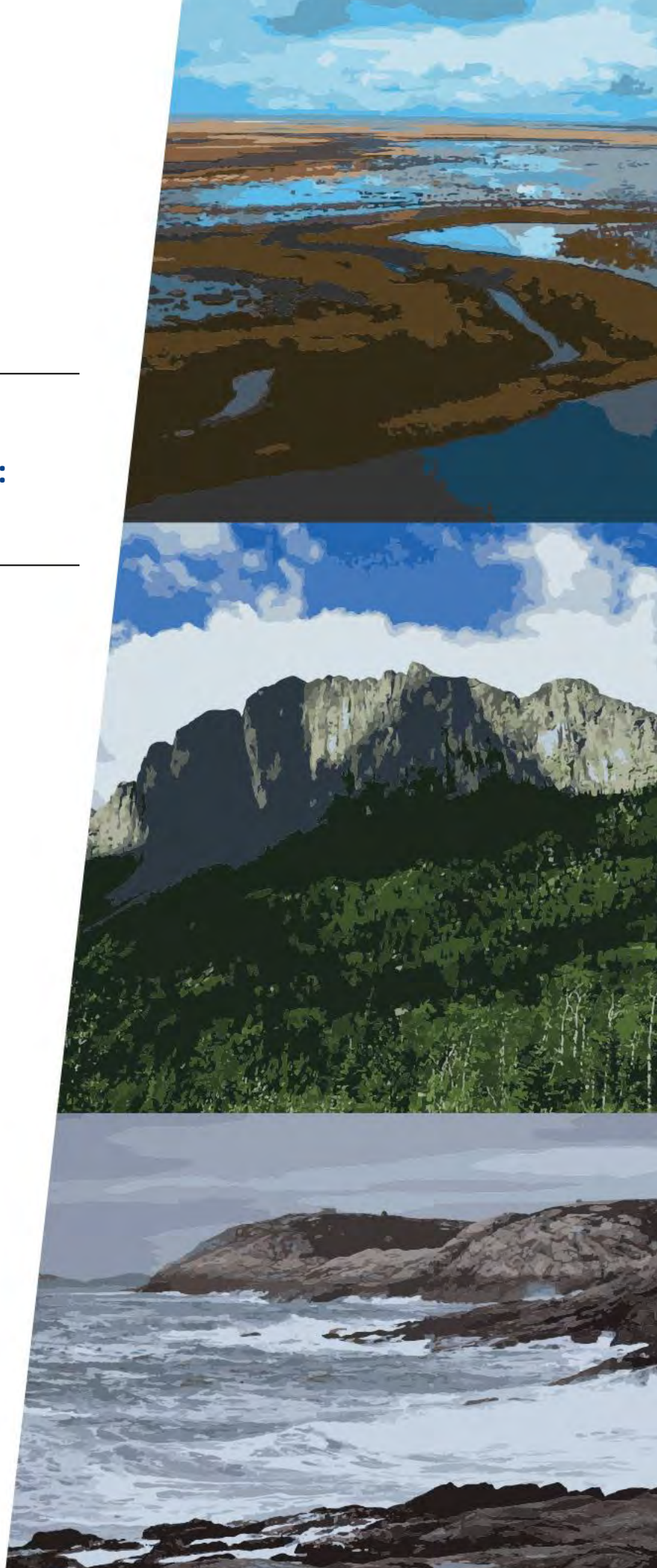
# Appendix G

## Wetlands Supporting Documentation

# Appendix G.1

## Wetland Biophysical Baseline Report

# Antrim Gypsum Project - Biophysical Baseline Report: Wetlands



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# EXECUTIVE SUMMARY

The Antrim Gypsum Project (the Project) is located near Gays River, along Lake Egmont Road in Cooks Brook, Nova Scotia. CertainTeed Canada Inc. (CertainTeed) proposes to develop the Project as a conventional gypsum quarrying operation including an open pit quarry, till and organic stockpiles, overburden storage area, rock processing plant as well as water management infrastructure. The Project will produce crushed gypsum and anhydrate at an estimated average rate of production of 2.0 million tonnes per year, with a marketable production rate of 1.5 million tonnes per year. The gypsum and anhydrate products will be transported via trucks to a port facility for shipment to manufacturing facilities either in Canada or the United States. For the purposes of this environmental assessment, a Project Area (PA) was defined as the footprint of Project related infrastructure and includes the following parcels of land (PID 40228389, 40228371, 40212409, 40229676, 40959983, 40959975, 41517319, 41152893, 40767014, 40228009 and 40228017).

McCallum Environmental Ltd (MEL) was retained to complete baseline wetland delineation surveys and functional assessments for the proposed Antrim Gypsum Project (the Project). This assessment supports the preparation and submission of the provincial Environmental Assessment Registration Document (EARD).

Wetland surveys were completed for the Project with the key objectives of facilitating avoidance of wetlands where practicable, assessing wetland function, including habitat provisions for species at risk, understanding the potential project interactions with wetlands, and to support wetland regulatory applications and permitting. This was achieved by completing a review of background desktop resources in combination with field studies to identify potential environmental constraints and sensitivities. This report outlines the methods and results of field evaluations completed within the PA.

