebrate species (rusty crayfish), one invasive terrestrial invertebrate species (spongy moth), two noxious weed species (coltsfoot and European buckthorn), six non-regulated invasive plant species (goutweed, small-flowered hairy willowherb, broad-leaved helleborine, European water-horehound, bittersweet nightshade, European highbush cranberry) and four designated exotic/introduced plant species (white willow, rough bluegrass, Greek anemone, bladder campion) were detected within the relevant BIS study areas during initial Tier 1 studies. Of these species, only spongy moth has been reported within the AOI to date.

Potential Project Interactions with Species of Interest

Potential project interactions for species of interest differ among the three groups discussed above. For species of conservation concern and species of interest to stakeholders and rights-holders, APM Project interactions are similar and include:

1. Direct loss of habitat due to clearing of land or infilling of water during construction;

2. Indirect habitat loss due to dust, noise, vibrations, and changes in habitat conditions resulting in the loss of functional habitat;
3. Direct and indirect mortality related to traffic, collisions with infrastructure, mechanical clearing activities, trampling and injury, spread of disease, reproductive failure, and creation of zones of attraction to areas with higher risk of mortality;
4. Impacts to movement due to the creation of barriers, zones of avoidance, or large expanses of cleared habitat; and
5. Changes to ecosystem function.

For invasive species, as well as weedy and introduced plants not considered invasive, APM Project interactions relate to the potential to spread these species through the SON-South Bruce siting area during the APM Project construction and operations phases, if no mitigation measures exist to control their spread. Invasive species have the potential to negatively impact species of conservation concern and those of interest to stakeholders and rights-holders through effect pathways 1-5 as they can modify habitats essential for sustaining naturally occurring biodiversity, cause additional competition for resources, increase predation risk, and act as a vector in spreading disease to natural populations.

Important Habitat

Several types of important habitats were considered during baseline work and the preparation of the 2022 BIS Change Assessment: candidate Significant Wildlife Habitat (SWH), critical habitat for SAR, and important fish habitat. These habitats are components of the natural heritage features and areas that are protected by Ontario Provincial Policy Statement (PPS) under the *Planning Act* (MMAH 2020). SWH includes seasonal concentration areas, rare vegetation communities, specialized habitat for wildlife, habitat for species of conservation concern, and animal movement corridors. Critical habitat is habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in a federal recovery strategy or action plan for the species. Important fish habitat includes habitat required to fulfill important life history phases of fish species. It includes habitat used for spawning, rearing, overwintering and migration between seasonally important habitats.

Based on desk-based analyses of ecosites and other habitat criteria conducted to date, Zoetica has identified one confirmed SWH type (Deer Winter Congregation Areas) and two candidate SWH types (Bat Maternity Colonies, Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)) within the BV-specific study areas.

Based on desk-based searches of critical habitat identified in recovery strategies and NHIC records for at-risk species conducted to date, critical habitat belonging to six species was found. Critical habitat was detected within the relevant BIS study areas for pugnose shiner, rainbow mussel, wood turtle, spotted turtle, American ginseng, and goldenseal. Critical habitat squares for the turtle and vegetation SAR and critical habitat for rainbow mussel overlap with the AOI. The habitat regulation for wood turtle (O. Reg. 832/21) under the Ontario *Endangered Species Act* does not currently apply to areas within the County of Bruce. However, following the mitigation hierarchy with consideration of this habitat regulation may contribute to positive effects of the APM Project through conservation efforts toward the species' recovery.

Desk-based information collated to date revealed one important fish habitat located within the relevant BIS study areas; a brook trout spawning area reported in the aquatic LSA. No potentially important fish habitat has been documented within the AOI.

The primary potential APM Project-related interactions with important habitat include:

1. Direct habitat loss due to land/vegetation clearing and infilling of aquatic habitats during construction;
2. Indirect habitat loss due to changes in habitat conditions (e.g., light, noise, vibration);
3. Alterations to habitat resulting in barriers to movement; and
4. Changes to ecosystem function resulting in degraded quality of habitat (e.g., loss of riparian vegetation/shading leading to increased stream temperatures).

Wetlands and Riparian Areas

Wetlands and riparian areas fulfill a wide range of ecological, hydrological, and biochemical functions and provide unique and specialized habitats for wildlife that depend on these features for various life-history phases and movement and migrations through connected, undisturbed habitat networks. In Ontario, wetlands are considered natural heritage features that require protection and sustainable management. Tier 1 studies within relevant BIS study areas included determining the distribution and prevalence of wetlands and riparian areas through desk-based analyses of ecosites, existing data for Provincially Significant Wetlands, and through mapping of various riparian buffer widths around watercourses and waterbodies that should be retained or enhanced to preserve wetland function into the future. The APM Project could potentially interact with wetlands and riparian areas through clearing activities and infilling during construction, or indirectly through the degradation of these habitats from project activities, which could affect the ecological functions that sustain aquatic health and biodiversity.

Ecosystem Function and Services

Ecosystem functions include the physical, chemical, and biological processes within the ecosystem to maintain biodiversity. Ecosystem services are the variety of benefits that nature provides to people, including regulating services (e.g., shading, pollutant removal, regulation of water), provisioning services (e.g., material benefits such as food, water, raw materials, and medicinal resources), and cultural services (e.g., non-material benefits including recreation and mental and physical health). A review of existing desk-based information collected to date as well as feedback received during engagement specific to the BIS revealed several components within the BIS study areas related to providing ecosystem functions and services to biodiversity and humans. These components include Areas of Natural and Scientific Interest (ANSI), Conservation Authority Lands, and County and Municipal Lands providing important habitats for sustaining biodiversity; all were located outside of the AOI within the local or regional study areas developed for ecosystem services. A trail network that provides recreational services to people was also identified; however only the Huron Shores ATV Club trails intersect the AOI, with all other trails located within the broader local or regional study areas. Potential project interactions with these ecosystem function and services components include i) restriction of trail access within the AOI due to fencing around project infrastructure, and ii) impacts to the quality of trails and lands that provide important habitats for sustaining biodiversity due to direct and indirect impacts on habitat and vegetation (e.g., wetlands and riparian habitats protect aquatic habitats by filtering contaminants and sediments; thus, loss of wetlands and riparian vegetation can decrease water quality).

Mitigation for Potential APM Project x Biodiversity Value Interactions

Mitigation for the APM Project will be planned and implemented following the steps of the mitigation hierarchy: avoid, minimize, restore, and offset. The NWMO will follow best management practices developed for protecting species of interest, important habitats, wetlands and riparian areas, and ecosystem function and services, where available. These best practices will be applied throughout the design, construction, and operation of the APM Project. NWMO will implement proven mitigation measures in both aquatic and terrestrial environments to protect these BVs. Key mitigation measures include designing infrastructure and activities to avoid important habitats and habitat features; minimizing areas to be cleared or infilled to only as necessary; minimizing habitat fragmentation by restricting activities within a project footprint; implementing prescribed setbacks to protect important habitats and adjacent lands; minimizing disturbance to species of interest and their habitats through measures to reduce light, noise, vibration, and human-BV interactions; implementing measures to preserve proper ecosystem functioning (including preventing the introduction and spread of invasive species, engineering wetlands to maintain surface hydrology and other wetland functions); and avoiding activities that could impact species of conservation concern and their habitats during sensitive periods, wherever possible. A more extensive list of mitigation methods that can be used to ensure impacts to BVs are not significant is outlined within the current document.

Avoidance Zone Considerations

Zoetica has created setback maps to show areas of the AOI that will likely require high, moderate, and low mitigation based on the presence of natural heritage features, as per the Ontario PPS, including aquatic habitats (waterbodies, watercourses, wetlands) and candidate SWH and their recommended or mandated buffers. These maps will be continually updated as more information is collected through the BIS baseline program and will assist the NWMO with APM Project site alignment and mitigation planning. Once a Project Description is developed by the NWMO and likely project interactions with biodiversity are analyzed, more specific recommendations of the mitigations to be used, and where, will be provided to the NWMO.

Potential Significant Effects

Based on data collected and analyzed to date, along with consideration of the CSM during all stages of development and operation of the APM Project and the relatively small size of the surface infrastructure and available mitigation measures, no biodiversity issues have currently been identified from a technical/biological perspective that would preclude the SON-South Bruce siting area as a feasible site for ongoing consideration of the APM Project. However, as more biodiversity baseline studies are conducted, and more is learned about the APM Project design and infrastructure, including the siting and the footprint of the excavated rock and surface infrastructure, additional APM Project x biodiversity interactions may be identified that need to be considered.

Next Steps

Information collected as part of the BIS Tier 1 studies along with information collected as part of other environmental programs (e.g., the Environmental Media Baseline Program), and through the human, social, and economic pillars, will aid in the site selection process for the APM Project. Once a site has been selected with a willing host community, the BIS will proceed with the collection of Tier 2 biodiversity data at the selected site. The focus of Tier 2 studies is to collect data to understand community and population metrics for biodiversity (e.g., relative abundance, species diversity) within relevant BIS study areas. These

data will be important for determining the overall effects (impacts and positive effects) of the APM Project on biodiversity. Tier 2 studies will also prioritize data collection for species of interest including listed species, species of importance to stakeholders and rights-holders determined through engagement with the relevant communities, and species that can act as indicators.

Additional Tier 1 studies may continue at the selected site to gather data required for the IA. For example, terrestrial ecosystem mapping may be extended to the RSA to collect relevant data for determining important species habitat associations for select species, and for determining the relative proportion of available high-quality habitat in the various BIS study areas. Environmental DNA metabarcoding studies may be continued to include repeated seasonal sampling to enable occupancy modelling, identify biological hotspots within the BIS study areas, and provide for detections of cryptic species that may not be as easily detected through traditional methods.

Data collected as part of Tier 2 BIS studies will build on data collected in Tier 1 studies to update setback considerations and to inform the NWMO of priority locations that require early consideration through the mitigation hierarchy. Along with a formal APM Project Description and project-specific Tailored Impact Statement Guidelines, this stage of data collection will start to inform the IA (e.g., which biodiversity values may be selected as valued components, and allow for preliminary predictions of both impacts and benefits to biodiversity. The iterative process of baseline reporting and identifying potential impacts and benefits allows for the application of early learnings to assist in making good decisions, identifying needed cross-disciplinary collaborations, and applying the mitigation hierarchy (e.g., identifying design adaptation needs early in the process) and will result in the submission of a sound and focused IA following best practices outlined in the BPPA Report (Zoetica 2021a).

Table of Contents

List of Figures

List of Tables

List of Appendices

List of Appendix Tables

GLOSSARY AND ABBREVIATIONS

Adaptive Management	Adaptive management is defined consistent with the CNSC's definition of adaptive management (REGDOC-3.6): A planned and systematic process for continuously improving management practices [primarily environmental] by learning from their outcomes. [For an environmental assessment (EA)], it involves, among other things, the implementation of new or modified mitigation measures over the life of the project to address unanticipated environmental effects. Note: The need to implement adaptive management measures may be determined through an effective follow-up program.
AHM	Aquatic Habitat Mapping
ANSI	Area of Natural and Scientific Interest
AOI	Area of Interest
APM Project	The Adaptive Phased Management (APM) Project is the Deep Geological Repository (DGR) and other required infrastructure for the safe, long-term management of Canada's used nuclear fuel.
BIS	Biodiversity Impact Studies
BMP	Best Management Practice
BPD	Biodiversity Impact Studies – Southwestern Ontario Region: Baseline Program Design
BPPA	Biodiversity Impact Studies – Southwestern Ontario Region: Best Practices and Preferred Approach
BV	Biodiversity Value; The biotic environmental components that will be considered for study within The APM Project's Biodiversity Impact Studies. A subset of biodiversity values will ultimately be scoped into the Biodiversity Impact Assessment as Valued Components.
CNSC	Canadian Nuclear Safety Commission
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Critical habitat	Habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a recovery strategy under the Ontario *Endangered Species Act*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species.
CSM	Conceptual Site Model
DFO	Fisheries and Oceans Canada
DGR	Deep Geological Repository
ECCC	Environment and Climate Change Canada
Ecoregion	Second highest level of the ELC hierarchy (Crins et al. 2009). Large geographic areas primarily identified by sub-continental climatic regimes and bedrock geology.

Ecosite	Second lowest level of the ELC hierarchy (Crins et al. 2009). The land within an ecosite will generally contain similar substrate and vegetation.
Ecosystem function	In the context of biodiversity, ecosystem functions include the physiochemical and biological processes that occur within the ecosystem to maintain biodiversity.
Ecosystem services	Ecosystem services are the direct and indirect benefits to human well-being that the natural environment provides through healthy ecosystems. Ecosystem services include provisioning services such as the production of food and water, regulating services, such as the control of climate and disease, supporting services, such as nutrient cycles and oxygen production, and cultural services, such as spiritual and recreational benefits.
ECS	Ecoregional Criterion Schedule
EDDMapS	Early Detection and Distribution Mapping System
eDNA	Environmental DNA
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
EMBP	Environmental Media Baseline Program
END	Endangered
EO	Element Occurrence
EP	Environmental Protection
ESA	Ontario *Endangered Species Act*
GBIF	Global Biodiversity Information Facility
GHD	General Habitat Description
GIS	Geographic Information System
GL	Great Lakes
GLSL-CS	Great Lakes / St. Lawrence – Canadian Shield
Habitat suitability / suitable habitat	The ability of the habitat, in its current condition, to provide the life requisites of a species.
IA	Impact Assessment
LSA	Local Study Area LSA_{TER} = Terrestrial Local Study Area LSA_{AQU} = Aquatic Local Study Area LSA_{ECO} = combined LSA_{TER} and LSA_{AQU} for studying ecosystem function and services
MECP	Ontario Ministry of the Environment, Conservation and Parks
Mitigation hierarchy	A tool designed to help limit the negative impacts of development on biodiversity and ecosystem services. Involves a sequence of four key actions – avoid, minimize, restore, and offset – and provides a best practice approach to aid in the sustainable management of environmental resources by establishing a mechanism to balance conservation needs with development priorities.

NA	Not Applicable
NAR	Not at Risk
NDMNRF	Ontario Ministry of Northern Development, Mines, and Natural Resources and Forestry
NHIC	Ontario Natural Heritage Information Centre
NWMO	Nuclear Waste Management Organization
PSW	Provincially Significant Wetland
Rights-holders	First Nation and Métis communities who have asserted and or hold recognized treaty and/or Indigenous rights and whose traditional territories include the project location.
Riparian Environments	The riparian environment or riparian area is the interface between land and an aquatic habitat. Riparian vegetation is characterized by hydrophilic plants that occur along the river margins and banks.
RSA	Regional Study Area RSA_{AVI} = Regional Study Area for Terrestrial Avifauna $RSA_{AVI-AQU}$ = Regional Study Area for Aquatic and Semi-aquatic Avifauna RSA_{BAT} = Regional Study Area for Bats RSA_{ECO} = Regional Study Area for Ecosystem Function and Services RSA_{HRP} = Regional Study Area for Terrestrial Herpetofauna $RSA_{HRP-AQU}$ = Regional Study Area for Aquatic and Semi-aquatic Herpetofauna RSA_{UNG} = Regional Study Area for Ungulates RSA_{VEG} = Regional Study Area for Vegetation
SAR	Species at Risk
SARA	Federal *Species at Risk Act*
SARO	Species at Risk in Ontario
SC	Special Concern
SCC	Species of Conservation Concern; includes provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) and provincially rare (SRANK S1, S2, S3, SH) species. Regionally rare species may also be scoped in if identified by stakeholders and/or rights-holders as VCs.
SOI	Species of Interest; includes species of conservation concern, culturally important species, indicator species, and invasive species (where applicable).
SON	Saugeen Ojibway Nation
SON-South Bruce siting area	Used to describe the broader area surrounding the defined area within which the APM Project may be located. The SON-South Bruce siting area is the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation (SON) in southwestern Ontario.
SRANK	Subnational Conservation Rank; the conservation status of a species or plant community within a particular province, territory, or state. In Ontario, the NHIC assigns SRANKs using the best available information and considering factors such as abundance, distribution, population trends, and trends (NDMNRF 2021). Species assigned S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), and SH (Possibly Extirpated) are considered provincially rare by the NHIC. See the NatureServe website for more information:

	https://www.natureserve.org/nsexplorer/about-the-data/statuses/conservation-status-categories
SVCA	Saugeen Valley Conservation Authority (also known as Saugeen Conservation)
SWH	Significant Wildlife Habitat; Defined in the Ontario Provincial Policy Statement, 2020 as: *Wildlife habitat* – areas where plants, animals and other organisms live, and find adequate amounts of food, water, shelter, and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annual life cycle; and areas which are important to migratory and non-migratory species. *Significant* – in regards to wildlife habitat, ecologically important in terms of features, functions, representation, or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system. Candidate SWH are areas that meet the ELC ecosite code(s) and/or habitat criteria outlined in the SWH ecoregional criterion schedule (ECS). Confirmed SWH are areas that meet the defining criteria outlined in the SWH ECS. Detailed field investigations are usually needed to confirm SWH.
TEM	Terrestrial Ecosystem Mapping
THR	Threatened
VC	Valued Component. For impact assessments of designated projects under the *Impact Assessment Act*, the Agency's Glossary of Terms defines VCs as "environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties. Valued components may be identified as having scientific, biological, social, health, cultural, traditional, economic, historical, archaeological and/or aesthetic importance."
WLON	Wabigoon Lake Ojibway Nation

1.0 OVERVIEW

The Nuclear Waste Management Organization (NWMO) is responsible for implementing the Adaptive Phased Management (APM) Deep Geological Repository (DGR) (hereafter 'APM Project'), which is Canada's plan for the safe, long-term management of used nuclear fuel, in a manner that protects both people and the environment. Zoetica™ was retained by the NWMO to undertake Biodiversity Impact Studies (BIS) for the APM Project within two potential locations that are both being considered for the DGR for the long-term storage of Canada's used nuclear waste. Initial Tier 1 studies and select Tier 2 studies conducted as part of the BIS, along with other environmental studies conducted as part of the Environmental Media Baseline Program (EMBP) designed by CanNorth (CanNorth 2021) and information collected through the human, social, and economic pillars, will aid in the site selection process for the DGR and associated project infrastructure that make up the APM Project.