Following the desktop review of available topographic maps, provincial databases, and aerial photography, wetland field surveys were completed by MEL within the PA from May 2022 through September 2023. Wetland functional assessments were completed for each wetland within the PA using the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC) wetland evaluation technique.

A total of 79 freshwater wetlands are present within the PA, totaling 64 ha. The majority of the wetlands are swamps (92%), with the remainder including fens (1%), marsh (1%), and complexes containing fen and swamp components (5%). Species at risk were observed in 12 wetlands. It is anticipated that 10 of these 12 wetlands also have suitable habitat required for critical life functions to support these species, and thus, will most likely be classified as Wetlands of Special Significance (WSS). All final WSS designation will be determined by Nova Scotia Environment and Climate Change (NSECC).

This report has been prepared to support the Project's development and to understand wetland presence and function across the PA. This report will support the necessary mitigation sequence to reduce and/or avoid impacts to wetlands or wetland functions where possible through the Project's EARD and future permitting processes.

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## APPENDICES

# 1 INTRODUCTION

McCallum Environmental Ltd (MEL) was retained to complete baseline wetland delineation surveys and functional assessments for the proposed Antrim Gypsum Project (the Project), located in Cooks Brook, Nova Scotia. This assessment supports the preparation and submission of the provincial Environmental Assessment Registration Document (EARD) with Nova Scotia Environment and Climate Change (NSECC).

Wetland surveys were completed for the Project with the key objectives of facilitating avoidance of wetlands where practicable, assessing wetland function, including habitat provisions for species at risk, understanding the potential Project interactions with wetlands, and to support wetland regulatory applications and permitting. This was achieved by completing a review of background desktop resources in combination with field studies to identify potential environmental constraints and sensitivities. This report outlines the methods and results of field evaluations completed within the Project Area (PA).

## 1.1 Background

The Project is located near Gays River, along Lake Egmont Road in Cooks Brook, Nova Scotia (Figure 1, Appendix A). CertainTeed Canada Inc. (CertainTeed) proposes to develop the Project as a conventional gypsum quarrying operation including an open pit quarry, till and organic stockpiles, overburden storage area, rock processing plant as well as water management infrastructure. The Project will produce crushed gypsum and anhydrate at an estimated average rate of production of 2.0 million tonnes per year, with a marketable production rate of 1.5 million tonnes per year. The gypsum and anhydrate products will be transported via trucks to a port facility for shipment to manufacturing facilities either in Canada or the United States. The Project includes construction, operation, and closure activities.

## 1.2 Regulatory Context

The Nova Scotia *Environment Act* and Environmental Assessment Regulations regulate provincial environmental assessments. The proposed Antrim Gypsum Project is a facility that extracts or processes gypsum, therefore, requires a provincial environmental assessment registration as it is considered a *Class I* undertaking under Schedule A of the Nova Scotia Environmental Assessment Regulations.

In Nova Scotia, wetlands are protected under the Activities Designation Regulation of the *Environment Act* and the Wetland Conservation Policy (NSE, 2019). The *Environment Act* defines a wetland as “Land referred to as a marsh, swamp, fen, or bog that either periodically or permanently has water table at, near, or above the land surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly drained soils, hydrophytic vegetation, and biological activities adapted to wet conditions”.

Nova Scotia’s Wetland Conservation Policy (NSE, 2019) applies to all freshwater and certain tidal wetlands with the objectives to prevent net loss of wetland area or function, promote wetland protection and net gain, and enhance impact mitigation efforts. Under this policy and the *Environment Act*, approvals are required to alter wetlands, with certain exceptions (e.g., wetlands with area <100 $m^2$, specific linear developments).

The policy also provides a mechanism for the Province to designate Wetlands of Special Significance (WSS), which may include wetlands known to support at-risk species. Species, and their residences, with legal protection under the federal *Species at Risk Act* (SARA) include those listed as extirpated, endangered,

or threatened. These same protections apply to endangered and threatened species listed under the Nova Scotia *Endangered Species Act* (NSESA). These legally protected species are referred to as Species at Risk (SAR). These legal protections are not afforded to SARA Special Concern and NSESA Vulnerable listed species (e.g., blue felt lichen (*Pectenia plumbea*)). These species are referred to as Species of Conservation Interest (SOCI). Protection for these species may be managed under other policies, such as the *At-risk Lichens – Special Management Practices* (NSDNRR, 2018).

### 1.3 Assessment Spatial Boundaries

The spatial boundaries of the baseline biophysical surveys in support of the EA are defined by the PA depicted in Figure 2 (Appendix A), located three kilometers north of Antrim, and two kilometers west of tLake Egmont within the Halifax Regional Municipality (HRM). The PA is located on a mixture of private (PIDs 40228009, 40960858, 40228017, 40767014, 41152893, and 41517319) and Crown land (PIDs 40212409, 40959975, 40229676, 40212409, 40959983, 40228371, 40228389) and is 602 hectares in total size.

For the purposes of this environmental assessment, a PA was defined as the boundary of the terrestrial assessments related to the EARD.

## 2 BASELINE PROGRAM METHODOLOGY

### 2.1 Desktop Review Methodology

A desktop review of available topographic maps, provincial databases, and aerial photography was completed to aid in the determination and assessment of wetland habitat in the PA. Predicted wetland areas were identified from the NSECC Wetland Inventory Database (NSECC, June 2020); predicted watercourses were identified from the Nova Scotia Topographic Database (NSTDB) watercourse layer (version dated December 18, 2020). The Nova Scotia Wet Areas Mapping (WAM) database (version dated December 2007), the provincial flow accumulation data set (version dated May 2007) and LiDAR data (various dates) was reviewed to identify potential un-mapped wetlands. The predictive WSS layer, provided by NSECC, was consulted for the presence of expected and potential WSS within the PA (NSECC, June 2020).

### 2.2 Field Program Methodology

Following the initial desktop review, wetland field surveys were completed by MEL within the PA from May to August 2022 and from May to September 2023. Wetland delineation and assessment generally took place within the growing season (June 1st to September 30th). Wetlands that were assessed outside of this period were revisited within the growing season to confirm boundaries, functional assessment conclusions and species assemblages. Wetland characteristics can be completed sufficiently during any time of the growing season, however seasonal factors were considered for the identification of priority species and their habitat, and wetland functional assessment. As necessary, targeted species surveys were completed within identified wetland habitat to further support functional assessment. Species assemblages found within wetlands are described in respective Project baseline reports (e.g., Fish and Fish Habitat Baseline Report, Avifauna Baseline Report, etc.).

Targeted wetland surveys were completed within the PA where mapped systems were present to confirm and delineate known wetland habitat. Meandering transects were also completed across the PA to support

efforts to delineate wetlands present within the PA, beyond those identified in the available desktop resources (Section 2.1). Trained wetland delineators and evaluators completed all field surveys. Delineated wetlands that extended outside of the PA were only delineated to the PA boundary. An exception to this includes wetlands with observed uniquely important characteristics or functions (e.g., blue felt lichen observed in a wetland contiguous with the PA). Details related to functional assessment methods for wetlands which extend outside of the PA boundary are described in Section 2.3.

Wetland delineation was conducted in accordance with the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the United States Army Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (United States Army Corps of Engineers, 2012). In each wetland, vegetation, hydrology, and soils data were recorded at both wetland and upland data points on either side of the wetland boundary in accordance with the Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987). Wetland classes were determined using the Canadian Wetland Classification System (Warner and Rubec, 1997).

Wetland boundaries were documented using a handheld Garmin GPS unit, with sub-5 m accuracy. Any inlet and outlet watercourses or other notable features were marked during the delineation processes. All watercourses observed within the boundaries of the wetland were mapped and assessed (see Fish and Fish Habitat Baseline Report). Pink flagging tape was used to mark wetland boundaries in the field. See the Fish and Fish Habitat Baseline Report for more information on watercourse delineation and assessment.

In keeping with the Army Corps of Engineers (Environmental Laboratory, 1987) methodologies for wetland delineation, three criteria are required for a wetland determination to be made:

- Presence of hydrophytic (water loving) vegetation;
- Presence of hydrologic conditions that result in periods of flooding, ponding, or saturation during the growing season; and,
- Presence of hydric soils.

Hydrophytic vegetation is defined as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory, 1987). Hydrophytic vegetation should be the dominant plant type in wetland habitat (Environmental Laboratory, 1987).

Dominant plant species observed at each data point were classified according to their indicator status (probability of occurrence in wetlands) in accordance with the Nova Scotia Wetland Indicator Plant List. Further relevant information was reviewed in Flora of Nova Scotia (Roland 1998) and Nova Scotia Plants (Munro, Newell & Hill 2014).

If the majority (greater than 50%) of the dominant vegetation at a data point is classified as obligate (OBL), facultative wetland (FACW), or facultative (FAC, excluding FAC-), then the location of the data point is

considered dominated by hydrophytic vegetation. Wetland vegetation compositions for wetland classes identified within the PA during field surveys have been described in Section 3.1.

A hydric soil is defined as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (United States Department of Agriculture, 2003). Indicators that a hydric soil is present include soil colour (gleyed soils and soils with bright mottles and/or low matrix chroma), aquic or preaquic moisture regime, reducing soil conditions, sulfidic material (odour), soils listed on the hydric soils list, iron and manganese concretions, organic soils (histosols), histic epipedon, high organic content in surface layer in sandy soils, and organic streaking in sandy soils.

A test pit was completed at each data point. These pits were excavated to a depth of at least 40 cm or refusal. The soil in each pit was then examined for hydric soil indicators. The matrix colour and mottle colour (if present) of the soil were determined using the Munsell Soil Colour Charts.

Wetland habitat, by definition, either periodically or permanently, has a water table at, near, or above the land surface or is saturated with water. To be classified as a wetland, a site should have at least one primary indicator or two secondary indicators of wetland hydrology. Examples of primary indicators of wetland hydrology include watermarks, drift lines, sediment deposition, and water-stained leaves. Examples of secondary indicators of wetland hydrology include oxidized root channels, dry season water table, and stunted or stressed plants. Each area of expected wetland habitat was assessed for signs of wetland hydrology through observations across the area and assessment of soil pits at each data point.