The two sites for which studies are being undertaken are the Saugeen Ojibway Nation (SON)-South Bruce siting area near the Municipality of South Bruce and the traditional territory of the Saugeen Ojibway Nation in southwestern Ontario and the Wabigoon Lake Ojibway Nation (WLON)-Ignace siting area near the Township of Ignace and the traditional territory of the Wabigoon Lake Ojibway Nation in northwestern Ontario. The focus of the BIS is the study of biodiversity values (BVs) of known or predicted relevance to the potential APM Project at each potential site, to ultimately enable impact predictions and optimal application of the mitigation hierarchy[1].

The BIS is designed to include a series of iterative documents that will ultimately feed into a formal Impact Assessment (IA). These documents include BIS design documents outlining best practices and preferred approaches to be used during study implementation (Biodiversity Impact Studies – Northwestern Ontario Region: Best Practices and Preferred Approach (BPPA) Report (Zoetica 2021)) and baseline study design documents that include detailed Standard Operating Procedures (Biodiversity Impact Studies – Northwestern Ontario Region: Baseline Program Design (BPD) Report (Zoetica 2022a)) and draw from the BPPA. Design documents are ultimately used to direct BIS baseline studies. In addition to design documents, reporting documents are also prepared following baseline work. Reporting documents include Baseline Reports (Biodiversity Impact Studies – Northwestern Ontario Region: Biodiversity Baseline Report (Zoetica 2022b)) that outline findings of baseline work and Change Assessment Memos (this document) that flag potential APM Project x Biodiversity interactions and biodiversity changes. The design and reporting documents include iterative input from other baseline programs, communities, and field experts. Learnings from earlier versions of these reports are integrated back into the design for further BIS studies until sufficient biodiversity information is gathered to fulfill the APM Project-specific requirements of a formal IA (see **Figure 1-1**).

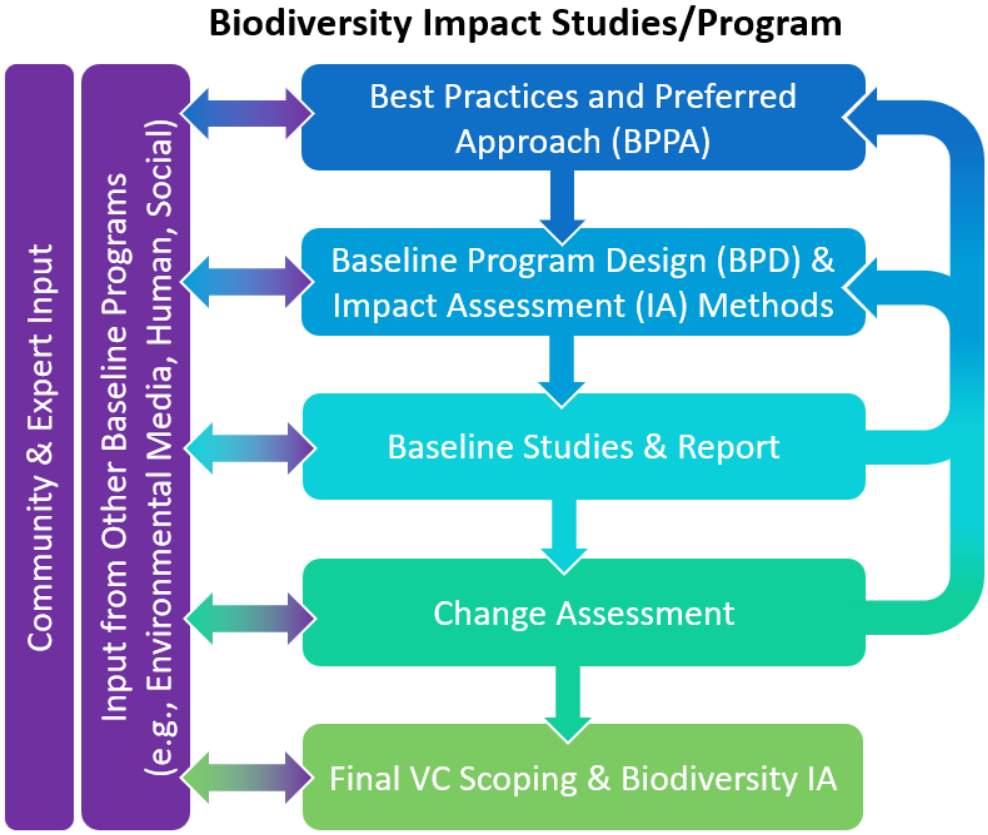


Figure 1-1. Biodiversity Impact Studies design flow and deliverables.

The 2022 BIS Change Assessment Memorandum, along with its future iterations, examines potential interactions between the APM Project and BVs that could result in changes to those BVs, based on information available at the time of writing. The early information based on successive findings presented in change assessment memos will facilitate the timely application of the mitigation hierarchy[1] and flag important potential effects for consideration by communities. The change assessment herein is not meant to replace a formal IA that draws from multiple years of multidisciplinary field data and a formalized project description. The 2022 BIS Change Assessment draws from Tier 1 desk-based data and limited field-based studies conducted to date (i.e., bat studies conducted in partnership with the Toronto Zoo) within relevant BIS study areas: an Area of Interest (AOI) where project infrastructure will be placed, terrestrial and aquatic local study areas (LSAs), and BV-specific regional study areas (RSAs). While additional Tier 1 BIS field-based studies commenced within relevant BIS study areas in 2022, data were not available at the time of writing the 2022 SON-South Bruce BIS Baseline Report and the 2022 SON-South Bruce Change Assessment Report (this document). Biodiversity information was considered alongside the updated Conceptual Site Model (CSM) (CanNorth 2023) to identify potential interactions. While an initial project description is in progress, it has not yet been shared with Zoetica. Future iterations of this Change Assessment Memo will consider the project description when available. Commonly utilized mitigation measures and best practices to manage potential negative changes to biodiversity are also presented.

The APM Project is in early phases of baseline data collection. Zoetica's approach to the BIS follows a tiered approach (see Section 4.2 of Zoetica's BPPA Report (Zoetica 2021a) for more information on Tiers) and is currently in Tier 1 of study focused on the collation of existing data on species presence, known

important habitats, and the collection of foundational habitat information through Terrestrial Ecosystem Mapping (TEM), Aquatic Habitat Mapping (AHM), and identification of candidate Significant Wildlife Habitat (SWH) (Zoetica 2022a). Initial studies documenting species presence, through searches of existing databases and environmental DNA (eDNA) metabarcoding studies in aquatic habitats, were also initiated in 2022 to aid in directing more specific (i.e., Tier 2) biodiversity studies; the results will be reported in the next iteration of the BIS Baseline Report. Initial scoping of BVs for the BIS, along with rationale for inclusion, is found in Section 3.1 of the BPPA Report (Zoetica 2021a). The following BVs have been included in the scope of the BIS for baseline study to date:

1. Vegetation
2. Wetlands and Riparian Environments
3. Mammals
    a. Ungulates
    b. Carnivores
    c. Small Terrestrial Mammals
    d. Semi-Aquatic Mammals
    e. Bats
4. Herpetofauna
    a. Amphibians
    b. Reptiles
5. Terrestrial Invertebrates
6. Birds (including migratory birds)
    a. Upland Breeding Birds (including Game Birds)
    b. Shorebirds
    c. Waterbirds
    d. Raptors
7. Fish and Fish Habitat
    a. Fish
    b. Primary and Secondary Producers (including aquatic invertebrates)
8. Ecosystem Function and Services

For the Change Assessment Memo, these BVs were further grouped into the following BV categories to summarize the potential APM Project related effects:

1. Species of Interest (SOI)
    a. Species of conservation concern (SCC)
    b. Species of interest to stakeholders and rights-holders
    c. Invasive Species
2. Important Habitat
    a. Candidate Significant Wildlife Habitat
    b. Critical Habitat
    c. Important Fish Habitat
3. Wetland and Riparian Areas
4. Ecosystem Function and Services

A formal IA will be conducted if-and-when community willingness has been achieved and a site has been selected for ongoing investigation, and after the completion of more focused Tier 2 and 3 studies on relevant BVs at that site. The formal IA, conducted following the federal *Impact Assessment Act*, will assess the magnitude and extent of significance of potential APM Project-related changes to BVs that are selected as valued components (VCs), along with relevant cumulative effects based on other activities in the SON-South Bruce siting area.

2.0 PROJECT LOCATION AND STUDY AREAS

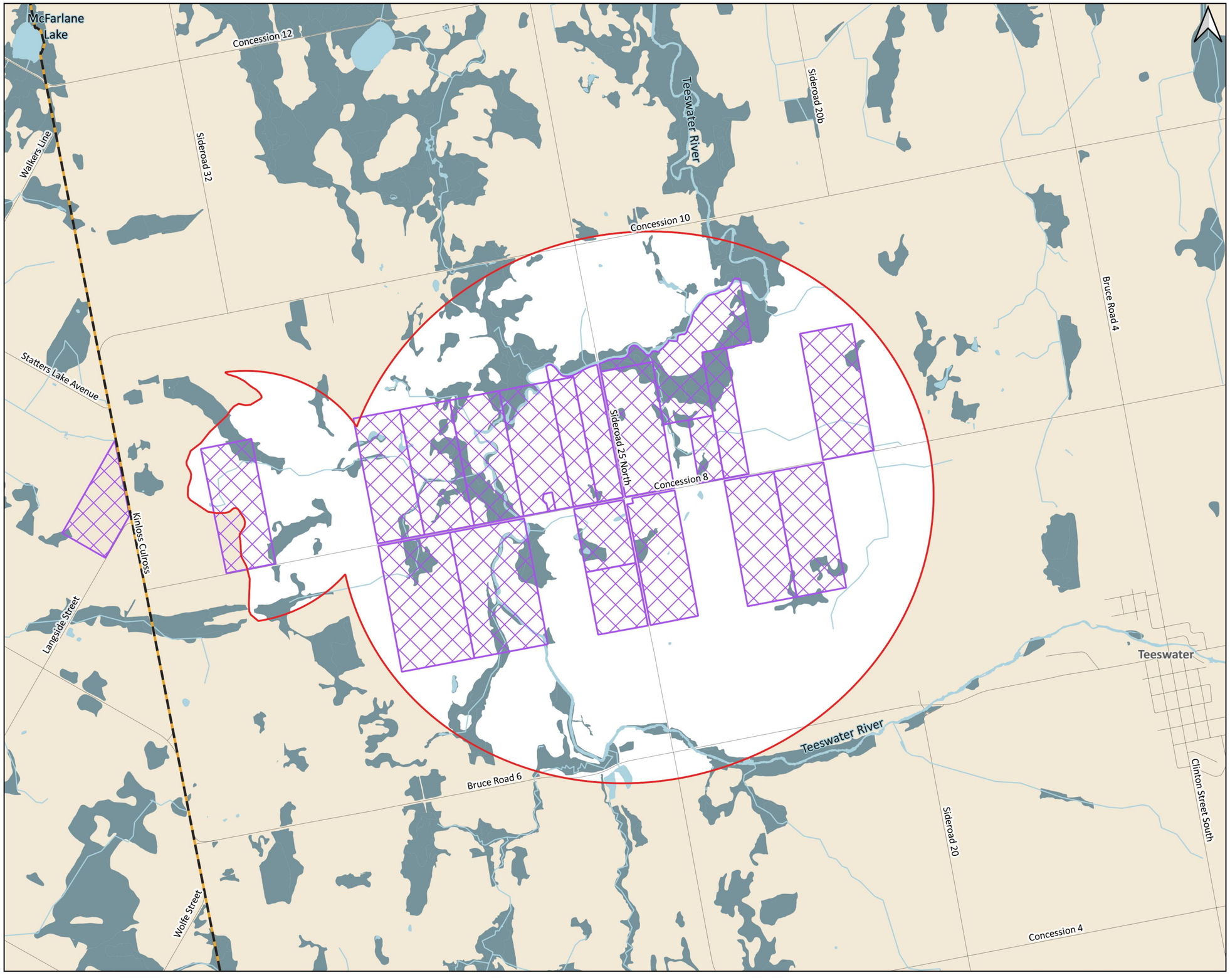
2.1 Project Location

The SON-South Bruce siting area is the broader area surrounding the defined area within which the APM Project may be located. For this report, the term 'SON-South Bruce siting area' is used to describe the general area surrounding the Municipality of South Bruce and includes the traditional territory of Saugeen Ojibway Nation, Métis Nation of Ontario Region 7, and Historic Saugeen Métis in southwestern Ontario.

The exact location of the APM Project infrastructure is under development. The APM Project's initial conceptual, preliminary design was prepared by the NWMO and can be found in *Deep Geological Repository Conceptual Design Report Crystalline/Sedimentary Rock Environment* (Naserifard et al. 2021). A preliminary CSM was then developed by CanNorth along with their EMBP and includes a description of the project components (CanNorth 2021). Most recently, CanNorth produced an updated CSM in their *Biophysical Conceptual Site Model Update and Screening Level Change Assessment* Report (CanNorth 2023). Zoetica used this draft CSM to make assumptions about the APM Project needed for designing the BIS Program; these assumptions included project components and their overall sizes. **Figure 2-1** outlines the NWMO-owned or optioned lands in the AOI; infrastructure could be placed anywhere within these lands.

2.2 Study Areas

For the BIS, several study areas were established to ensure that adequate but not extraneous information is collected to support the biodiversity IA. Study areas were designed to encompass the extent of anticipated APM Project activities and impacts while considering the distribution of BVs across the landscape (**Figure 2-2**). The design of study areas also considered potential cumulative impacts that may occur in the region within the ranges of the potential valued components (deemed BVs at this stage of investigation until VCs can be established) (**Figure 2-3**, **Figure 2-4**). For the BIS, the terrestrial and aquatic study areas were designed separately due to the unique considerations of each. Descriptions and rationale for developing these study areas can be found in Section 5.2 of the BPPA Report (Zoetica 2021a).



NWMO Biodiversity Impact Studies

NWMO Owned or Optioned Properties

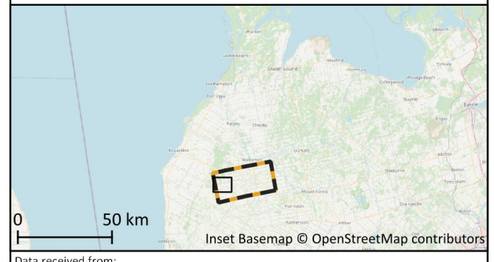
Figure 2-1

- Area of Interest (AOI)
- NWMO Purchased or Optioned Land
- South Bruce Boundary
- Local Road
- Watercourse
- Lake
- Wetland

1:30,000

0 0.5 1 km

ZOETICA



Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment (NDMNRF); Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI; NWMO Purchased or Optioned Land
Ecosite data were created for the BIS Project. Wetlands and water features are mapped using ecosite data within the LSA_{ECO} and data available from Ontario GeoHub outside the LSA_{ECO}.

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: RC	Approved by: AB
February 02, 2024	Map ID: NWMO_BIS_D199	

NWMO Biodiversity Impact Studies

Area of Interest and Local Study Areas

Figure 2-2

Municipality of Kincardine
Municipality of Brockton
Highway 9
Greenock Swamp Wetland Complex
Teeswater River
Township of Huron-Kinloss
Municipality of South Bruce
Teeswater Wetland Complex
Alps Creek
County of Bruce
Township of Ashfield-Colborne-Wawanosh
Nine Mile River
Municipality of Morris-Turnberry
Township of Howick

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{ECO})
- Watercourse
- Lake
- Wetland
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:130,000
0 2 4 km

ZOETICA

0 50 km

Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment (NDMNRF); Municipal Boundary - Lower Tier and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
November 07, 2022	Map ID: NWMO_BIS_D107b	

NWMO Biodiversity Impact Studies

Terrestrial Regional Study Areas

Figure 2-3

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{TER})
- Regional Study Area (RSA_{AVI})
- Regional Study Area (RSA_{BAT})
- Regional Study Area (RSA_{HRP})
- Regional Study Area (RSA_{SAM})
- Regional Study Area (RSA_{UNG})
- Regional Study Area (RSA_{CAR})
- Watercourse
- Lake
- Wetland
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:200,000

0 4 8 km

ZOETICA

Data received from:
Ontario GeoHub — OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment Municipal Boundary - Lower and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
November 07, 2022	Map ID: NWMO_BIS_D108b	

NWMO Biodiversity Impact Studies

Aquatic and Ecosystem Services Regional Study Areas

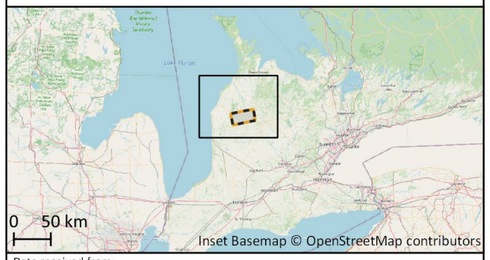
Figure 2-4

- Area of Interest (AOI)
- Local Study Area (LSA_{AQU})
- Local Study Area (LSA_{ECO})
- Regional Study Area (RSA_{AQU})
- Regional Study Area (RSA_{ECO})
- Watercourse
- Lake
- Wetland
- Saugeen No. 29
- South Bruce Boundary
- Other Municipal Boundary
- County Boundary
- Highway
- Local Road
- Trail

1:325,000

0 4 8 km

ZOETICA



Data received from:
Ontario GeoHub — Indian Reserve (NDMNRF); OHN Waterbody (NDMNRF); OHN Watercourse (NDMNRF); ORN Road Segment with Address (NDMNRF); OTN Trail Segment Municipal Boundary - Lower Tier and Upper Tier (MMAH); Wetlands (NDMNRF)
NWMO — AOI

Project CRS: NAD83 / UTM zone 17N		
Author: DM	Reviewed by: HB	Approved by: HB
November 07, 2022	Map ID: NWMO_BIS_D109b	

3.0 POTENTIAL APM X BIODIVERSITY INTERACTIONS (GENERAL)

Zoetica used the CSM developed for the APM Project (see Section 2.0) to predict project components that could interact and potentially affect BVs. Major components of the APM Project outlined in the CSM include: the DGR, Excavated Rock Management Area, Access Road, and other buildings and small ancillary infrastructure (CanNorth 2021). A preliminary APM Project component and biodiversity interaction matrix, based on proposed BVs and available information from the preliminary CSM, is presented in Table 3-3 of Zoetica's BPPA Report (Zoetica 2021a). When considering the construction and operation phases of the APM Project, the following general effects to biodiversity were considered possible (**Table 3-1**).