Additionally, wetland mosaics were delineated where necessary. The term “wetland mosaic” is used to describe areas where a watercourse disperses widely into wetland habitat as unconsolidated flow. These features were mapped by walking the outer-most flooded boundary and are discussed as they relate to fish or fish habitat in the Fish and Fish Habitat Biophysical Report.

Further baseline field surveys were conducted throughout the entire PA to assess the suitability of wetland habitat for wetland specific species, especially those considered to be SAR and/or SOCI. All surveys conducted for SAR and SOCI were completed in suitable habitat throughout the PA according to species-specific methodologies, such as, both early and late season botany surveys, avian migration, and breeding waterfowl surveys. Information on these baseline survey methods, including survey locations and timing, and species observed, can be found in the Flora, Fauna, and Habitat Baseline Report and the Avifauna Baseline Report. Priority species were assessed throughout the entire PA, including wetland specific priority species observations and habitat potential, as discussed in Section 3.5.2. It should be noted that, while it was not possible to confirm a species’ absence from the landscape if unobserved, all care was taken to identify the presence of preferred habitat within the PA. Where suitable wetland habitat was observed for SAR, the species was presumed to potentially use this habitat, at least periodically based on seasonal biological requirements, even if presence was not confirmed via observation of that species (or evidence thereof).

## 2.3 Wetland Functional Assessment Methodology

Wetland functional assessments were completed for each wetland within the PA using the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC) wetland evaluation technique. The WESP-AC process involves the completion of three forms; a desktop review portion (office form) that examines the landscape level aerial conditions to which the wetland is situated, and two field forms identifying biophysical characteristics of the wetland (field form) and stressors within the wetland (stressors form), if any. The process serves as a rapid method for assessing individual wetland functions and values. WESP-AC addresses 17 specific functions wetlands may provide (Table 2-1).

The specific wetland functions are individually allocated into grouped wetland functions and measured for "functional" and "benefit" scores. Wetland function relates to what a wetland does naturally (i.e., water storage), whereas wetland benefits are benefits of the function, whether it is ecological, social, or economic. The highest functioning wetlands are those that have both high 'function' and 'benefit' scores for a given function. WESP-AC enables a comparison to be made between individual wetlands within a province to gain a sense of the importance each has in providing ecosystem services.

**Table 2-1: WESP-AC Function Parameters**

| Grouped Wetland Function | Specific Wetland Functions |
|---|---|
| Hydrologic Function | Water Storage and Delay |
| Aquatic Support | Aquatic Invertebrate Habitat |
| | Stream Flow Support |
| | Organic Nutrient Export |
| | Water Cooling |
| Water Quality | Sediment Retention & Stabilization |
| | Phosphorus Retention |
| | Nitrate Removal & Retention |
| | Carbon Sequestration |
| Aquatic Habitat | Anadromous Fish Habitat |
| | Resident Fish Habitat |
| | Waterbird Feeding Habitat |
| | Waterbird Nesting Habitat |
| | Amphibian and Turtle Habitat |
| Terrestrial Habitat | Songbird, Raptor, & Mammal Habitat |
| | Pollinator Habitat |
| | Native Plant Habitat |

In addition to the grouped wetland functions above, WESP-AC also measures the following groups, however, these are only evaluated by their benefit scores:

- Wetland Condition; and
- Wetland Risk (i.e., sensitivity to potential impacts).

The following individual functions are assessed to determine the benefit scores associated with each wetland:

- Public Use & Recognition;
- Wetland Sensitivity;
- Wetland Ecological Condition; and
- Wetland Stressors.

For each wetland evaluated, the WESP-AC process calculates the overall score for the seven grouped wetland functions and the 17 specific wetland functions listed in Table 2-1 above. One score each is provided for function and benefit. Scores are ranked as 'Lower', 'Moderate', or 'Higher', allowing for analysis of the wetland as compared to calibrated baseline wetland scores in Nova Scotia to date. A 'Higher' WESP-AC score means that wetland has a greater capacity to support those processes as compared to other wetlands in the province. A 'Higher' WESP-AC score in both the function and benefits category means the wetland supports the natural ecosystem functions and provides services potentially important to society.

A summary of the WESP-AC results is provided in Appendix B. The raw WESP-AC Excel files can be provided to NSECC upon request.

The WESP-AC functional evaluation technique recognizes that, in many cases, delineation of entire wetlands where they extend beyond a PA is not always feasible (e.g., property ownership) or necessary (Adamus, 2018). Instead, WESP-AC permits the delimitation of an Assessment Area (AA), defined as the wetland or portion of wetland physically assessed in the field, while the office form considers the broader landscape characteristics and functions that extend beyond the AA and/or PA.

## 2.4 Wetlands of Special Significance

The Wetland Conservation Policy was developed by Nova Scotia Environment in 2011 and amended in 2019 (NSE, 2019). Its mandate is to provide a framework for the conservation of wetlands. Furthermore, it provides a framework for the identification of WSS. According to NSECC (2019, p.11-12), the following criteria define WSS:

- All salt marshes;
- Wetlands that are within or partially within a designated Ramsar site, Provincial Wildlife Management Area (Crown and Provincial lands only), Provincial Park, Nature Reserve, Wilderness Areas, or lands owned or legally protected by non-government charitable conservation land trusts;
- Intact or restored wetlands that are project sites under the North American Waterfowl Management Plan and secured for conservation through the NS-EHJV;
- Wetlands known to support at-risk species as designated under the federal Species at Risk Act or the Nova Scotia Endangered Species Act; and,

- Wetlands in designated protected water areas as described within Section 106 of the Environment Act.