Table 3-1. Potential project interactions on Biodiversity Values for which baseline data are available (Zoetica 2022b). Suggested mitigation that can be applied along the mitigation hierarchy is provided in

Figure 4-1. In most cases, sufficient information is not available to fully characterize the effects; therefore, the focus of this table is to identify ways in which the potential effects can be avoided or minimized prior to their being assessed.

Effect or Potential Effect	Project Phase(s)	Cause	Potentially Affected Biodiversity Value/Category[3]
Direct Habitat Loss[1]	Construction & Operations Phases	• Clearing of land • Infilling of water during construction	• SCC (including SAR and rare species) • SOI to stakeholders & rights-holders • SWH • Functional Riparian Habitat • Wetlands
Indirect Habitat Loss[2]	Construction & Operations Phases	• Dust settling on vegetation adjacent to infrastructure • Noise causing species to avoid adjacent habitats • Underwater and surface level vibrations • Change in habitat conditions (e.g., water temperature, water quality, shading, water flow, depth, sedimentation) • Spread of invasive species or diseases into an area due to temporary disturbance • Use of pesticides/herbicides resulting in reduced availability of insect prey and/or direct or indirect mortality	• SCC (including SAR and rare species) • SOI to stakeholders & rights-holders • SWH • Functional Riparian Habitat • Wetlands • Fish/Fish Habitat
Direct and Indirect Mortality	Construction & Operations Phases	• Traffic-caused mortality related to use of roads • Collisions of flying BVs with infrastructure • Clearing of vegetation or disruption of ground materials or other structures containing BVs, or their occupied dens, roosts, nests, or hibernacula • Spread of disease-causing agents • Injury or mortality due to trampling and equipment • Creation of zones of attraction into areas with higher risk of mortality (e.g., certain insectivorous species foraging on light-seeking insects) • Reproductive failure (e.g., nest abandonment) due to noise or other sensory disturbance	• SCC (including SAR and rare species) • SOI to stakeholders & rights-holders • Fish/Fish Habitat
Impacts to Movement	Construction & Operations Phases	• Creation of new barriers across water bodies • Creation of barriers or semi-permeable barriers through road construction and/or road traffic	• SCC (including SAR and rare species) • SOI to stakeholders & rights-holders

Effect or Potential Effect	Project Phase(s)	Cause	Potentially Affected Biodiversity Value/Category[3]
		• Creation of zones of avoidance (due to noise, light, mechanical and human disturbance) within typical movement pathways • Large expanses of cleared habitat preventing the movement of species that require connected habitat or habitat islands in close proximity to move through an area	• Fish/Fish Habitat
Changes to Ecosystem Function	Construction & Operations Phases	• Changes to water buffering capacity to naturally mitigate floods, droughts, and flows within natural ranges of variation • Changes in ecological communities that can be supported, and can support other species and humans • Changes to processes that protect soil health and turnover	• SCC (including SAR and rare species) • SOI to stakeholders & rights-holders • Functional Riparian Habitat • Wetlands • Fish/Fish Habitat

Notes:
Abbreviations: SCC = Species of Conservation Concern, SAR = Species at Risk; SOI = Species of Interest; SWH = Significant Wildlife Habitat

1. The loss of land for the creation of a permanent infrastructure component that will not enable restoration.
2. "Functional" habitat loss that causes the area to not be used by species or plants that were formerly found there, despite the absence of permanent infrastructure.
3. The BVs categories are outlined in Section 1.0.

4.0 MITIGATION

4.1 Mitigation Hierarchy

In general, mitigation will be approached in the order of the mitigation hierarchy: Avoid, Minimize, Restore, and Offset.

Figure 4-1 provides an example of mitigation measures that can be applied at each level along the hierarchy, with the measures within the top box needing to be attempted and exhausted prior to moving down the hierarchy to reduce, and ideally eliminate, any potential net negative impacts of the APM Project. Mitigation options shown in **Figure 4-1** are not meant to be exhaustive, as additional or more precise measures can be applied based on particular circumstances (noted in Sections 1.1 and 4.3, **Table 5-1** through **Table 5-9** as relevant). With the current level of information (i.e., no formal Project Description, and limited biodiversity data), it is not possible to identify which stages of the mitigation hierarchy may be applicable to all species or habitats.

Figure 4-1. Steps of the mitigation hierarchy including avoidance, minimization, restoration, and offset options to eliminate or reduce the magnitude of impacts at each step. While the last stage in the mitigation hierarchy is acknowledged to be "offset", offset will only be considered after other steps along the mitigation hierarchy are applied to their maximum feasible extent, and a residual effect remains.

4.2 Aquatic Mitigation (General)

The following mitigation measures are those that are generally recognized as effective at reducing or eliminating project effects to aquatic habitats and species. Measures A.1, A.2, A.3, and A.4 are generally applicable to all aquatic and semi-aquatic BVs.

A.1 Follow the conceptual framework of the Mitigation Hierarchy (Section 4.1, **Figure 4-1**)
A.2 Design infrastructure to avoid aquatic habitat, wherever possible
A.3 Limit areas to be cleared to strictly as necessary to minimize habitat loss and disturbance
A.4 Apply required and recommended setbacks (**Figure 4-1**) to protect sensitive features
A.5 Time activities based on Ontario Restricted Activity Timing Windows for relevant species present to avoid disturbance during sensitive periods
A.6 Identify presence of species to appropriately design culverts to allow for fish and wildlife passage
A.7 Build culverts large enough to allow for uninhibited movement of water
A.8 Build culverts with designs that hinder nest construction
A.9 Retain existing culverts that are in satisfactory condition and are considered to have adequate hydraulic capacity
A.10 Use alternatives to salt/sand where feasible for controlling ice on roads to avoid inputs of chemicals to aquatic habitats (watercourses, waterbodies, and wetlands)
A.11 Use alternatives to herbicides and pesticides on rights-of-way to avoid runoff of chemicals to aquatic habitats
A.12 Develop runoff catchment systems to divert runoff to areas where it can be filtered before entering aquatic habitat
A.13 Apply dust suppression measures during drilling and blasting activities to reduce the amount of dust entering aquatic habitats
A.14 Avoid or minimize blasting near aquatic habitat to reduce impacts from noise, vibration, and dust to these environments
A.15 Avoid or minimize blasting on windy days and very cold days to reduce distance over which noise, and its incumbent impacts to biota, travels and reduce the spread of dust to aquatic environments
A.16 Monitor blasting and drilling vibrations to ensure thresholds identified in the eventual IA are not exceeded, and to enable further reduction of noise and vibration through additional mitigation if thresholds are exceeded
A.17 Minimize equipment in aquatic habitat and ensure all equipment needed for temporary construction measures or permanent works is clean before entering water to minimize disturbance to aquatic habitats (e.g., erosion of banks), reduce potential for crushing of aquatic flora and fauna, and reduce potential introduction of foreign materials (e.g., contaminants, disease vectors)
A.18 Follow proper waste disposal measures to minimize the potential for waste materials (including contaminants) to enter aquatic habitats

A.19 Minimize lighting on aquatic habitat to minimize avoidance by fish and wildlife and to reduce the potential for mortality by predators due to increased visibility[2]

A.20 Ensure proper screening on hoses for drawing water from watercourses and waterbodies to prevent potential entrainment of fish

A.21 Ensure spills are cleaned up immediately to avoid contaminants entering and spreading in aquatic habitats and to limit potential uptake by and impacts to flora and fauna

A.22 Retain surrounding wetlands to maintain surface hydrology or create engineered wetlands, bioswales and other features that can provide lost or altered ecosystem function[3]

A.23 Minimize in-stream work to only necessary to minimize physical disturbance of aquatic habitat

A.24 Conduct salvage of fish, amphibians, and turtles at isolated work zones for in-water works

A.25 Adhere to applicable regulatory requirements (e.g., Ontario's *Endangered Species Act, 2007*; *Migratory Birds Convention Act, 1994*; the provincial *Pesticides Act, 1990*; federal *Pest Control Products Act*; see also Appendix E of the BPPA Report for Acts, regulations, and other biodiversity considerations (Zoetica 2021a))

A.26 Apply established Best Management Practices (BMPs) where appropriate and economically feasible (see Section 4.4 and Appendix A)

A.27 Develop and implement a Construction Environmental Management Plan to minimize the impacts of construction activities on biodiversity

A.28 Develop and implement an Erosion and Sediment Control Plan to minimize runoff of sediments, avoid interaction of sediments with aquatic habitats, and help maintain bank stability

A.29 Develop a Compliance and Effectiveness Monitoring Program to ensure mitigation measures are properly implemented and are effective and to determine the need for adaptive mitigation

A.30 Develop and implement a Revegetation Plan to reduce habitat loss and restore ecosystem function

A.31 Develop and implement a Restoration Plan to help increase the speed and area in which habitat is restored after disturbance to restore ecosystem function

A.32 Develop and implement an Environmental Incident Management Plan to document unexpected impacts of the APM Project to biodiversity and assess the need for adaptive management

[2] See the City of Surrey's *Biodiversity Design Guidelines*: Light and Noise Module for examples of considerations for lighting and noise with respect to minimizing effects to biodiversity: https://www.surrey.ca/sites/default/files/media/documents/BiodiversityDesignGuidelines_LightNoise.pdf

[3] Case studies demonstrating the effectiveness of engineered drainage features (e.g., bioswales, artificial wetlands) are presented in the City of Surrey's *Biodiversity Design Guidelines*: https://www.surrey.ca/sites/default/files/media/documents/BiodiversityDesignGuidelines_Drainage.pdf

4.3 Terrestrial Mitigation (General)

The following mitigation measures are those that are generally recognized as effective at reducing or eliminating project effects to terrestrial habitats and species. Measures T.1, T.2, T.3, T.4, T.5, and T.6 are generally applicable to all terrestrial and semi-aquatic BVs.

- T.1 Follow the conceptual framework of the Mitigation Hierarchy (Section 4.1, **Figure 4-1**)
- T.2 Avoid overlap with habitat of high biodiversity value, habitat hosting aggregates of provincially or federally listed plant or animal species, or species of interest to rights-holders and stakeholders
- T.3 Design infrastructure to avoid important habitat wherever possible to minimize habitat loss and disturbance
- T.4 Site infrastructure in previously disturbed areas that do not provide important habitat values for biodiversity
- T.5 Limit areas to be cleared to minimize habitat loss and disturbance
- T.6 Apply required and recommended setbacks (**Figure 4-1**) to protect sensitive features
- T.7 Retain important and mature trees whenever possible to avoid removal of potentially important habitats
- T.8 Implement deterrent features to keep wildlife from interacting with unsafe areas
- T.9 Time activities based on activity windows for relevant species, such as nesting/breeding season or migration to avoid disturbance and mortality
- T.10 Conduct pre-clearing surveys for plant and invertebrate species of interest (e.g., at-risk, rare, culturally important species) and active nests, dens, and other important habitat features before commencing construction activities to avoid disturbance of sensitive biota
- T.11 Establish setbacks to protect plants from encroachment by construction activities
- T.12 Implement an appropriate, scientifically informed buffer zone around active nests on a case-by-case and species-by-species basis (ECCC 2022) to protect biota from disturbance
- T.13 Monitor active nests until they are deemed inactive by a qualified environmental professional with sufficient and relevant experience (e.g., successful fledging or depredation) to avoid disturbance to birds during sensitive periods
- T.14 If needed, build artificial nesting stations/structures to account for lost habitat due to direct or indirect habitat loss
- T.15 Retain coarse woody debris as habitat for small mammals to reduce habitat loss
- T.16 Utilize existing roads where feasible to avoid construction of additional linear features and minimize habitat fragmentation
- T.17 Utilize wildlife presence and wildlife crossing signs to minimize mortality due to collisions with traffic
- T.18 Build wildlife corridors to facilitate animal movement
- T.19 Pair new linear requirements (e.g., transmission lines) with existing linear features (e.g., roads) to avoid habitat loss, disturbance, and fragmentation
- T.20 Use a vertical alignment design for roads that improves visibility and stopping sight distance for motorists and keep vegetation clear to improve sightlines for motorists (these measures should reduce animal collisions)
- T.21 Use alternatives to salt/sand for controlling ice on roads to reduce the potential attraction of salt-seeking wildlife to locations that will increase their risk of mortality

T.22 Use alternatives to herbicides and pesticides on rights-of-way to reduce ingestion of harmful chemicals by wildlife

T.23 Use materials on the road base that are free of contaminated materials (e.g., use of recycled blast material that is not acid rock generating)

T.24 Apply dust suppression measures during drilling and blasting activities to minimize dusting of adjacent soil and vegetation

T.25 Avoid or minimize drilling and blasting on windy days, very cold days, and near waterbodies to reduce distance over which noise, and its incumbent impacts to biota, travels

T.26 Monitor blasting and drilling vibrations to ensure thresholds identified in the eventual IA are not exceeded, and to enable further reduction of noise and vibration through additional mitigation if thresholds are exceeded

T.27 Follow proper waste disposal measures to minimize wildlife waste interactions

T.28 Ensure spills are cleaned up immediately to minimize contaminants entering important habitats

T.29 Adhere to applicable regulatory requirements (e.g., Ontario's *Endangered Species Act, 2007*; *Migratory Birds Convention Act, 1994*; the provincial *Pesticides Act, 1990*; federal *Pest Control Products Act*; see also Appendix E of the BPPA Report for Acts, regulations, and other biodiversity considerations (Zoetica 2021a))

T.30 Apply established BMPs where appropriate and economically feasible (see Section 4.4 and Appendix A)

T.31 Create a Road Management Plan to minimize potential impacts to wildlife (e.g., amphibian fencing, wildlife underpasses, speed limits)

T.32 Develop plans to protect soil health to reduce impacts to vegetation and biota that require the retention of nutrients

T.33 Develop and implement a rare plant and/or seed salvage plan, if needed

T.34 Develop an Erosion and Sediment Control Plan to reduce the potential for sediment to interact with sensitive habitats and reduce the potential for erosion in sensitive areas (e.g., riparian areas)

T.35 Develop and implement a Construction Environmental Management Plan to minimize the impacts of construction activities on biodiversity

T.36 Develop a Compliance and Effectiveness Monitoring Program to ensure mitigation measures are properly implemented and are effective and to determine the need for adaptive management

T.37 Develop and implement a Revegetation Plan to reduce habitat loss and restore ecosystem function

T.38 Develop and implement a Restoration Plan to help increase the speed and area in which habitat is restored after disturbance to restore ecosystem function

T.39 Develop and implement an Environmental Incident Management Plan to document unexpected impacts of the APM Project to biodiversity and assess the need for adaptive management

Table 4-1. Required or recommended setback distances for natural heritage features from sources identified to date. General habitat descriptions (GHD) are only included for habitat of relevance to SAR that have been observed within the BIS study areas to date (Zoetica 2022b).