To date, NSECC Wetland Specialists have provided guidance that the presence of a sessile or non-mobile (primarily flora) SAR within a delineated wetland triggers the determination of that wetland as a WSS. Mobile species have home ranges that may include wetlands within and beyond the PA, which may be used at various times of the year for specific biological requirements (i.e., breeding season, thermal regulation, foraging). As a result, a WSS designation assessment based on the observation a mobile species considers species-specific and site-specific conditions, including the following factors:

- whether the species was observed within the wetland;
- whether suitable habitat is present within the wetland;
- what is the wetland habitat used for (i.e., does the habitat within the wetland provide necessary life functions (i.e., nesting, or overwintering habitat)); and,
- the discreteness or specificity of habitat use by the mobile species (i.e., wood turtles have specific and discrete nest beach requirements, compared with the in-discrete and non-specific foraging habitat usage by mainland moose, for example).

A framework for determination of WSS designation based on functional benefit using WESP-AC has recently been developed and implemented by NSECC. A Functional WSS Interpretation Tool automatically assesses the subject wetland based on the WESP-AC functional results. The grouped functions in Table 2-1 are used to calculate a "Functional Benefit Product" (FBP). The FBP is categorized into scores of "low", "moderate" and "high". The thresholds for these categories are calibrated by WESP-AC assessments across Nova Scotia. These categories are used to create WSS determination rules. The grouped functions are further combined into "supergroups" for habitat (Aquatic Habitat and Transition Habitat) and support (Hydrologic Support, Water Quality Support and Aquatic Support) functions. The wetland could be designated as a WSS if certain 'high' or combination of 'moderate and 'high' scores are satisfied within these supergroups.

NSECC has also developed a WSS predictive GIS layer (September 2020, pers. comm., Ian Bryson, NSECC Wetland Specialist), which overlays mapped wetlands with protected areas layers, and rare species observations from the Atlantic Canada Conservation Data Centre (ACCDC), among other attributes. According to NSECC, this WSS GIS layer is intended to be used as a planning tool, and its contents should be interpreted as potential WSS. The actual determination of WSS status is based on field verification of the parameters or considerations listed above.

This predictive layer was consulted during the desktop evaluation for wetlands prior to field delineations by MEL. This predictive layer incorporates all ACCDC rare species observations which fall within NSECC mapped wetlands, regardless of the species' ranking or status, positional accuracy of the data points, observation date, and mobility of species. As such, it is used as a predictive tool only to support WSS determination.

At the time of registration, NSECC was in the process of updating their WSS designation criteria. Final WSS designation will be determined by NSECC with guidance from data collected through Project field surveys. The Project Team will continue to engage with NSECC and NSDNRR to discuss WSS designation on a site-specific basis.

# 3 RESULTS

## 3.1 Desktop Results

The NSECC wetland inventory database shows six mapped wetlands within the PA (Figure 3, Appendix A). Four wetlands are identified as swamps, one wetland is a complex with fen and swamp components, the final wetland type within the database is unknown. All NSECC mapped wetlands within the PA are predicted to be throughflow wetlands, based on the NSTDB mapped watercourse layer. The desktop review shows no WSS wetlands within the PA.

## 3.2 Field Survey Results

A total of 79 freshwater wetlands are present within the PA, as shown on Table 3-1 and in Figure 4, Appendix A. A summary of wetlands, including type, area and dominant flow paths are provided in Table 3-1: Wetland Delineation SummaryTable 3-1.

**Table 3-1: Wetland Delineation Summary**

| Wetland ID | Size (ha) | Water Flow Path[1] | Wetland Type |
|---|---|---|---|
| WL1* | 1.9066 | Discontinuous Throughflow | Tree Swamp |
| WL2* | 0.1818 | Isolated | Tree Swamp |
| WL3 | 1.5560 | Continuous Throughflow | Tree Swamp |
| WL4 | 0.2665 | Isolated | Tree Swamp |
| WL5 | 0.0150 | Outflow | Tree Swamp |
| WL6 | 15.6602 | Discontinuous Throughflow | Complex |
| WL7 | 0.0573 | Outflow | Tree Swamp |
| WL8* | 0.1008 | Continuous Throughflow | Tree Swamp |
| WL9* | 1.3125 | Continuous Throughflow | Complex |
| WL10 | 0.0163 | Isolated | Tree Swamp |
| WL11 | 0.0902 | Isolated | Tree Swamp |
| WL12 | 0.7435 | Outflow | Tree Swamp |
| WL13 | 0.3494 | Outflow | Tree Swamp |
| WL14 | 0.0352 | Continuous Throughflow | Tree Swamp |
| WL15 | 0.0337 | Isolated | Tree Swamp |
| WL16 | 0.1850 | Isolated | Tree Swamp |
| WL17 | 0.1145 | Continuous Throughflow | Tree Swamp |
| WL18* | 1.3856 | Outflow | Meadow Swamp |
| WL19 | 0.0367 | Isolated | Tree Swamp |
| WL20 | 1.8501 | Isolated | Tree Swamp |
| WL21 | 0.0247 | Isolated | Tree Swamp |
| WL22 | 0.0124 | Isolated | Tree Swamp |
| WL23 | 1.9988 | Continuous Throughflow | Fen |
| WL24 | 0.1043 | Outflow | Shrub Swamp |
| WL25 | 0.0161 | Isolated | Tree Swamp |
| WL26 | 0.0109 | Isolated | Tree Swamp |