Feature	Minimum Buffer (m)	Reference Details
Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 2nd Ed. (OMNR 2010)		
Significant habitat of endangered or threatened species	120	Section 5.4 – Adjacent Lands
Significant wetlands	120	Section 6.4 – Adjacent Lands
Significant woodlands	120	Section 7.4 – Adjacent Lands
Significant valleylands	120	Section 8.4 – Adjacent Lands
Significant wildlife habitat	120	Section 9.4 – Adjacent Lands
Significant areas of natural and scientific interest – life science	120	Section 10.4 – Adjacent Lands
Significant areas of natural and scientific interest – earth science	50	
All fish habitat	120	Section 11.4 – Adjacent Lands
County of Bruce Official Plan (County of Bruce 2010)		
• **PSW** • **Habitat of THR or END species** • **Significant woodland** • **Significant valleyland** • **SWH** • **Deer Wintering Areas** • **Fish Habitat**	120	Section 4.3.3 – Requirements for Environmental Impact Studies
Locally Significant Wetland	60	
ANSI Earth Science	50	
Known area of karst topography	0[1]	
Cold water stream	30	Section 4.3.2.1 – Cold and Warm Water Streams
Warm water stream	15	
Natural Environment lands exhibiting hazardous characteristics[2]	50	Section 5.8.5.15 – Adjacent Lands
The Official Plan for the Formosa, Mildmay and Teeswater Settlement Areas: The Urban Communities of the Municipality of South Bruce (Cuesta Planning Consultants 2019)		
Hazard Land Area[2]	50	Section 4.8.4 – Policies (f)
Cold water stream or warm water stream[3]	50	Section 5.1.2 –Environmental Review Policies (d, iii)
The Corporation Of The Municipality of South Bruce By-Law Number. 2011-63 (The Corporation of the Municipality of South Bruce 2011)		
EP-1 zone: PSW	120	Section 22.5 – Special Provisions (.1)
Top of bank of any 'watercourse'[4]	30	Section 3.17 – Watercourse Setbacks
Top of bank of open or enclosed 'municipal drain'[4]	15	
Significant Wildlife Habitat Criteria Schedules For Ecoregion 6E (OMNRF 2015a)[5]		

Feature	Minimum Buffer (m)	Reference Details
Waterfowl Stopover and Staging Areas (Terrestrial)	100-300[6]	Section 1.1 – Seasonal Concentration Areas of Animals
Waterfowl Stopover and Staging Areas (Aquatic)	100	
Shorebird Migratory Stopover Area	100	
Bat Hibernacula	200	
Reptile Hibernaculum	30	
Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)	50	
Colonially-Nesting Bird Breeding Habitat (Tree/Shrubs)	300	
Colonially-Nesting Bird Breeding Habitat (Ground)	150	
Waterfowl Nesting Area	120	Section 1.2.2 – Specialized Habitat for Wildlife
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat	• Bald Eagle – 400-800[7] • Osprey – 300	
Woodland Raptor Nesting Habitat	• Red-shouldered Hawk, Northern Goshawk – 400 • Barred Owl – 200 • Broad-winged Hawk, Cooper's Hawk – 100 • Sharp-shinned Hawk – 50	
Turtle Nesting Areas	30-100[8]	
Amphibian Breeding Habitat (Woodland)	230	
American Ginseng General Habitat Description (MECP 2013a)		
American Ginseng GHD Category 1	100	N/A
American Ginseng GHD Category 2	50 (from Category 1)	
Barn Swallow General Habitat Description (MECP 2013b)		
Barn Swallow GHD Category 1	0[1]	N/A
Barn Swallow GHD Category 2	5	
Barn Swallow GHD Category 3	200 (from Category 2)	
Bobolink General Habitat Description (MECP 2013c)		
Bobolink GHD Category 1	10	N/A
Bobolink GHD Category 2	60 (from Category 1)	
Bobolink GHD Category 3	300 (from Category 2)	
Eastern Meadowlark General Habitat Description (MECP 2013d)		
Eastern Meadowlark GHD Category 1	10	N/A
Eastern Meadowlark GHD Category 2	100 (from Category 1)	
Eastern Meadowlark GHD Category 3	300 (from Category 2)	

Feature	Minimum Buffer (m)	Reference Details
Eastern Whip-poor-will General Habitat Description (MECP 2013e)		
Eastern Whip-poor-will GHD Category 1	20	N/A
Eastern Whip-poor-will GHD Category 2	170 (from Category 1)	
Eastern Whip-poor-will GHD Category 3	500 (from Category 2)	
Environmental Planning and Regulations Policies Manual (SVCA 2018)		
ANSI Life Science	120	Policy 3.7.2.1-2
ANSI Earth Science	50	
Provincially Significant Wetland	120	Policy 3.7.2.3-6
Other wetland	30	Policy 3.7.2.3-6 and Policy 4.13-4
Watercourse	15	3.7.9 – Buffer Policies
Riverine Flooding Hazard	15	4.6.2 – Riverine Flooding Hazards: Definition and Context
Lake Huron shoreline (dynamic beach)	30	4.8 – Lake Huron Shoreline
Lake Huron shoreline (no dynamic beach)	15	
Shoreline Erosion Hazard (Regulated Shoreline Area on Great Lakes)	30	4.8.2 – The Shoreline Erosion Hazard
Shoreline Erosion Hazard (Regulated Shoreline Area on large inland lakes)	15	
Dynamic Beach Hazard	30	4.8.3 – The Dynamic Beach Hazard The
Inland Lakes	30	Policy 4.9-1
Apparent Valley (Confined Systems)	15	4.11.1 – Riverine Erosion Hazards – Definition and Context What Is the Riverine Erosion Hazard? Erosion
Apparent Valley (Confined System) with Active Toe Erosion	30	
No Apparent Valley (Unconfined Systems)	15	

Notes:

Abbreviations: PSW = Provincially Significant Wetland, THR = Threatened, END = Endangered, SWH = Significant Wildlife Habitat, ANSI = Area of Natural and Scientific Interest, EP = Environmental Protection, GHD = General Habitat Description

1. Where the buffer distance is 0 m, the regulation covers the extent of the feature and does not include a buffer around the feature unless also specified.
2. New developments – applicant may be required to submit an Environmental Impact Statement (EIS).
3. New developments – generally prohibited without providing EIS and support of the Saugeen Valley Conservation Authority (SVCA).
4. Buffer distance specified ***OR*** within an EP – Environmental Protection zone (see mapping), whichever is greater.
5. SWH types for which ELC ecosites or other defined habitat units constitute the SWH (rather than a distance-based buffer) are not included in this table.
6. The flooded field ecosite habitat plus a 100-300 m radius area, dependent on local site conditions and adjacent land use, is the SWH (OMNR 2000).
7. The area of the habitat from 400-800 m is dependent on sight lines from the nest to the development and inclusion of perching and foraging habitat (James 1984).
8. The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100 m around the nesting area dependent on slope, riparian vegetation and adjacent land use, is the SWH (OMNR 2000).

At this time, the list of setback distances does not indicate which are required or may still permit development with a demonstration of mitigation to enable no net negative effects.

4.4 Best Management Practices

Agencies within the Ontario and Federal governments have created a plethora of BMPs from which to draw from when detailed mitigation and management plans are being created. Not all BMPs published in provincial or federal guidance documents will be applicable to the APM Project. The APM Project will only draw from relevant and implementable BMPs. A list of relevant BMPs that will be considered in the development, construction, and operation of the APM Project is included in Appendix A; however, this list is not likely to be exhaustive.

5.0 POTENTIAL BIODIVERSITY X APM INTERACTIONS AND MITIGATION

Zoetica's BIS is designed to comply with regulatory requirements, and will take community concerns and feedback received through engagement into consideration (see Zoetica's BPPA Report for a detailed summary of engagement and concerns and interests relevant to biodiversity expressed by attendees (Zoetica 2021a)). Studies were also designed with considerations of requirements relevant to biodiversity outlined in the *Tailored Impact Statement Guidelines (TISG) Template for Designated Projects Subject to the Impact Assessment Act and the Nuclear Safety and Control Act* (hereafter 'TISG Template') (IAAC 2020). While a formal APM Project-specific TISG document has not yet been issued, requirements outlined in the TISG Template are those that are likely to be included in the APM Project-specific TISG document. Based on these regulatory and community considerations, the following sections summarize baseline information, potential APM Project x biodiversity interactions, and specific mitigation measures for BVs that are likely to become VCs for the APM Project IA; namely, species of interest, important wildlife and fish habitats (including candidate SWH and critical habitat for federally listed SAR), wetland and riparian areas, and ecosystem functions and services.

For the purposes of the 2022 BIS Baseline Report and Change Assessment Memo, "species of interest" include species of conservation concern, species of interest to stakeholders and rights-holders, and invasive species. The cultural importance of species cannot be ascertained by Zoetica at this time, as this task requires coordination with the APM Project's human health and social impact team. The scope of species of interest for BIS reporting will be expanded in future years of the BIS baseline program to include culturally important and indicator species (to be carried forward as VCs for the IA) when more information is gathered through Tier 2 studies and engagement.

In addition, species of interest and important habitats reported within the 2022 BIS Change Assessment Memo include those that occur within any relevant BIS study area and not just within the AOI. This conservative approach was taken to account for the movement of certain species into and out of the Project area and because the project may have indirect effects that fall beyond the boundaries of the AOI (e.g., dust, noise). Over time, as more is known about the siting and activities of the APM Project, it is possible that some BVs may be added or eliminated from the APM Project x biodiversity interactions assessment. For example, if a species of conservation concern is located within the RSA, but not the LSA or AOI, the species may be deemed as not interacting with the APM Project and may be eliminated from further change assessment reporting.

5.1 Species of Interest

Species of interest include species of conservation concern, species of interest to stakeholders and rights-holders, and invasive species. Scientific names for species of interest discussed within this section are provided in **Appendix B**.

5.1.1 Species of Conservation Concern

Species of conservation concern include provincially and/or federally listed SAR (Extirpated, Endangered, Threatened, Special Concern) protected under the federal *Species at Risk Act* (*SARA*) and Ontario *Endangered Species Act* (*ESA*), and provincially rare (subnational rank S1, S2, S3, SH) species whose habitat is protected as SWH (see Section 5.2.1). Regionally rare species may also be scoped into the BIS in future years if they are identified by stakeholders and/or rights-holders as VCs. The species of conservation concern summarized in **Table 5-1** include those that were positively identified within the BIS study areas of relevance during Tier 1 studies. A total of 59 species of conservation concern – 35 SAR and 24 provincially rare species – have been observed to date, including:

- 3 at-risk mammals (bats)
- 4 at-risk and 1 provincially rare fishes
- 1 provincially rare invertebrate
- 20 at-risk birds (14 upland breeding birds, 1 shorebird, 3 waterbirds, 2 raptors) and 13 provincially rare birds (2 upland breeding birds, 1 shorebird, 10 waterbirds)
- 5 at-risk herpetofauna (1 amphibian, 4 reptiles)
- 3 at-risk and 9 provincially rare plants

Of these species of conservation concern, nine have been positively identified within the AOI. Four additional species may have been observed within the AOI; however, due to Ontario Natural Heritage Information Centre (NHIC) data sensitivity standards for these ‘restricted species’, their names and locations cannot be disclosed. Further studies are required to determine whether the APM Project will interact with any of these species.

Table 5-1. Species of conservation concern identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations were collected from desk-based sources unless noted that it was collected during fieldwork.

BV Group	Species	Federal Status	Provincial Status	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
				AOI	LSA	RSA				
Vegetation	Restricted Vegetation Species #1 (V1)	END (COSEWIC, *SARA*)	END (SARO)		✓[3]		• Sensitive data not available in public version of this report	• Clearing of land • Infilling of water during construction • Dust settling on vegetation adjacent to infrastructure • Change in habitat conditions (e.g., soil conditions, hydrology and hydrogeology, light levels, floristics) • Spread of invasive species into an area due to temporary disturbance • Injury or mortality due to trampling or equipment	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.10 • See Section 1.1 for aquatic mitigation • Avoid area specified in the species' GHD: forest or treed swamp ecosite within 150 m of occupied area/occurrence records (MECP 2013a).	Tier 2 • Field-verify restricted species • Conduct Tier 2 field studies for at-risk plants
	Hill's Pondweed	SC (COSEWIC, *SARA*)	SC (SARO)	X	✓ LSA_{AQU}	*NA*	• Figure 1-1 in Chapter 2 of the 2022 BIS Baseline Report: near Cunningham Lake (Zoetica 2022b)	• Change in habitat conditions (e.g., water temperature, flow, depth, sedimentation, chemistry) • Spread of invasive species into an area due to temporary disturbance • Pollutants entering aquatic habitats	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic and terrestrial mitigation, namely T.10	• Conduct Tier 2 field studies for at-risk and invasive plants
	Bush's Pocket Moss	-	Vulnerable (S3) (SRANK)	*X*	✓ LSA_{TER}	*NA*	• Figure 1-1 in Chapter 2 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Dust settling on vegetation adjacent to infrastructure • Change in habitat conditions • Spread of invasive species into an area due to temporary disturbance	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.1 for aquatic mitigation • See Section 4.2 for terrestrial mitigation, namely T.10, T.11, T.33	Tier 2 • Field-verify existing records for current species presence, distribution, and habitat suitability • Conduct Tier 2 field studies for rare plants
	Beaked Spikerush	-	Vulnerable (S3) (SRANK)	*X*	✓ LSA_{TER}	*NA*				
	Rigid Sedge	-	Vulnerable? (S3?) (SRANK)	*X*	✓ LSA_{TER}	*NA*				
	Additional rare plants detected in LSA_{AQU}	• Green Arrow Arum (S3) • Tubercled Orchid (S3) • Greater Round-leaved Orchid (S2) • Slender Mountain-mint (S3) • Large-leaved Leafy Moss (S3) Floating Crystalwort (S3)		*X*	✓ LSA_{AQU}	*NA*	• Figure 1-1 in Chapter 2 of the 2022 BIS Baseline Report: north of Hwy 9 (Zoetica 2022b) • Greenock Swamp ANSI Life Science Report (Johnson 1994)	• Change in habitat conditions • Spread of invasive species into an area due to temporary disturbance	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.10, T.11, T.33 • See Section 1.1 for aquatic mitigation	• Conduct Tier 2 field studies for rare plants
Mammals	Restricted Mammal Species #1	END (COSEWIC, *SARA*)	END (SARO)		✓[3]		• Sensitive data not available in public version of this report	• Clearing of land • Noise and vibrations • Spread of disease-causing agents • Creation of areas that biodiversity values avoid or are attracted to (e.g., feeding on light-seeking insects)	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.7, T.8	Tier 2 • Evaluate candidate SWH in the AOI, LSATER, and RSABAT • If present, develop species-specific Tier 2 studies
	Restricted Mammal Species #2	END (COSEWIC, *SARA*)	END (SARO)		✓[3]					
	Restricted Mammal Species #3	END (COSEWIC, *SARA*)	END (SARO)		✓[3]					
Herpetofauna	Western Chorus Frog (GLSL-CS pop.)	THR (COSEWIC, *SARA*)	NAR (SARO)	X	X	✓ $RSA_{HRP-AQU}$	• Figure 2-2 in Chapter 5 of the 2022 BIS Baseline Report (Zoetica 2022b)	• No potential interactions identified for species occurring in the RSA	• See • Figure **4-1** for mitigation hierarchy steps that could apply	Conduct Tier 2 field studies for amphibians

BV Group	Species	Federal Status	Provincial Status	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
				AOI	LSA	RSA				
									• See Section 1.1 for aquatic mitigation, namely A.17, A.24 • See Section 4.3 for terrestrial mitigation, namely T.8, T.10	
	Snapping Turtle	SC (COSEWIC, *SARA*)	SC (SARO)	✓	✓ LSA_{TER}	✓ $RSA_{HRP-AQU}$	• Figure 3-3 in Chapter 5 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Noise and vibrations (surface, underwater) causing species to avoid adjacent habitats • Change in habitat conditions (e.g., water temperature, shading, water flow, depth, sedimentation) • Spread of invasive species • Traffic-caused mortality • Disruption of ground materials containing occupied nests • Spread of disease-causing agents • Creation of barriers to movement (aquatic and terrestrial) • Creation of areas that biodiversity values avoid or are attracted to • Exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.6, A.17, A.24 • See Section 4.3 for terrestrial mitigation, namely T.8, T.10, T.17, T.18, T.31	Tier 2 • Field-verify NHIC EO to assess species presence, distribution, and habitat suitability, with a focus on areas that may be impacted by construction activities (see CSM map/diagram) Conduct Tier 2 field studies for turtles
	Midland Painted Turtle	SC (COSEWIC, *SARA*)	-	X	✓ LSA_{TER}	✓ $RSA_{HRP-AQU}$	• EO Candidates in NHIC Observation dataset (not mapped in the 2022 BIS Baseline Report) • See also Figures 4-6 and 4-18 in Appendix C, Chapter 1 of the 2022 BIS Baseline Report for candidate SWH ecosites for Turtle Wintering Areas and Turtle Nesting Areas, respectively (Zoetica 2022b)	• Noise and vibrations (surface, underwater) causing species to avoid adjacent habitats • Change in habitat conditions (e.g., water temperature, shading, water flow, depth, sedimentation) • Spread of invasive species • Traffic-caused mortality • Spread of disease-causing agents • Creation of barriers to movement (aquatic and terrestrial) • Creation of areas that biodiversity values avoid or are attracted to • Exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.6, A.17, A.24 • See Section 4.3 for terrestrial mitigation, namely T.8, T.10, T.17, T.18, T.31	Tier 2 • Field-verify NHIC EO Candidates to assess species presence, distribution, and habitat suitability • Field-verify candidate ecosites for turtle-related SWH, with a focus on areas that may be impacted by construction activities (see CSM map/diagram) Conduct Tier 2 field studies for turtles
	Eastern Milksnake	SC (COSEWIC, *SARA*)	NAR (SARO)	X	X	✓ $RSA_{HRP-AQU}$	• Figure 3-3 in Chapter 5 of the 2022 BIS Baseline Report (Zoetica 2022b)	• No potential interactions identified for species occurring in the RSA	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.10, T.17, T.18, T.31 • See Section 1.1 for aquatic mitigation (for eastern ribbonsnake)	Conduct Tier 2 field studies for reptiles
	Eastern Ribbonsnake (GL pop.)	SC (COSEWIC, *SARA*)	SC (SARO)	X	X	✓ $RSA_{HRP-AQU}$				
Birds	Bobolink	THR (COSEWIC, *SARA*)	THR (SARO)	✓	✓ LSA_{TER}	✓ RSA_{AVI}	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land	• See	Tier 2

BV Group	Species	Federal Status	Provincial Status	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
				AOI	LSA	RSA				
	Eastern Meadowlark	THR (COSEWIC, *SARA*)	THR (SARO)	✓	✓ *LSA_{TER}*	✓ *RSA_{AVI}*	• NHIC Element Occurrences (EOs) only in LSA_{TER} and RSA_{AVI}, but there are GBIF records in AOI	• Dust settling on vegetation adjacent to infrastructure • Noise and vibrations causing species to avoid adjacent habitats and/or nest failures • Change in habitat conditions • Mortality due to road traffic, trampling, and equipment • Collisions with infrastructure • Clearing of vegetation or disruption of ground materials containing occupied nests • Creation of areas that biodiversity values avoid or are attracted to • Use of pesticides resulting in reduced availability of insect prey and direct or indirect mortality	• Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.9, T.10, T.12, T.13 • Avoid area specified in the species' GHDs: 300 m of continuous suitable habitat from the nest site or approximated centre of defended territory (MECP 2013c, 2013d) • Restore/provide suitable semi-natural grassland habitat by leaving agricultural land on NWMO-owned properties fallow, especially within critical habitat square for bobolink (see Section 1.1.1)	• Field-verify NHIC EOs to assess current or future habitat suitability Conduct Tier 2 field studies for bobolink (MNR 2011) and eastern meadowlark (OMNR 2013)
	Barn Swallow	THR (COSEWIC, *SARA*)	THR (SARO)	✓	✓ *LSA_{TER}*	✓ *RSA_{AVI}*	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b) • 2020 Phase 2 Studies at borehole sites in the AOI (Tulloch Environmental 2020, 2021)	• Clearing of land • Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Demolition of abandoned buildings or structures containing occupied nests • Creation of areas that biodiversity values avoid or are attracted to (e.g., feeding on light-seeking insects) • Use of pesticides resulting in reduced availability of insect prey and exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.8, T.9, T.10, T.12, T.13, T.14 • Avoid area specified in the species' GHD: 200 m of the nest (MECP 2013b) • Restore/provide suitable foraging habitat by leaving agricultural land on NWMO-owned properties fallow	Tier 2 Conduct field studies for upland breeding birds to assess community composition and relative abundance
	Bank Swallow	THR (COSEWIC, *SARA*)	THR (SARO)	✓	X *LSA_{TER}*	✓ *RSA_{AVI}*	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b) • See also Figure 4-8 in Appendix C, Chapter 1 of the 2022 BIS Baseline Report for candidate SWH ecosites for Colonially-Nesting Bird Breeding Habitat (Bank and Cliff) (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Disruption of ground materials containing occupied nests • Creation of areas that biodiversity values avoid or are attracted to (e.g., feeding on light-seeking insects) • Use of pesticides resulting in reduced availability of insect prey and exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.8, T.9, T.10, T.12, T.13, T.14 • Avoid areas recommended for the species' habitat regulation: 50 m from colony (to protect nest site), 1,000 m from colony (to protect foraging habitat), wetland ecosite (to protect nocturnal roost sites) (Falconer et al. 2016) • Restore/provide suitable foraging habitat by leaving agricultural land on NWMO-owned properties fallow	Tier 2 • Field-verify candidate SWH ecosites for Colonially-Nesting Bird Breeding Habitat Conduct Tier 2 field studies for upland breeding birds to assess community composition and relative abundance

BV Group	Species	Federal Status	Provincial Status	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
				AOI	LSA	RSA				
	Red-headed Woodpecker	END (COSEWIC, *SARA*)	END (SARO)	X	✓ LSA_{TER}	X RSA_{AVI}	• EO Candidate in NHIC Observation dataset (not mapped in the 2022 BIS Baseline Report)	• Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Creation of areas that biodiversity values avoid or are attracted to • Spread of non-native tree diseases resulting in reduced supply of food (tree nuts) and nest sites • Use of pesticides resulting in reduced availability of insect prey	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.7, T.9, T.10, T.12, T.13 • Preserve decadent trees[4] as potential nesting/roosting structures • Avoid area recommended for the species' habitat regulation: 200 m from nest cavity location or 600 m from human observer location when individual(s) are detected (ECCC 2021, MECP 2022).	Tier 2 • Field-verify NHIC EO Candidate to assess current or future habitat suitability Conduct Tier 2 field studies for upland breeding birds to assess community composition and relative abundance
	Eastern Wood-pewee	SC (COSEWIC, *SARA*)	SC (SARO)	X	✓ LSA_{TER}	✓ RSA_{AVI}	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Creation of areas that biodiversity values avoid or are attracted to • Use of pesticides/herbicides reducing availability of insect prey	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation namely T.9, T.10, T.12, T.13	Conduct Tier 2 field studies for upland breeding birds to assess community composition and relative abundance
	Louisiana Waterthrush	THR (COSEWIC, *SARA*)	THR (SARO)	X	✓ LSA_{TER}	X RSA_{AVI}				
	Wood Thrush	THR (COSEWIC, *SARA*)	SC (SARO)	X	✓ LSA_{TER}	✓ RSA_{AVI}				
	Additional upland breeding bird SCC detected in the RSA_{AVI}[5]	• Canada Warbler (SC, THR, SC) • Common Nighthawk (SC, THR, SC) • Eastern Whip-poor-will (THR, THR, THR) • Evening Grosbeak (SC, SC, SC) • Grasshopper Sparrow (SC, SC, SC) • Rusty Blackbird (SC, SC, SC) Fox Sparrow (S3N)		X	X	✓ RSA_{AVI}	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• No potential interactions identified for species occurring in the RSA	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.9, T.10, T.12, T.13	Conduct Tier 2 field studies for upland breeding birds to assess community composition and relative abundance
	White-crowned Sparrow	-	Vulnerable (S3N) (SRANK)	✓	X LSA_{TER}	✓ RSA_{AVI}	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b) • Oct 2020 Phase 2 Studies at borehole sites in the AOI (Tulloch Environmental 2021)	• Clearing of land • Noise and vibrations causing species to avoid adjacent habitats • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation	Conduct Tier 2 field studies to assess non-breeding (winter) habitat use for qualification as EO and candidate SWH.
	Lesser Yellowlegs	THR (COSEWIC)	-	✓	X LSA_{TER}	✓ $RSA_{AVI\text{-}AQU}$	• Figure 3-2 in Chapter 7 of the 2022 BIS Baseline Report: pond off Concession Rd 8 in the AOI (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Clearing of vegetation or disruption of ground materials containing occupied nests	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.2 for aquatic mitigation • See Section T.9, T.10, T.12, T.13 (for breeding upland sandpiper)	Conduct Tier 2 field studies for shorebirds to assess community composition and relative abundance
	Upland Sandpiper	-	Imperiled (S2B) (SRANK)	✓	X LSA_{TER}	✓ $RSA_{AVI\text{-}AQU}$				

BV Group	Species	Federal Status	Provincial Status	Observed in[1] AOI	LSA	RSA	Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	Tundra Swan	-	Vulnerable (S3M) (SRANK)	X	✓ LSA_{TER}	✓ $RSA_{AVI-AQU}$	• Figure 4-3 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Noise and vibrations causing species to avoid adjacent habitats • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation • See Section 4.3 for terrestrial mitigation	Conduct Tier 2 field studies for waterbirds to assess community composition and relative abundance
	Greater White-fronted Goose	-	Vulnerable (S3M) (SRANK)	X	✓ LSA_{TER}	✓ $RSA_{AVI-AQU}$				
	Additional waterbird SCC detected in the $RSA_{AVI-AQU}$[4]	• Black Tern (NAR, -, SC) • Horned Grebe (SC, SC, SC) • Least Bittern (THR, THR, THR) • American Coot (S3B) • Blue-winged Teal (S3B) • Canvasback (S3N) • Caspian Tern (S3B) • Common Gallinule (S3B) • Great Black-backed Gull (S1B) • Great Egret (S2B,S3M) Red-necked Grebe (S3)		X	X LSA_{TER}	✓ RSA_{AVI}	• Figure 2-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• No potential interactions identified for species occurring in the RSA	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation • See Section 4.3 for terrestrial mitigation, namely T.9, T.10, T.12, T.13 for breeding birds	Conduct Tier 2 field studies for waterbirds to assess community composition and relative abundance
	Bald Eagle	NAR (COSEWIC)	SC (SARO)	✓	✓ LSA_{TER}	✓ $RSA_{AVI-AQU}$	• Figure 5-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b) • See also Figures 4-4 and 4-16 in Appendix C, Chapter 1 of the 2022 BIS Baseline Report for candidate SWH ecosites for Raptor Wintering Area and Bald Eagle and Osprey Nesting, Foraging, and Perching Habitat, respectively (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Noise and vibrations causing species to avoid adjacent habitats and/or nest failure • Change in habitat conditions • Traffic-caused mortality • Collisions with infrastructure • Clearing of vegetation containing occupied nests • Creation of areas that biodiversity values avoid or are attracted to • Exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation • See Section 4.3 for terrestrial mitigation, namely T.7, T.9, T.10, T.12, T.13	Tier 2 • Field-verify candidate ecosites for eagle-related SWH, with a focus on areas that may be impacted by construction activities (see CSM map/diagram) Conduct Tier 2 field studies for raptors
	Golden Eagle	NAR (COSEWIC)	END (SARO)	X	X	✓ RSA_{AVI}	• Figure 5-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• No potential interactions identified for species occurring in the RSA	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation	Conduct Tier 2 field studies for raptors
Fish and Primary and Secondary Producers	Greater Redhorse	-	Vulnerable (S3) (SRANK)	X	✓ LSA_{AQU}	✓ RSA_{AQU}	• Reported in GBIF and/or NHIC; see Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Underwater noise and vibrations leading to avoidance of habitat • Change in habitat conditions (e.g., water temperature, shading, water flow, depth, sedimentation) • Creation of barriers with water crossing structures (e.g., culverts)	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.5, A.6, A.19, A.24	Tier 1 • Continue seasonal eDNA studies to determine potential seasonal presence of SAR in aquatic habitats the AOI and LSA_{AQU} Tier 2 • Conduct community characterization studies in the areas potentially impacted by the APM Project and in potential reference areas to confirm lack of detection in the AOI and LSA_{AQU}
	Black Redhorse	THR (COSEWIC, *SARA*)	THR (SARO)	X	X	✓ RSA_{AQU}	• Reported in GBIF and/or NHIC; see Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• No potential APM Project interactions have been identified to date		
	Pugnose Shiner	THR (COSEWIC, *SARA*)	THR (SARO)	X	X	✓ RSA_{AQU}				
	Lake Sturgeon	THR	THR	X	X	✓				

BV Group	Species	Federal Status	Provincial Status	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
				AOI	LSA	RSA				
		(COSEWIC)	(SARO)			RSA_{AQU}				
	Northern Brook Lamprey	SC (COSEWIC, *SARA*)	SC (SARO)	X	X	✓ RSA_{AQU}				
	River Bluet	-	Vulnerable (S3) (SRANK)	X	✓ LSA_{AQU}	NA	• Reported in GBIF dataset; See Figure 3-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Dust settling on vegetation adjacent to infrastructure • Noise causing species to avoid adjacent habitats • Surface level vibrations • Change in habitat conditions • Mortality due to traffic	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.11, A.13, A.19	Tier 1 • Continue seasonal eDNA studies to determine potential seasonal presence of SAR in aquatic habitats the AOI and LSA_{AQU}
	Notes: SAR Conservation statuses: END = Endangered, THR = Threatened, SC = Special Concern, NAR = Not at Risk. Provincially Rare SRANKS: S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable. B (Breeding), M (Migration), and N (Non-breeding) are breeding status qualifiers; only the relevant SRANK(s) for the SON-South Bruce siting area is presented in this table. 1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species. "NA" is used where study area was not investigated for the species. Spatial data from NHIC are represented by a 1 km grid rather than a point, as per the NHIC's Sensitive Data Location Standards. As such, check marks for species with NHIC records do not necessarily indicate confirmed presence in the study area(s). 2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage. 3. Precise locations of restricted species, as designated by the NHIC, are undisclosed due to data sensitivity. 4. "Decadent trees" include dead trees, snags, dying trees, and trees with one or more large dead or dying limbs (MECP 2022). 5. Conservation statuses for grouped species are presented in the order of (COSEWIC, *SARA*, SARO) for SAR.									

5.1.2 Species of Interest to Stakeholders and Rights-holders

The NWMO has been actively engaging with interested parties in the SON-South Bruce siting area since 2012. Engagement focused on environmental studies (BIS and EMBP) was conducted in 2020 and is ongoing. At this time, few species other than species of conservation concern have been mentioned by stakeholders and rights-holders as important to consider during the BIS program design (see Appendix B of Zoetica's BPPA Report (Zoetica 2021a) for species mentioned during engagement). Only one species identified as of interest and potentially important to local stakeholders and rights-holders was identified within the BIS study areas of relevance during Tier 1 studies to date (**Table 5-2**). However, species may be added or removed as studies progress.

Table 5-2. Species of interest to stakeholders and rights-holders identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

Species	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
Lake Whitefish	X	X	✓ RSA_{AQU}	• Lake Huron; See Table A-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• No potential APM Project interactions have been identified to date	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.5, A.6, A.14, A.19	• Conduct Tier 2 fish community characterization studies in AOI and LSA_{AQU} and expand to RSA_{AQU} if relevant

Notes:

1. For this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.

5.1.3 Invasive Species

An invasive species is one that is not native to Ontario (or a part of Ontario) and that threatens ecosystems, habitats, or native species. Invasive species can also threaten human health and socio-economic values such as infrastructure and recreation. Regulated invasive species (e.g., listed under the Ontario *Invasive Species Act* and *Weed Control Act*), non-regulated invasive species (e.g., those identified as species of concern by provincial or regional invasive species organizations), and other weedy and introduced plants could be spread through the SON-South Bruce siting area due to unmitigated APM Project development. Invasive species identified within the BIS study areas of relevance during Tier 1 studies to date are presented in **Table 5-3**. To date, only spongy moth, an invasive forest pest, has been detected within the AOI.

Table 5-3. Invasive species identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

Species	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
Noxious weeds: Coltsfoot & European Buckthorn	X	✓ LSA_{AQU}	*NA*	• Figure 1-3 in Chapter 2 of the 2022 BIS Baseline Report: near Schmidt Lake (Zoetica 2022b)	• Spread of invasive species into an area due to temporary disturbance • Ongoing surface land management during operations	• Ensure construction equipment and materials brought on site are clean and free of visible plant parts and soil • Conduct pre-construction surveys for invasive plants • Manage and dispose of invasive plants according to BMPs • Re-seed disturbed areas as soon as possible with native plant mix to prevent establishment and spread of invasive species • Monitor for invasive plants during construction and operations	• Conduct Tier 2 field studies for invasive plants
Non-regulated invasives (6 spp.) **Designated exotic/ Introduced (4 spp.)**	X	✓ LSA_{AQU} LSA_{TER}	*NA*	• Figure 1-3 in Chapter 2 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Spread of weedy and introduced species into an area due to temporary disturbance • Ongoing surface land management during operations	• Ensure construction equipment and materials brought on site are clean and free of visible plant parts and soil • Re-seed disturbed areas as soon as possible with native plant mix to prevent establishment and spread of weedy and introduced species	• Conduct Tier 2 field studies for weedy and introduced plants

Species	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
Spongy Moth (a.k.a. LDD Moth, Gypsy Moth)	✓	✓ LSA_{TER}	NA[3]	• Figure 1-2 in Chapter 6 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Spread of invasive species into an area due to temporary disturbance • Ongoing surface land management during operations	• Adhere to CFIA phytosanitary regulations and procedures for spongy moth (CFIA 2022) • Ensure construction equipment and materials brought on site are free of egg masses, larvae, caterpillars, and adult moths • Monitor trees for defoliation and report spongy moth observations to the CFIA	Tier 1 • Continue with Terrestrial Ecosystem Mapping (TEM) field studies, which includes forest health monitoring
Rainbow Smelt	X	X	✓ RSA_{AQU}	• Reported in EDDMapS dataset at mouth of Saugeen River; Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Invasive species could be spread to the AOI if people bring them in for bait	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation • Report sightings of invasive fish to DFO and EDDMapS and follow instructions by these governing bodies for preventing the spread of aquatic invasive species and controlling or eradicating aquatic invasives • Follow measures outlined in NDMNRF's Boaters Action Plan (NDMNRF 2022) for vessels or other equipment used in water.	• Conduct Tier 2 fish community characterization studies in AOI and LSA_{AQU} and expand to RSA_{AQU} if relevant
Threespine Stickleback	X	X	✓ RSA_{AQU}	• Reported in EDDMapS dataset at mouth of Saugeen River; Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Invasive species could be spread to the AOI		
Round Goby	X	X	✓ RSA_{AQU}	• Reported in EDDMapS dataset at mouth of Saugeen River; Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Invasive species could be spread to the AOI		
White Perch	X	X	✓ RSA_{AQU}	• Reported in EDDMapS dataset at mouth of Saugeen River; Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Invasive species could be spread to the AOI		
Rusty Crayfish	X	✓ LSA_{AQU}	*NA*	• Reported in EDDMapS dataset on Teeswater River; Figure 3-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Invasive species could be spread to the AOI if people bring them in for bait		Tier 1 • Continue eDNA studies Tier 2 • Conduct Tier 2 surveys for rusty crayfish if relevant

Species	Observed in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				

Notes:

1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species. "NA" used where study area was not investigated for the species.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.
3. In general, terrestrial invertebrates are being studied within the AOI and LSA_{TER} for the BIS. However, as invasive forest and agricultural pests have potential impacts on ecosystem function and services (e.g., merchantable timber), these species will also be considered to the extent of the RSA_{ECO} with respect to ecosystem health status and trends.

5.2 Important Habitat

Habitats within this section are those identified as potentially important within the BIS study areas of relevance during Tier 1 studies to date.

5.2.1 Candidate Significant Wildlife Habitat

SWH is a component of the natural heritage features and areas that are protected by Ontario Provincial Policy Statement (PPS) under the *Planning Act* (MMAH 2020). SWH includes seasonal concentration areas, rare vegetation communities, specialized habitat for wildlife, habitat for species of conservation concern, and animal movement corridors. For the SON-South Bruce siting area, identification of candidate and confirmed SWH is informed by the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 6E* (OMNRF 2015a). **Table 5-4** lists candidate SWH identified within the BIS study areas of relevance during Tier 1 studies to date. Only candidate SWH that meet additional habitat criteria outlined in the 6E ecoregional criterion schedule are included in **Table 5-4** (i.e., candidate SWH that are based solely on ecosite matches and cannot be further refined at this point in BIS studies are not yet considered). To date, no SWH has been confirmed within the AOI.

Table 5-4. Candidate SWH identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

Type	Identified in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
Deer Winter Congregation Areas ***Confirmed SWH***	*X*	✓ *LSA_{TER}*	✓ *RSA_{UNG}*	• Figure 2-1 in Chapter 4 of the 2022 BIS Baseline Report (Zoetica 2022b) • Greenock Swamp Wetland Complex extends into northern portion of LSA_{TER}	• Change in habitat conditions	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.6 • Avoid NDMNRF-mapped Deer Wintering Areas (confirmed SWH)	• Conduct Tier 2 field studies to identify Deer Movement Corridors (SWH type) to/from Deer Winter Congregation Areas
Bat Maternity Colonies	✓	✓ *LSA_{TER}*	*NA*	• Figure 6-1 in Chapter 4 of the 2022 BIS Baseline Report (Zoetica 2022b) • NBCP bat studies in the SON-South Bruce siting area (Thorne et al. 2021, Sparrow-Scinocca et al. 2022)	• Clearing of land • Change in habitat conditions • Clearing of vegetation containing occupied roosts	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.6, T.10 • Avoid area of entire woodland or forest ecosite containing maternity colonies (if confirmed as SWH)	• Conduct Tier 2 field studies to identify and evaluate candidate maternity roosts (OMNR 2011)
Colonially-Nesting Bird Breeding	*X*	✓ *LSA_{TER}*	✓ *$RSA_{AVI-AQU}$*	• Figure 4-2 in Chapter 7 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Change in habitat conditions	• See • Figure **4-1** for mitigation hierarchy steps that could apply	Tier 2 • Field-verify NHIC great blue heron

Type	Identified in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
Habitat (Tree/Shrubs)				• Great blue heron colonies found east of AOI near Teeswater and in northwestern portion of Greenock Swamp Wetland Complex		• See Section 4.3 for terrestrial mitigation, namely T.6, T.10 • See Section 1.1 for aquatic mitigation • Avoid active colony plus min. 300 m buffer from edge, or extent of forest ecosite containing the colony (if confirmed as SWH)	colony records to determine activity status • Conduct Tier 2 field studies for waterbirds
Special Concern and Rare Wildlife Species	See **Table 5-1** for a summary of all Species of Conservation Concern.						