| Wetland ID | Size (ha) | Water Flow Path[1] | Wetland Type |
|---|---|---|---|
| WL27 | 0.0172 | Isolated | Tree Swamp |
| WL28 | 0.0674 | Isolated | Tree Swamp |
| WL29 | 0.0148 | Isolated | Tree Swamp |
| WL30 | 0.0254 | Discontinuous Throughflow | Tree Swamp |
| WL31* | 0.1055 | Continuous Throughflow | Tree Swamp |
| WL32 | 0.0674 | Isolated | Tree Swamp |
| WL33 | 0.9170 | Discontinuous Throughflow | Tree Swamp |
| WL34* | 2.5216 | Outflow | Tree Swamp |
| WL35 | 1.3891 | Discontinuous Throughflow | Tree Swamp |
| WL36 | 0.1766 | Discontinuous Throughflow | Tree Swamp |
| WL37 | 0.0240 | Isolated | Tree Swamp |
| WL38* | 0.0212 | Isolated | Tree Swamp |
| WL39 | 0.0369 | Isolated | Tree Swamp |
| WL40* | 0.1113 | Outflow | Marsh |
| WL41 | 9.7009 | Discontinuous Throughflow | Complex |
| WL42 | 0.0564 | Continuous Throughflow | Tree Swamp |
| WL43 | 0.2334 | Isolated | Tree Swamp |
| WL44 | 1.1555 | Continuous Throughflow | Tree Swamp |
| WL45 | 0.0877 | Isolated | Tree Swamp |
| WL46 | 0.2780 | Isolated | Tree Swamp |
| WL47 | 0.1644 | Inflow | Tree Swamp |
| WL48 | 0.9751 | Isolated | Tree Swamp |
| WL49 | 0.0290 | Outflow | Tree Swamp |
| WL50 | 0.0254 | Isolated | Tree Swamp |
| WL51* | 9.4450 | Continuous Throughflow | Complex |
| WL52 | 0.0567 | Isolated | Tree Swamp |
| WL53 | 0.1655 | Isolated | Tree Swamp |
| WL54* | 0.9992 | Discontinuous Throughflow | Tree Swamp |
| WL55 | 0.0896 | Discontinuous Throughflow | Tree Swamp |
| WL56 | 0.0529 | Isolated | Tree Swamp |
| WL57 | 1.1000 | Isolated | Tree Swamp |
| WL58 | 0.0763 | Isolated | Tree Swamp |
| WL59 | 0.1695 | Inflow | Tree Swamp |
| WL60 | 0.1620 | Outflow | Tree Swamp |
| WL61 | 0.0951 | Isolated | Tree Swamp |
| WL62 | 0.5458 | Continuous Throughflow | Tree Swamp |
| WL63 | 0.0185 | Isolated | Tree Swamp |
| WL64 | 0.1026 | Discontinuous Throughflow | Shrub Swamp |
| WL65 | 1.2821 | Isolated | Shrub Swamp |
| WL66 | 0.2762 | Outflow | Shrub Swamp |
| WL67 | 0.9379 | Continuous Throughflow | Shrub Swamp |
| WL68 | 0.0262 | Isolated | Tree Swamp |
| WL69 | 0.0194 | Isolated | Tree Swamp |
| WL70 | 0.1831 | Isolated | Tree Swamp |
| WL71 | 0.1199 | Isolated | Tree Swamp |
| WL72 | 0.1766 | Continuous Throughflow | Shrub Swamp |
| WL73 | 0.0419 | Isolated | Tree swamp |
| WL74 | 0.0768 | Outflow | Tree swamp |
| WL75 | 0.5077 | Outflow | Shrub swamp |

| Wetland ID | Size (ha) | Water Flow Path[1] | Wetland Type |
|---|---|---|---|
| WL76 | 0.4236 | Isolated | Tree Swamp |
| WL77 | 0.0470 | Isolated | Tree Swamp |
| WL78 | 0.2851 | Isolated | Shrub Swamp |
| WL79 | 0.4124 | Isolated | Tree Swamp |
| Total Ha: | **64.1639** | | |

*Wetland continues beyond the PA boundary.

[1] Indicates connectivity to a regulated watercourse.