Notes:

1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species. "NA" used where study area was not investigated for the species.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.

5.2.2 Critical Habitat

Critical habitat is habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the federal recovery strategy or in an action plan for the species (*Species at Risk Act*, S.C. 2002, c. 29). Identification of critical habitat is not a required component of a provincial recovery strategy under the Ontario *ESA*. However, the approach used to identify critical habitat, in conjunction with the best scientific information available, is recommended when developing a habitat regulation. A habitat regulation is a legal instrument under the *ESA* that prescribes an area that will be protected as the habitat of the species, where habitat is defined in part as "*an area on which the species depends, directly or indirectly, to carry on its life processes, including life processes such as reproduction, rearing, hibernation, migration or feeding*… [and includes] *dens, nests, hibernacula and other residences*".

Known critical habitat within the BIS study areas of relevance is presented in **Table 5-5**. For wood turtle, spotted turtle, American ginseng, and goldenseal, critical habitat is represented as large squares in their respective recovery strategies due to data sensitivity. The critical habitat squares of these species overlap with all relevant BIS study areas (including the AOI); however, further discussions with Environment and Climate Change Canada (ECCC) and the Ontario Ministry of the Environment, Conservation and Parks (MECP) are needed to determine the precise locations of critical habitat. Fisheries and Oceans Canada (DFO) publishes more specific critical habitat locations for aquatic SAR; there is known critical habitat for rainbow mussel along the Teeswater River, extending into the AOI.

Table 5-5. Critical habitat identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, potential mitigation, and data gaps. All observations are from desk-based sources.

Species[3]	Identified in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA	RSA				
American Ginseng (END, END, END)	✓	✓ LSA_{TER}	✓ RSA_{VEG}	• Figure 1-2 in Chapter 2 of the 2022 BIS Baseline Report (Zoetica 2022b)	• See discussion of American Ginseng in Section 5.1.1		
Goldenseal (SC, THR, THR)	✓	✓ LSA_{TER}	✓ RSA_{VEG}	• Figure 1-2 in Chapter 2 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Dust settling on vegetation adjacent to infrastructure • Change in habitat conditions (e.g., soil hydrology and drainage, nutrient and light levels) • Spread of invasive species into an area due to temporary disturbance • Injury or mortality due to trampling or equipment	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 4.3 for terrestrial mitigation, namely T.10 • See Section 1.1 for aquatic mitigation • Avoid area recommended for the species' habitat regulation: ecosite where occurrence record is located plus min. 50 m buffer of natural vegetation (Jolly 2016)	• Conduct Tier 2 field studies for at-risk plants
Wood Turtle (THR, THR, END)	✓	✓ LSA_{TER}	✓ $RSA_{HRP\text{-}AQU}$	• Figure 3-2 in Chapter 5 of the 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Infilling of water during construction • Noise and vibrations (underwater, surface) causing species to avoid adjacent habitats • Change in habitat conditions (e.g., water temperature, shading, water flow, depth, sedimentation) • Spread of invasive species • Traffic-caused mortality • Disruption of ground materials containing occupied nests • Spread of disease-causing agents • Creation of barriers to movement (aquatic and terrestrial) • Creation of zones of avoidance • Exposure to chemical contaminants	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.6, A.17, A.24 • See Section 4.3 for terrestrial mitigation, namely T.8, T.10, T.17, T.18, T.31 • Avoid area recommended for the species' habitat regulation[4]: 2 km riverine corridor (upstream and downstream of known turtle occurrence) plus 200 m of adjacent upland habitat; 300 m from hibernation sites and nesting sites (OWTRT 2010)	• Continue with Tier 1 eDNA studies. • Continue engagement with knowledgeable stakeholders and rights-holders to identify sensitive habitats • Conduct Tier 2 field studies for wood turtle (OMNRF 2015b)
Spotted Turtle (END, END, END)	✓	✓ LSA_{TER}	✓ $RSA_{HRP\text{-}AQU}$				
Pugnose Shiner (THR, THR, THR)	*X*	*X*	✓ RSA_{AQU}	• Teeswater River; Figure 2-1, Chapter 8, in 2022 BIS Baseline Report (Zoetica 2022b)	• No potential APM Project interactions have been identified to date	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.5	• Conduct Tier 2 fish habitat and community characterization studies to establish potential monitoring sites to test predictions of the Impact Assessment.
Rainbow Mussel (SC, SC, SC)	✓	✓ LSA_{AQU}	*NA*	• Teeswater River; Figure 3-1, Chapter 8, in 2022 BIS Baseline Report (Zoetica 2022b)	• Direct habitat loss due to infrastructure placement and clearing of land • Infilling of water during construction • Change in habitat conditions (e.g., water temperature, water quality, shading, water flow, depth, sedimentation)	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.17, A.21, A.23, A.24	• Continue with Tier 1 eDNA studies. • Conduct Tier 2 studies to characterize rainbow mussel in the Teeswater River and its tributaries in the AOI to determine if additional potential critical habitat exists in the AOI

Notes:
SAR Conservation statuses: END = Endangered, THR = Threatened, SC = Special Concern, NAR = Not at Risk. Provincially Rare SRANKS: S1 = Critically Imperiled, S2 = Imperiled, S3 = Vulnerable; B (Breeding), M (Migration), and N (Non-breeding) are breeding status qualifiers.

1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species. "NA" used where study area was not investigated for the species.

Species[3]	Identified in[1] AOI	LSA	RSA	Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps

2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.
3. Species conservation statuses are presented in order of (COSEWIC, *SARA*, SARO).
4. The habitat regulation for wood turtle (O. Reg. 832/21) under the Ontario *ESA* does not currently apply to areas within the County of Bruce. However, following the mitigation hierarchy with consideration of this habitat regulation may contribute to positive effects of the APM Project through conservation efforts toward the species' recovery.
5. Critical habitat for Rainbow mussel is proposed in the Recovery Strategy for Rainbow Mussel (DFO 2018). Rainbow mussel was downlisted in 2019 to special concern. The Recovery Strategy document is listed a "Finalization Delayed" on the SARA website (https://species-registry.canada.ca/index-en.html#/species/943-644#recovery_strategies).

5.2.3 Important Fish Habitat

Important fish habitat includes habitat required to fulfill important life history phases of fish including spawning, rearing, and overwintering phases, and includes migratory habitat required by fish to access these habitats. A review of desk-based information collected to date revealed a single brook trout spawning area within the relevant BIS study areas for fish (**Table 5-6**). No potentially important fish habitat has been documented within the AOI.

Table 5-6. Important fish habitat identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

Type	Observed in[1] AOI	LSA_{AQU}	RSA_{AQU}	Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
Brook Trout Spawning Area	*X*	✓	*X*	• Southern LSA_{AQU}; Figure 2-1, Chapter 8 in 2022 BIS Baseline Report (Zoetica 2022b)	• Change in habitat conditions (e.g., water temperature, water quality, shading, water flow, depth, sedimentation)	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, namely A.5, A.6, A.14, A.20, A.23	• Conduct Tier 2 fish community characterization studies during appropriate seasons to determine additional potential spawning locations

Notes:
1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries. A "✓" was used when a species is detected within a study area. An "X" denotes the species was not detected within a study area that was investigated for the species.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.

5.3 Wetland and Riparian Areas

Wetlands and riparian environments play a vital role in sustaining healthy aquatic ecosystems. These environments provide unique and specialized habitats for wildlife that depend on these features to carry out various life history phases. Tier 1 studies conducted to date have revealed that wetland and riparian habitats can contribute to many of the candidate SWHs in BIS study areas relevant to the BVs they support (see Section 5.2.1). In addition to supporting biodiversity, wetlands and riparian environments can provide hydrological and social functions as they contribute to and are affected by groundwater recharge and discharge, regulating functions for flooding and water quality in aquatic habitats, and economic value as they tend to support valuable products such as wild rice, commercial fish and furbearers, and recreational opportunities. **Table 5-7** contains a list of the wetland types and Provincially Significant Wetlands (PSWs) found within the AOI, LSA and RSA developed for ecosystem function and services. In addition, **Table 5-8** summarizes the proportion of each study area consisting of the area surrounding aquatic habitats, represented as riparian habitat widths of 15 m, 30 m, and 100 m, that are relevant to healthy ecosystem function. The relative proportions in each study area of increasing size indicates the relative distribution of certain wetland features across space. For example, the amount of marsh habitat in the AOI is proportionally greater than marsh habitat in the relevant LSA. In contrast, hardwood and mixedwood swamp habitat is proportionally greater in the LSA relative to the AOI. The relative rarity of wetland types across space, and the need for retaining functional riparian areas for protecting wetland health and biodiversity are considered in this section alongside potential interactions with the APM Project and potential mitigation to minimize impacts. Major wetland categories and riparian areas may be adjusted following the integration of TEM and/or AHM data and in future tiers of study.

Table 5-7. Wetlands identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

	Percentage of Study Area[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
Type	**AOI**	**LSA_{ECO}**	**RSA_{ECO}**				
Conifer Swamp	*1.4*	*1.1*	NA	• Figure 1-1 and 1-2, Chapter 3 in 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Decreased habitat quality for supporting biodiversity due to dusting	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, including A.17, A.22, A.23 • See Section 4.3 for terrestrial mitigation	• No ELC data within the RSA_{ECO} to classify wetlands by type. Refined Classification dataset was limited to natural and naturalized areas within the LSA_{ECO}. Tier 1 • Update Ecosite Map with field verified data • Continue eDNA studies in relevant habitats potentially impacted by the APM Project and appropriate reference locations to glean potential use and timing of various wetland types by biota. Tier 2 • Conduct Tier 2 studies in habitats potentially affected by the APM Project and in reference areas to confirm biodiversity in these habitats
Hardwood Swamp	*4.0*	*14.8*	NA				
Mixedwood Swamp	*3.1*	*8.5*	NA				
Shrub Swamp	*0.4*	*0.8*	NA				
Marsh	*4.4*	*1.5*	NA				
Fen	-	*<0.1*	NA		• Decreased habitat quality for supporting biodiversity due to dusting		
Greenock Swamp Wetland Complex (PSW)	*7.7*	*28.9*	4.8	• Figure 1-3, Chapter 3 in 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Decreased habitat quality for supporting biodiversity due to dusting	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, including A.17, A.22, A.23 • See Section 4.3 for terrestrial mitigation, including T.6	• Conduct Tier 2 BIS studies within relevant areas of the PSW that make potentially be impacted by the APM Project
Teeswater Wetland Complex (PSW)	*1.8*	*3.4*	0.5				
Wingham Wetland Complex (PSW)	-	*0.5*	0.4	• Figures 1-3 and 1-4, Chapter 3 in 2022 BIS Baseline Report (Zoetica 2022b)	• Decreased habitat quality for supporting biodiversity due to Clearing of land • Degradation of riparian habitat for supporting biodiversity due to dusting • Decreased riparian function for sustaining aquatic health		
Kinloss Creek (PSW)	-	*0.2*	0.4				
Chepstow Swamp (PSW)	-	*<0.1*	0.2				
PSWs in the RSA_{ECO}[3]	-	-	2.3	• Figure 1-4, Chapter 3 in 2022 BIS Baseline Report (Zoetica 2022b)	• No potential APM Project interactions have been identified to date	• NA	• NA

Notes:

1. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed by its boundaries. "NA" used where study area was not investigated.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.
3. There are 12 PSWs in the RSA_{ECO} that are not partially contained within the AOI or the LSA_{ECO} namely: Saratoga Wetland Complex, Dickies Creek Wetland Complex, Howick Bog, Bluevale Wetland Complex, Wroxeter Wetland Complex, St. Augustine Wetland Complex, Anderson creek Wetland Complex, St. Helens Wetland Complex, Sangs Creek, Otter Creek, Lakelet Lake Wetland Complex, and Edengrove Wetland Complex.

Table 5-8. Riparian area surrounding aquatic habitat within the AOI, LSA_{TER} and LSA_{ECO} influencing aquatic health. All observations are from desk-based sources.

Type	Percentage of Study Area[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA_{TER}	LSA_{ECO}				
Riparian Area (15 m)	*3.8*	*3.9*	2.0	• Figures 1-5 and 1-6, Chapter 3 in 2022 BIS Baseline Report (Zoetica 2022b)	• Clearing of land • Degradation of riparian habitat for supporting biodiversity due to dusting • Decreased riparian function for sustaining aquatic health	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation, including A.17, A.22, A.23 • See Section 4.3 for terrestrial mitigation	Tier 2 • Determine condition of riparian habitat within riparian buffer distances through desk-based and field verification studies. • Conduct Tier 2 biodiversity studies to understand biodiversity in riparian environments
Riparian Area (30 m)	*7.7*	*7.8*	3.9				
Riparian Area (100 m)	*23.9*	*25.3*	13.1				
Riparian Area (120 m)	*15.6*	*13.8*	14.9				

Notes:
1. For the purposes of this table, the indicated study area includes overlap with other study area(s) that may be encompassed by its boundaries.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.

5.4 Ecosystem Services and Functions

Ecosystem functions include the physical, chemical, and biological processes within the ecosystem that serve to maintain biodiversity. Ecosystem services are the variety of benefits that nature provides to people including regulating services that help regulate ecosystem processes (e.g., shading, pollutant removal, regulation of water), provisioning services (e.g., material benefits such as food, water, raw materials, and medicinal resources), and cultural services (e.g., nonmaterial benefits including recreation, conducting ceremonies, and mental and physical health). The BIS covers ecosystem function and services as they relate to biodiversity. **Table 5-9** contains important or potentially important areas identified to date for providing ecosystem services within the BIS study areas of relevance during Tier 1 studies. While wetlands can provide water regulating services, further information gathered during Tier 2 BIS studies and other studies (e.g., conducted as part of the EMBP) will be important for determining the relevance of a particular wetland in providing a regulating service. Similarly, other ecosystem components (e.g., lakes, rivers, and wetlands) can provide provisioning services (e.g., fish, wild rice), but require additional information to determine the relevance of these ecosystem components in the area. Thus, currently, **Table 5-9** contains only those ecosystem components that are of known significance and do not require further studies to glean their importance as ecosystem services within the BIS study areas.

Table 5-9. Ecosystem services and functions identified to date within relevant BIS study areas, the ways in which the APM Project could interact with them, data gaps, and potential mitigation. All observations are from desk-based sources.