In total, the 79 wetlands account for approximately 64.1639 hectares, representing a land cover of 11% of the PA (Figure 4, Appendix A). According to guidance from the US Corps of Engineers wetland delineation manual (Corps of Engineers Wetland Delineation Manual (Environmental Laboratory, 1987), at least 50% vegetation cover must be present to be classified as wetland, as such, habitats lacking vegetation cover in observed low flow periods were described as open water features. It is important to note that areas that meet this open water definition within delineated wetland boundaries have been removed from the calculation of wetland areas. Open water features are discussed specifically relating to watercourses and fish habitat (Fish and Fish Habitat Baseline Report). Delineated wetland mosaics, where a watercourse disperses widely into a wetland as unconsolidated flow, have been included in the calculation of wetland area. Data determination forms describing vegetation cover, soil characteristics and hydrology indicators were collected for each wetland, along with WESP-AC, and adjacent upland habitat. This data is available to support alteration applications in the permitting phase of the Project. A detailed assessment of sub-wetland habitat types (e.g., graminoid, coniferous forest, regenerating/cutover, etc.) are discussed and shown in the Flora, Fauna, and Habitat Baseline Report.

Swamps represent the most abundant wetland class in the PA, accounting for 92% of all wetlands. Swamps identified in the PA are predominantly mixedwood and or coniferous, with few deciduous dominant swamps. Seventy-five percent of swamps had a prominent shrub layer which consisted of black spruce (*Picea mariana),* balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), and tamarack (*Larix laricina*) saplings, as well as woody shrubs such as wild raisin (*Vibernum nudum*), mountain holly (*Ilex mucronatus*) and speckled alder (*Alnus incana*). The majority of swamps delineated within the PA (n= 64) are under one hectare in size, and collectively they account for 77% of the total wetland area. However, this is likely slightly underrepresented, as five wetland complexes contain a swamp component. Fifty-four percent of swamps delineated within the PA are isolated, 24% are in a throughflow position, 16% are in a headwater (outflow) position, and 3% receive surface water inflow but lack a defined outflow.

One fen is present within the PA, accounting for 1% of all wetlands (Table 3-1). Additionally, four wetland complexes contain a fen component. These wetlands either have continuous or discontinuous throughflow watercourses and are dominated by graminoid species such as three-seeded sedge (*Carex trisperma)* and wool grass *(Scirpus cyperinus)*.

Only one marsh is located within the PA and there are no wetland complexes containing marsh characteristics. The marsh is in a headwater (outflow) position. The marsh has a dominant herbaceous cover of swamp candles (*Lysimachia terrestris)*, white meadowsweet (*Spirea alba)* and blue flag iris *(Iris versicolor).*

No bog wetlands were observed within the PA.

**Table 3-2. Summary of Wetland Classes**

| Wetland Type | Area | | | | Relative Abundance | | |
|---|---|---|---|---|---|---|---|
| | Average (ha) | Minimum (ha) | Maximum (ha) | Total (ha) | # of Wetlands | % of all Wetlands | % of all Wetland area |
| Swamp | 0.355 | 0.010 | 2.521 | 25.93 | 73 | 92% | 40% |
| Marsh | 0.111 | 0.111 | 0.111 | 0.111 | 1 | 1% | <1% |
| Fen | 1.998 | 1.998 | 1.998 | 1.998 | 1 | 1% | 3% |
| Complex | 9.030 | 1.312 | 15.66 | 36.12 | 4 | 5% | 56% |

Of the 79 wetlands delineated within the PA, 4 are wetland complexes consisting of multiple wetland types. Within the PA, these complexes are comprised of swamp and fen components (Table 3-3). The largest wetland complex is wetland 6, which is 15 hectares and consists of tree swamp and fen components.

**Table 3-3. Wetland Complex Class Composition**

| Wetland ID | Swamp | Fen |
|---|---|---|
| WL6 | ✓ | ✓ |
| WL9 | ✓ | ✓ |
| WL41 | ✓ | ✓ |
| WL51 | ✓ | ✓ |

All four complexes within the PA contain fen and swamp components and have an associated throughflow watercourse present.

Four wetlands were associated with wetland mosaics: WL1, WL6, WL23, and WL44. These mosaics ranged in size from 175 $m^2$ (WL mosaic F within WL1) to 6,899 $m^2$ (WL mosaic A within WL6). WL6 is associated with four mosaics mostly due to the prevalence of beaver activity. Wetland mosaics are discussed more in the Fish and Fish Habitat Report as they relate to fisheries resources.

Seven wetlands were associated with open water features: WL3, WL6, WL24, WL34, WL35, WL41, and WL43. These features are not included in wetland area calculations and are instead discussed in more detail in the Fish and Fish Habitat Report as they relate to fisheries resources.

## 3.3 Functional Assessment

The following sections summarize the results of the WESP-AC functional assessments for the 79 wetlands within the PA, broken into the Grouped Functions described in Section 2.3. The results are further detailed in the summary tables provided in Appendix B. No functional WSS were identified through the WESP-AC WSS Interpretation Tool. The raw WESP-AC Excel files can be provided to NSECC upon request.

### 3.3.1 Hydrologic Group

The Hydrologic Group evaluates the effectiveness of a wetland to store or delay the downslope movement of surface water. However, the model does not account for wetland size, and in turn, the ability of larger wetlands to store more water than smaller wetlands. Wetlands that have the highest functions within this

group include those that do not have surface water outlets, and instead, are isolated from flowing surface water.