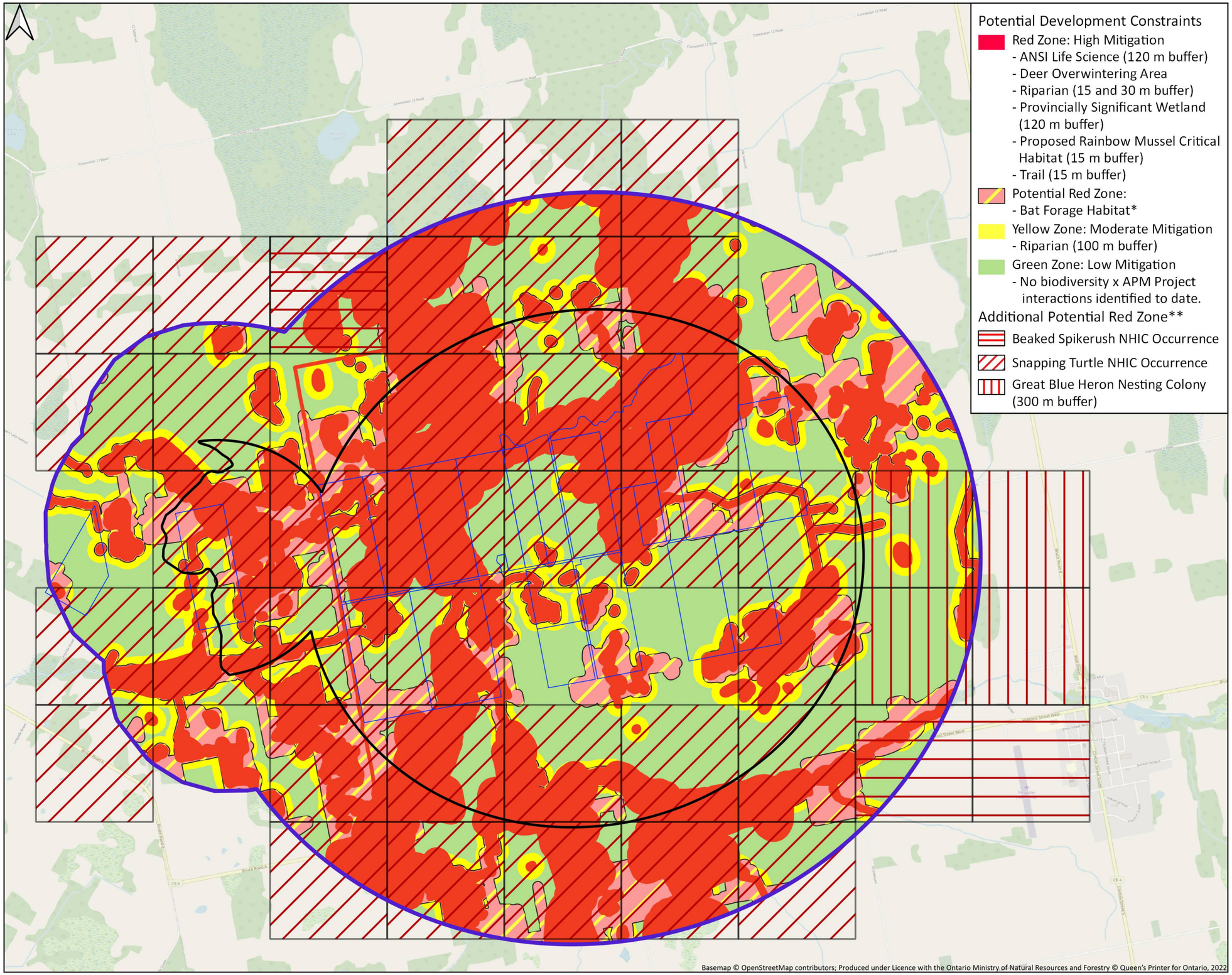
Type	Present in[1]			Key Locations	Potential Interactions with APM	Potential Mitigation[2]	Gaps/Next Steps
	AOI	LSA_{ECO}	RSA_{ECO}				
Ecosystems and ecosystem components critical to sustaining biodiversity							
Areas of Natural and Scientific Interest (ANSI), including Greenock Swamp ANSI	*X*	✓	✓	• See Figure 1-1, Chapter 9 in the 2022 BIS Baseline Report (Zoetica 2022b)	• Change in quality of vegetation and aquatic areas due to dusting, change to water quality or quantity	• See • Figure **4-1** for mitigation hierarchy steps that could apply • See Section 1.1 for aquatic mitigation • See Section 4.3 for terrestrial mitigation	• Conduct Tier 2 studies in areas potentially impacted by the APM Project and in reference areas to understand the importance of these areas in sustaining biodiversity
Conservation Authority Lands	*X*	✓	✓				
County and Municipal Lands	*X*	✓	✓				
Ecosystems and ecosystem components providing provisioning services and cultural services[3]							
Trails (Huron Shores ATV Club)	✓	✓	✓	• See Figure 1-1, Chapter 9 in the 2022 BIS Baseline Report (Zoetica 2022b)	• Restricted access of trails running through the AOI due to fencing around infrastructure • Impact on quality of trail for recreation due to impacts on vegetation and habitat	• See • Figure **4-1** for mitigation hierarchy steps that could apply • Develop guidelines for maintaining the condition of trails within the AOI and LSA_{ECO}[5]	• Work with teams from other IA pillars to plan relevant BIS Tier 2 studies if required.
Culross Trails	*X*	✓	X		• Impact on quality of trail for recreation due to impacts on vegetation and habitat		
Trails in the RSA_{ECO}[4]	*X*	*X*	✓		• No potential APM Project interactions identified to date	• NA	• NA

Notes:
1. For the purposes of this table, the indicated study area excludes overlap with other study area(s) that may be encompassed by its boundaries.
2. Potential mitigation included in this table reflects the typical mitigation measures that can be applied to reduce potential Project impacts. Additional mitigation measures may be included where needed to minimize any negative effects of the Project on biodiversity. The NWMO will follow the mitigation hierarchy (see Section 4.1) in all stages of the Project using the best available data at each stage.
3. Cultural services such as recreation, tourism, aesthetic appreciation and spiritual enjoyment of nature are not part of the BIS but will be included in other IA pillars.
4. Trails in the RSA_{ECO} are 26 additional trails in the RSA that do not intersect with the AOI and LSA_{ECO}. The majority occur in the southern portion of the RSA_{ECO}.
5. See the City of Surrey's *Biodiversity Design Guidelines: Module 7 – Trails* for examples of considerations for trails including maintenance of trail quality: https://www.surrey.ca/sites/default/files/media/documents/BiodiversityDesignGuidelines_Trails.pdf

6.0 SETBACK AREAS

Zoetica has taken data collected to date and created maps showing areas where setback distances will help to minimize potential APM Project x biodiversity interactions and will help to direct engineering in this endeavour (**Figure 6-1**). Zoetica emphasizes that maps are based on data collected to date, only, and maps are unable to capture features that may change in location over time (e.g., new stick nests constructed in the future). In general, areas to be avoided as much as possible during project design (else, high mitigation efforts if not avoided) include aquatic habitats (waterbodies, watercourses, wetlands) and their 15-30 m riparian buffers, wildlife features, and around areas known to contain significant wildlife habitat or SAR. As shown in **Figure 6-1** and described in Appendix B in Chapter 1 of the 2022 BIS Baseline Report (Zoetica 2022b), aquatic habitats are widely distributed and comprise approximately 14.6% of the AOI. These aquatic habitats are important for a variety of species of conservation concern and support candidate and confirmed SWH, and the Greenock Swamp is both a PSW and an Area of Natural and Scientific Interest (ANSI), Life Science.

The setback maps integrate required or recommended buffer distances outlined in **Table 4-1**, using the most conservative values where applicable until more information is available through detailed field investigations planned as part of Tier 2 studies for the BIS baseline program. For example, field studies are needed to confirm the great blue heron nesting colony and habitat for snapping turtle, shown on **Figure 6-1**, as SWH. When the area of the SWH has been identified, the additional 120 m buffer to accommodate adjacent lands for SWH, according to the *Natural Heritage Reference Manual* (OMNR 2010), can also be applied. These setback maps will be continually built upon and refined as more baseline data are collected for the BIS and as avoidance maps are produced by other disciplines (e.g., groundwater connections identified through the EMBP) for mergence with BIS exclusion maps. Ultimately, these maps are intended to show where development and site alteration should be avoided, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, in alignment with the Ontario PPS.



NWMO Biodiversity Impact Studies

Biodiversity Sensitivities Map

Figure 6-1a

Area of Interest (AOI)
Local Study Area (LSA_{TER})
NWMO Purchased or Optioned Properties

* Bat Forage Habitat layer is only potential critical habitat, as recovery strategy around the habitat has not yet been finalized. Bat Forage Habitat may exist within the Red Zone. See Figure 6-1b for the full extent of the Bat Forage Habitat layer.

**Exact location of data cannot be shown on map due to data sensitivity, and therefore are masked with a 1 km grid.

Restricted species detected in the AOI and LSA_{TER} were excluded from the map for data sensitivity purposes.

Subject to change based on integration of additional information.

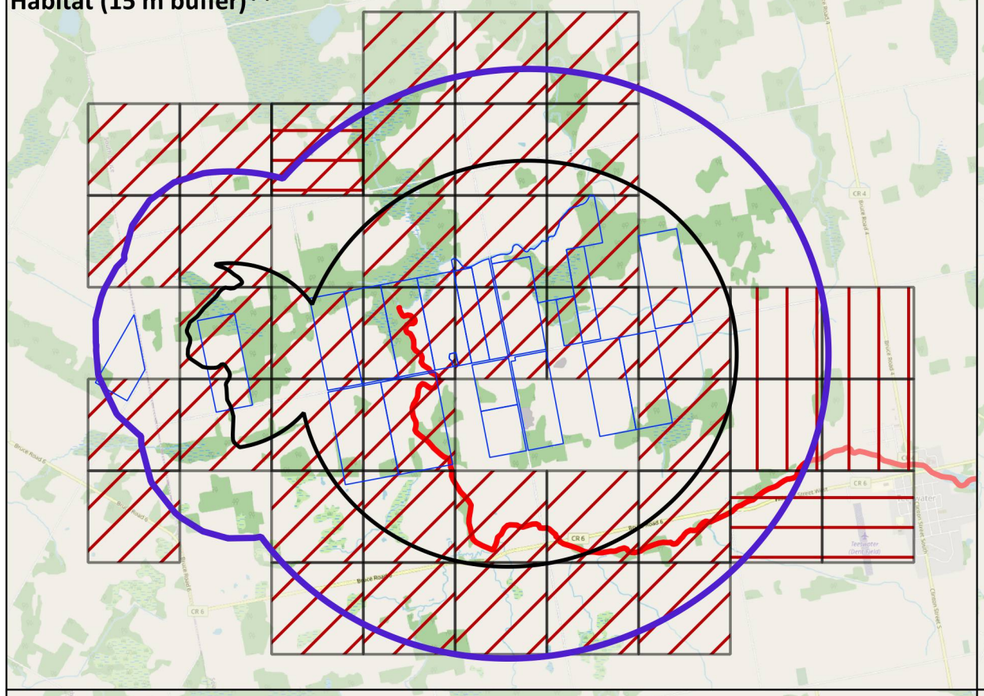
1:32,000
0 0.5 1 km

ZOETICA

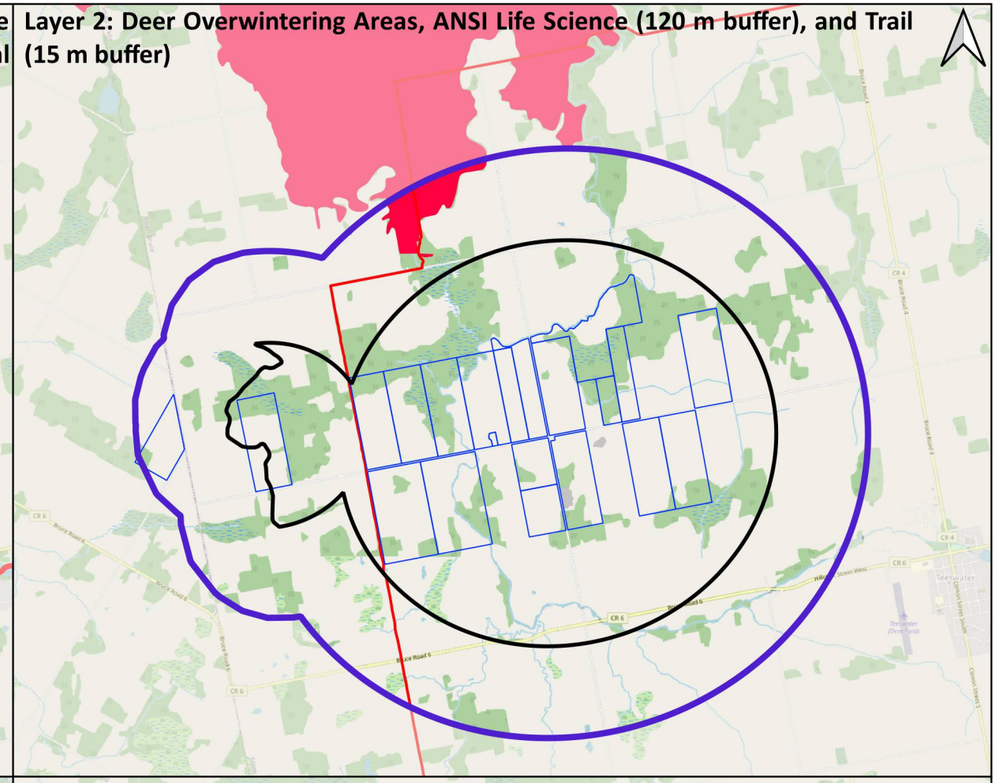
Data received from:
Ontario GeoHub — Areas of Natural and Scientific Interest (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Wetlands (MNRF)
NWMO — AOI; NHIC WCA Observations (MNRF); Non Sensitive Wildlife Activity Area (NDMNRF); NHIC Species Occurrences (MNRF); NWMO Purchased or Optioned Properties; Trail Segments (MNRF)
Critical Habitat for Rainbow data were created based on the federal recovery strategy

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
November 21, 2022	Map ID: NWMO_BIS_A090a	

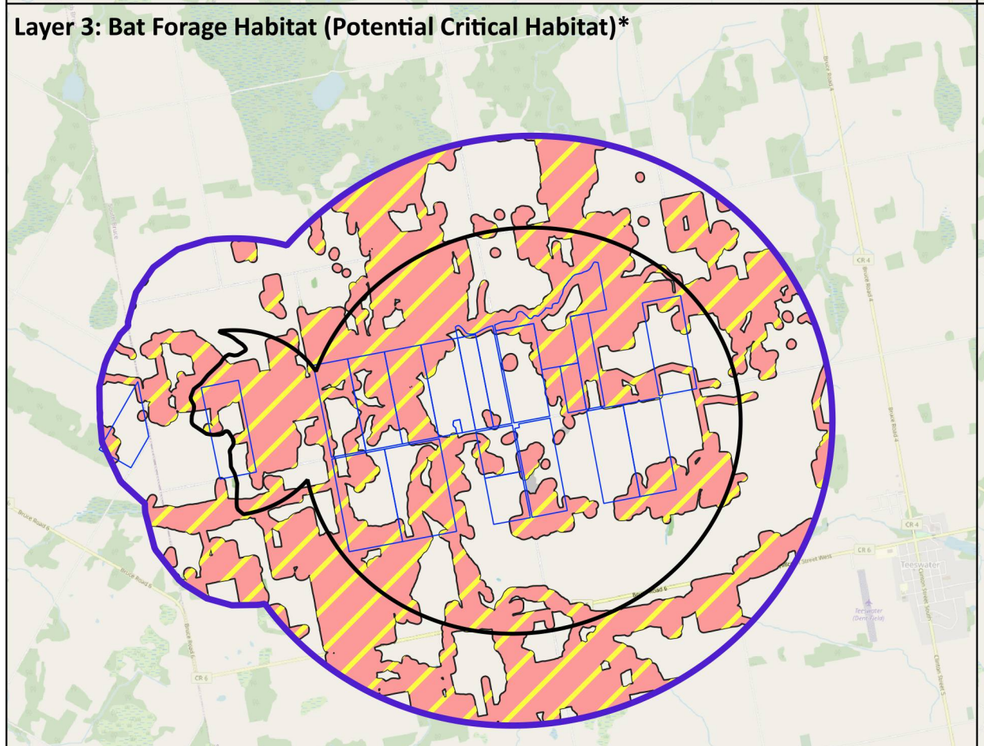
Layer 1: NHIC Occurrences Grids (Snapping Turtle and Beaked Spikerush), Great Blue Heron Nesting Colony Grids (300 m buffer), and Proposed Rainbow Mussel Critical Habitat (15 m buffer)**



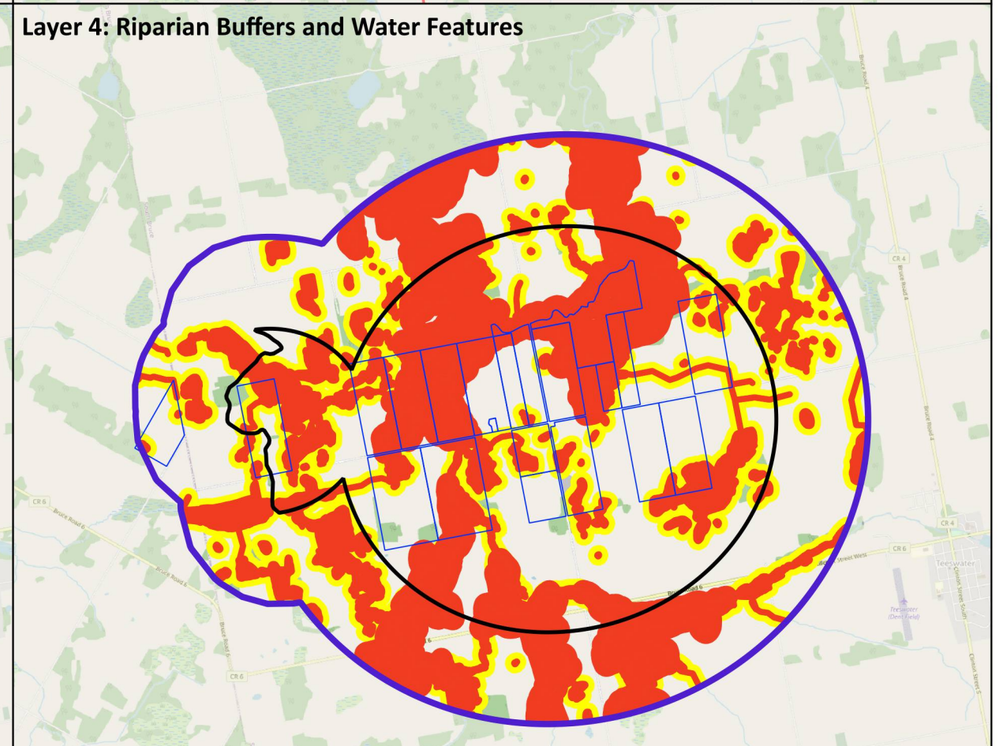
Layer 2: Deer Overwintering Areas, ANSI Life Science (120 m buffer), and Trail (15 m buffer)



Layer 3: Bat Forage Habitat (Potential Critical Habitat)*



Layer 4: Riparian Buffers and Water Features



NWMO Biodiversity Impact Studies

Biodiversity Sensitivities Map

Figure 6-1b

- Area of Interest (AOI)
- Local Study Area (LSA_{TER})
- NWMO Purchased or Optioned Properties

See Figure 6-1a for Full Legend

* Bat Forage Habitat layer is only potential critical habitat, as recovery strategy around the habitat has not yet been finalized.

**Exact location of data cannot be shown on map due to data sensitivity, and therefore are masked with a 1 km grid.

Restricted species detected in the AOI and LSA_{TER} were excluded from the map for data sensitivity purposes.

Subject to change based on integration of additional information.

1:65,000

0 1 2 km

ZOETICA

Data received from:
Ontario GeoHub — Areas of Natural and Scientific Interest (MNRF); OHN Waterbody (MNRF); OHN Watercourse (MNRF); Wetlands (MNRF)
NWMO — AOI; NHIC WCA Observations (MNRF); Non Sensitive Wildlife Activity Area (NDMNRF); NHIC Species Occurrences (MNRF); NWMO Purchased or Optioned Properties; Trail Segments (MNRF)
Critical Habitat for Rainbow data were created based on the federal recovery strategy

Project CRS: NAD83 / UTM zone 17N		
Author: AH	Reviewed by: CC	Approved by: HB
November 21, 2022	Map ID: NWMO_BIS_A090b	

7.0 POTENTIAL SIGNIFICANT EFFECTS

Based on data collected and analyzed to date, along with considerations of the CSM during all stages of development and operation of the APM Project, and the relatively small size of the surface infrastructure and available mitigation measures, no biodiversity issues have been identified at this time that would preclude the SON-South Bruce siting area as a feasible site for ongoing consideration of the APM Project. Zoetica has included both spatial and Best Practice considerations within this report for consideration by the NWMO, and which can be used to build and manage a project that can eliminate or minimize potential impacts of the APM Project to biodiversity at this site, based on potential interactions that have been identified to date.

However, Zoetica provides the following important cautions:

1. Field studies have only recently been initiated; no data from Tier 1 studies have been received to date.
2. Additional studies and analyses of Tier 1 data, and data collection during future Tiers of studies, may uncover data that require further consideration about the site's suitability and potential for impacts.
3. The NWMO has not yet produced a formal Project Description, nor has Zoetica had the opportunity to examine data and predictions collected and made by other disciplines. While a project description is in progress, it has not yet been shared with Zoetica. Future iterations of this Change Assessment Memo will consider the project description when available. Biodiversity is also affected by the chemical, physical, and social environment, which may be altered by the APM Project. Chemical and physical environmental impacts of the project are being investigated and predicted by the EMBP, and human and social impacts are being considered in the human and social impact studies program.

8.0 NEXT STEPS

The NWMO is currently nearing the site selection stage, anticipated to occur in the fourth quarter of 2024. Information collected as part of the BIS Tier 1 studies along with information collected as part of other environmental programs such as the EMBP, and through the human, social, and economic pillars, will aid in the site selection process for the APM Project. The project will only proceed with a willing host community; thus, information collected as part of these programs will help inform local communities of the potential project interactions and possible mitigations to allow communities to make an informed decision on their willingness to house the APM Project. Currently at the SON-South Bruce site, Tier 1 data were collected in 2022 and will be analyzed and integrated into the 2023 BIS Baseline Report and the 2023 BIS Change Assessment Memo. Additional data is anticipated to be collected at the SON-South Bruce site in 2024 to fill any data gaps identified during the review of Tier 1 baseline data collected in 2022.

Once a site has been selected, the BIS will proceed with data collection as part of Tier 2 BIS studies. The design of these studies is informed by BIS Tier 1 data along with relevant and available data collected as part of the EMBP and the human and social pillars. The focus of Tier 2 studies is to collect data to understand community and population metrics for biodiversity (e.g., relative abundance, species diversity) within the relevant BIS study areas, which will be important for determining the overall effects of the APM Project on biodiversity. Tier 2 studies will also prioritize data collection for species of interest including listed species, species of importance to stakeholders and rights-holders, and species that can act

as indicators. It is anticipated that further engagement will be conducted with the relevant communities and feedback received during these engagement activities will provide valuable information that will be incorporated in the Tier 2 baseline study design at the selected site. For example, species of importance to stakeholders and rights-holders revealed through engagement activities will assist Zoetica in focussing data collection for Tier 2 studies.

Some Tier 1 studies are also anticipated to continue at the selected site. For example, Terrestrial Ecosystem Mapping has thus far been restricted to the LSAs and may be conducted in the larger RSA, where required, to understand habitat associations for larger-ranging species (e.g., for developing habitat suitability maps for select species of interest) and the relative proportions of high-quality habitat within the various study areas. eDNA studies may also continue and include repeated seasonal sampling to enable occupancy modelling, identify biological hotspots within the BIS study areas, and provide for detections of cryptic species that may not be as easily detected through traditional methods. eDNA metabarcoding may also be used as a tool to detect changes in occupancy over time and can be used to track changes in species ranges, track the progression of introduced or invasive species, and track species extirpations over time. Traditional Tier 2 survey methods would be implemented along with eDNA metabarcoding studies to validate eDNA detections.

Once sufficient biodiversity data are collected, these data will be used to identify important habitats within the relevant BIS study areas and help to prioritize ecosystem components that provide important ecosystem services for people. These data will build on data collected as part of Tier 1 studies to update disturbance avoidance maps and to inform the NWMO of priority locations that require consideration through the mitigation hierarchy. Along with a formal APM Project Description, and a project-specific TISG, this stage of data collection will start to inform the IA (e.g., which biodiversity values may be selected as valued components), and preliminary predictions of effects (both impacts and benefits) on biodiversity can be assessed. The iterative process of baseline reporting and identifying potential impacts and benefits to biodiversity as data are being collected allows for: (1) the application of early learnings to assist in making good decisions, (2) identifying needed cross-disciplinary collaborations, and (3) early application of the mitigation hierarchy (e.g., identifying design adaptation needs early in the process) to ultimately result in a sound and focused IA with carefully documented change processes, following best practices outlined in the BPPA (Zoetica 2021b).

9.0 LIMITATIONS AND CAUTIONS

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APPENDIX A — BEST MANAGEMENT PRACTICES

Table A-1. Partial list of Best Management Practice (BMPs) and other guidance documents.

Topic	Relevant BMPs
General	County of Bruce Official Plan. Current to September 2022 (Link) Municipality of South Bruce Official Plan. Consolidated February 2019 (Link)
Soil Health	AF203 – Best Management Practice: Cold and Wet Soils. Ministry of Agriculture, Food and Rural Affairs, 2021, Publication No. 300534 (Link) AF151 – Best Management Practices Soil Health in Ontario. Ministry of Agriculture, Food and Rural Affairs, 2016, Publication No. 025616 (Link) (Lien) AF183 – Best Management Practices Soil Remediation. Ministry of Agriculture, Food and Rural Affairs, 2018, Publication No. 026873_U (Link) AF165 – Best Management Practices: Erosion Control Structures. Ministry of Agriculture, Food and Rural Affairs, 2017, Publication No. 025866 (Link) AF193 – Best Management Practices: Wind Erosion. Ministry of Agriculture, Food and Rural Affairs, 2018, Publication No. 026472 (Link) AF187 – Best Management Practices: Wind Strips. Ministry of Agriculture, Food and Rural Affairs, 2017, Publication No. 02590 (Link) AF191 – Soil Erosion by Water. Ministry of Agriculture, Food and Rural Affairs, n.d. (Link) (Lien) AF185 – Best Management Practices: Subsurface Drainage. Ministry of Agriculture, Food and Rural Affairs, 2017, Publication No. 025898 (Link) AF195 – Best Management Practices: Subsurface Compaction. Ministry of Agriculture, Food and Rural Affairs, 2018, Publication No. 026865 (Link) AF197 – Best Management Practices: Surface Crusting. Ministry of Agriculture, Food and Rural Affairs, 2018,Publication No. 026867_U (Link) AF207 – Best Management Practices: pH Extremes. Ministry of Agriculture, Food and Rural Affairs, 2021, Publication No. 300755 (Link) AF205 – Best Management Practices: Droughtiness. Ministry of Agriculture, Food and Rural Affairs, 2021, Publication No. 300538 (Link) ***Additional documents from the Ministry of Agriculture, Food and Rural Affairs are available here.***
Roads	Best Management Practices for Mitigating the Effects of Roads on Amphibian and Reptile Species at Risk in Ontario. OMNRF, 2016 (Link) Resource Roads and Wetlands: A guide for Planning, Construction, and Maintenance. Ducks Unlimited Canada, 2016, Special Publication SP-530E (Link) Fish and Wildlife Crossing Guidelines. Credit Valley Conservation, 2017 (Link)

Topic	Relevant BMPs
	Protocol for the Review and Approval of Forestry Water Crossings, MNRF and Fisheries and Oceans Canada, 2020 (Link) Technical Guide for Enhancing, Managing and Restoring Pollinator Habitat Along Ontario's Roadsides. Pollinator Partnership Canada, n.d. (Link) (Lien) Environmental guidelines for access roads and water crossings. Ministry of Natural Resources, 1990 (Link) Codes of Practice. Fisheries and Oceans Canada, 2022 (Link)
Fish and Wildlife Management	Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada. Canadian Wildlife Service, Environment Canada, 2004 (Link) (Lien) BMP10 – Best Management Practices: Fish and Wildlife Habitat Management. Service Ontario Publications, 2012 (Link) Reptile and Amphibian Exclusion Fencing: Best Practices. MNRF, 2020 (Link) Best Management Practices for Excluding Barn Swallows and Chimney Swifts from Buildings and Structures. MNRF, 2017 (Link) Best management Practices for the Protection, Creation and Maintenance of Bank Swallow Habitat in Ontario. MNRF, 2017 (Link) Best Management practices for Identifying, Managing, and Creating Habitat for Ontario's Species at Risk Snakes. MNRF, 2018 (Link) Creating Nesting Habitat for Barn Swallows, Best Practices Technical Note. OMNRF, 2016 (Link) MTO Best Management Practices for Species at Risk Protection During Maintenance Activities. Ontario Ministry of Transportation, 2017 (Link) Forestry and Waterfowl: Assessing and Mitigating Risk Practitioner Guide. Forest Management and Wetland Stewardship Initiative, 2018 (Link) Codes of Practice. Fisheries and Oceans Canada, 2022 (Link) A Land Manager's Guide to Conserving Habitat for Forest Birds in Southern Ontario. OMNR, 2011 (Link) General Nesting Periods of Migratory Birds. Environment and Climate Change Canada, 2018 (Link) ***The below documents may have been rewritten and/or replaced by newer guides, but may still be in use by some forest management plans during their operational period, and for independent forest audit purposes. Additional archived documents that may be useful are available here.***

Topic	Relevant BMPs
	Habitat Management Guidelines for Birds of Ontario Wetlands, Including Marshes, Swamps, and Fens or Bogs of Various Types. OMNR, 1985 [Archived] (Link) Habitat Management Guidelines for Cavity-Nesting Birds in Ontario. OMNR, 1984 [Archived] (Link) Habitat Management for Ontario's Forests Nesting Accipiters, Buteos and Eagles. OMNR, 1984 [Archived] (Link) Management Guidelines and recommendations for Osprey in Ontario. OMNR, 1983 [Archived] (Link)
Invasive Species and Pest Control	A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario. OMNR, 2016 (Link) Best Management Practices - Integrated Pest Management. Ministry of Agriculture, Food and Rural Affairs, 2016 (Link) Preventing Aquatic Invasive Species. Fisheries and Oceans Canada, 2022 (Link) Clean Equipment Protocol for Industry. Peterborough Stewardship Council and Ontario Invasive Plant Council, 2013 (Link) ***The following documents are a selection of resources from the Ontario Invasive Plant Council. More guidance documents are available here.*** Invasive *Phragmites* (*Phragmites australis*) Best Management Practices in Ontario. Ontario Invasive Plant Council, 2020 (Link) (Lien) Invasive Reed Canary Grass (*Phalaris arundinacea* subsp. *arundinacea*) Best Management Practices in Ontario. Ontario Invasive Plant Council, 2012 (Link) Purple Loosestrife (*Lythrum salicaria* L.), Best Management Practice Technical Document for Land Managers. Ontario Invasive Plant Council, 2017 (Link)
Wetlands and Water	Wetland Best Management Practices for Forest Management Planning & Operations. Forest Management and Wetland Stewardship Initiative, 2018 (Link for download) Best Management Practices – Water Management. Ministry of Agriculture, Food and Rural Affairs, 2016 (Link)
Fish and Fish Habitat	A Protocol Detailing the Fish Habitat referral Process in Ontario. Fisheries and Oceans Canada, 2000 (Link) Measures to Protect Fish and Fish Habitat. Fisheries and Oceans Canada, 2019 (Link) Codes of Practice. Fisheries and Oceans Canada, 2022 (Link) Extension Notes Ontario – Protecting Fish Habitat. LandOwner Resource Centre, 2000 (Link) Extension Notes Ontario – Protecting Fish Habitat from Sediment. LandOwner Resource Centre, 2000 (Link) Ontario's Provincial Fish Strategy – Fish for the Future. OMNRF, 2015 (Link)

Topic	Relevant BMPs
	Ontario Restricted Activity Timing Windows for the Protection of Fish and Fish Habitat. Fisheries and Oceans Canada, 2013 (Link)
Forest Management	AF193 – Best Management Practices: Buffer Strips. Ministry of Agriculture, Food and Rural Affairs, 2017, Publication No. 025990 (Link) BMP18E – Best Management Practices Agroforestry Series Volume 1: Woodlot Management. Ministry of Agriculture, Food and Rural Affairs, 2012 (Link) Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales. MNRF, 2010 (Link) Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales: Background and Rationale for Direction. Ministry of Natural Resources, 2010 (Link) Forest Management Guide for Great Lakes-St. Lawrence Landscapes. Ministry of Natural Resources, 2019 (Link) Forest Management Guide to Silviculture in the Great Lakes-St. Lawrence and Boreal Forests of Ontario. Ministry of Natural Resources, 2019 (Link) Afforestation Guide for Southern Ontario. Ministry of Natural Resources and Forestry, 2019 (Link) A Silvicultural Guide to Managing Southern Ontario Forests. Ministry of Natural Resources, 2000 (Link)

APPENDIX B — SCIENTIFIC NAMES

Table B-1. Scientific names for species mentioned in this report.

Common Name	Scientific Name
MAMMALS	
Eastern Small-footed Myotis	*Myotis leibii*
Little Brown Myotis	*Myotis lucifugus*
Tri-colored Bat	*Perimyotis subflavus*
FISHES & AQUATIC INVERTEBRATES	
Lake Sturgeon	*Acipenser fulvescens*
Lake Whitefish	*Coregonus clupeaformis*
River Bluet	*Enallagma anna*
Threespine Stickleback	*Gasterosteus aculeatus*
Northern Brook Lamprey	*Ichthyomyzon fossor*
White Perch	*Morone americana*
Black Redhorse	*Moxostoma duquesnei*
Greater Redhorse	*Moxostoma valenciennesi*
Round Goby	*Neogobius melanostomus*
Pugnose Shiner	*Notropis anogenus*
Rainbow Smelt	*Osmerus mordax*
Brook Trout	*Salvelinus fontinalis*
Rusty Crayfish	*Faxonius rusticus*
Rainbow Mussel	*Villosa iris*
BIRDS	
Cooper's Hawk	*Accipiter cooperii*
Northern Goshawk	*Accipiter gentilis*
Sharp-shinned Hawk	*Accipiter striatus*
Greater White-fronted Goose	*Anser albifrons*
Eastern Whip-poor-will	*Antrostomus vociferus*
Golden Eagle	*Aquila chrysaetos*
Great Egret	*Ardea alba*
Canvasback	*Aythya valisineria*
Upland Sandpiper	*Bartramia longicauda*
Red-shouldered Hawk	*Buteo lineatus*
Broad-winged Hawk	*Buteo platypterus*
Canada Warbler	*Cardellina canadensis*
Black Tern	*Chlidonias niger*

Common Nighthawk	*Chordeiles minor*
Evening Grosbeak	*Coccothraustes vespertinus*
Eastern Wood-pewee	*Contopus virens*
Tundra Swan	*Cygnus columbianus*
Bobolink	*Dolichonyx oryzivorus*
Rusty Blackbird	*Euphagus carolinus*
American Coot	*Fulica americana*
Common Gallinule	*Gallinula galeata*
Bald Eagle	*Haliaeetus leucocephalus*
Barn Swallow	*Hirundo rustica*
Caspian Tern	*Hydroprogne caspia*
Wood Thrush	*Hylocichla mustelina*
Least Bittern	*Ixobrychus exilis*
Great Black-backed Gull	*Larus marinus*
Red-headed Woodpecker	*Melanerpes erythrocephalus*
Osprey	*Pandion haliaetus*
Louisiana Waterthrush	*Parkesia motacilla*
Fox Sparrow	*Passerella iliaca*
Horned Grebe	*Podiceps auritus*
Red-necked Grebe	*Podiceps grisegena*
Bank Swallow	*Riparia riparia*
Blue-winged Teal	*Spatula discors*
Barred Owl	*Strix varia*
Eastern Meadowlark	*Sturnella magna*
Lesser Yellowlegs	*Tringa flavipes*
White-crowned Sparrow	*Zonotrichia leucophrys*
AMPHIBIANS & REPTILES	
Western Chorus Frog	*Pseudacris triseriata*
Snapping Turtle	*Chelydra serpentina*
Midland Painted Turtle	*Chrysemys picta marginata*
Eastern Milksnake	*Lampropeltis triangulum*
Eastern Ribbonsnake	*Thamnophis sauritus*
VEGETATION	
Goutweed	*Aegopodium podagraria*
Greek anemone	*Anemonoides blanda*
Rigid Sedge	*Carex tetanica*

Spotted Turtle	*Clemmys guttata*
Beaked Spikerush	*Eleocharis rostellata*
Small-flowered hairy willowherb	*Epilobium parviflorum*
Broad-leaved helleborine	*Epipactis helleborine*
Bush's Pocket Moss	*Fissidens bushii*
Black Ash	*Fraxinus nigra*
Wood Turtle	*Glyptemys insculpta*
Goldenseal	*Hydrastis canadensis*
European water-horehound	*Lycopus europaeus*
Spongy Moth	*Lymantria dispar*
White-tailed Deer	*Odocoileus virginianus*
American Ginseng	*Panax quinquefolius*
Green Arrow Arum	*Peltandra virginica*
Tubercled Orchid	*Platanthera flava*
Greater Round-leaved Orchid	*Platanthera macrophylla*
Rough bluegrass	*Poa trivialis*
Hill's Pondweed	*Potamogeton hillii*
Slender Mountain-mint	*Pycnanthemum tenuifolium*
European Buckthorn	*Rhamnus cathartica*
Large-leaved Leafy Moss	*Rhizomnium magnifolium*
Floating Crystalwort	*Riccia fluitans*
White willow	*Salix alba*
Bladder campion	*Silene vulgaris*
Bittersweet nightshade	*Solanum dulcamara*
Coltsfoot	*Tussilago farfara*
European highbush cranberry	*Viburnum opulus*