On average, the functions for the Hydrological Group, for all Project wetlands, were Moderate and the benefits were Lower. Wetlands which received Higher function ranks (see Appendix B) are isolated wetlands, typically in a higher topographic position such as Wetlands 15, 25 and 38. Lower function ranks were awarded to wetlands that actively convey water, with outflow and throughflow watercourses (see Appendix B), such as Wetlands 14 and 17. Table 3-1 presents an overview of hydrological connectivity by wetland.

### 3.3.2 Water Quality Group

The Water Quality Group is compiled from four different functions: sediment retention and stabilization; phosphorus retention; nitrate removal; carbon sequestration. The main function of this group is to evaluate the wetland's potential to intercept, retain, and filter sediments, particulates, and organic matter. Similar to the hydrologic group, the wetlands that have the highest functions in this regard include those that do not have a surface water outlet, and instead are isolated from flowing surface water. This model also does not account for wetland size and as such, larger wetlands do not necessarily score higher than small wetlands, although in reality size may factor into this function.

Project wetlands have a Higher function rank, on average, for the Water Quality Group (see Appendix B). The average benefit score is Moderate. The Higher function rank for Water Quality is likely a result of the numerous isolated wetlands within the PA which do not a have a defined outflow and therefore have greater ability to retain and filter particulate and organic matter. These wetland types are commonly hydrologically isolated and/or receiving (inflow) wetlands, such as swamps, which are the dominant wetland class.

### 3.3.3 Aquatic Support Group

The Aquatic Support Group comprises four individual functions: stream flow support; aquatic invertebrate habitat; organic nutrient export; and water cooling. The main function of this group is to determine the wetland's ability to support ecological stream functions that promote habitat health. Wetlands lying adjacent to or containing flowing water score higher than those that do not (i.e. isolated wetlands). In addition, however, headwater wetlands are crucial for supporting stream flow during the dry season by contributing to water flow via groundwater input and storage capacity.

On average, wetlands scored Higher for function and Lower for benefit in this group. The Higher function score is a result of 37% of wetlands containing throughflow or outlet watercourse, as well as open waterbodies, these include Wetlands 3, 8, 9, and 51 (see Appendix B). Wetlands associated with throughflow watercourses in combination with ponded habitat, support a wider variety of microhabitats for invertebrates, and allow for a greater water cooling and organic nutrient export. Aquatic habitat and wetland support are further described in the Fish and Fish Habitat Baseline Report.

### 3.3.4 Aquatic Habitat Group

The Aquatic Habitat Group is compiled from five different functions: anadromous fish habitat, resident fish habitat, amphibian and turtle habitat, waterbird feeding habitat, and waterbird nesting habitat. Wetlands that have the highest functions within this group include those that are adjacent to or contain water features.

The average ranking for Aquatic Habitat function within the PA is Moderate with a Higher benefit function. The Higher function ranking wetlands are those associated with watercourse systems and open water features, such as Wetlands 3, 9, 35 and 24 (see Appendix B). Aquatic habitat and wetland support are further described in Fish and Fish Habitat Baseline Report.

### 3.3.5 Transitional Habitat Group

The Transitional Habitat Group comprises three different functions: songbird, raptor, and mammal habitat, native plant habitat and pollinator habitat. The main function of the collective group is to evaluate the wetland's ability to support healthy habitat for birds, mammals, and native plants.

Due to the location of the PA, many wetlands provide relatively remote, undisturbed and unfragmented habitat, resulting in a Higher average function and benefit rank for Transitional Habitat. A detailed assessment of baseline habitat is provided in the Flora, Fauna, and Habitat Baseline Report.

### 3.3.6 Wetland Condition

Wetland Condition refers to the integrity or health of a wetland as defined by its vegetative composition and richness of native species. Scores are derived from the similarity between the wetlands being evaluated and reference wetlands of the same type and landscape setting (Adamus, 1996).

On average, wetlands within the PA had a Moderate Wetland Condition rank. The wetlands with Moderate to Higher ranks contain a relatively successful level of vegetative community health and species diversity (see Appendix B). This score is reflected in the results of priority species observations within the PA. Many wetlands offer habitat to priority species such as Wetlands 6, 34, and 35, as described in section 3.5.2. More information on terrestrial flora and fauna can be found in the Flora, Fauna, and Habitat Baseline Report. Lower ranked wetlands are typically smaller wetlands associated with historic disturbances such as roads, trails, disturbance, etc., which may be more susceptible to changes in their surroundings.

### 3.3.7 Wetland Risk

Wetland Risk takes sensitivity and stressors into account by averaging the two. Sensitivity is the lack of intrinsic resistance and resilience of the wetland to human or naturally caused stress (Niemi *et al*., 1990). The functional assessment tool uses five metrics to measure sensitivity: abiotic resistance, biotic resistance, site fertility, availability of colonizers, and growth rate. Stress relates to the degree to which the wetland is or has recently been altered by humans in a way that degrades its ecological condition. The model applies four stress groups: hydrologic stress, water quality stress, fragmentation stress, and general disturbance stress. Wetlands that are highly resilient may have Lower risk scores despite their exposure to multiple stressors. Additionally, wetlands exposed to fewer threats, but with low resilience may have Higher risk scores. Wetland resilience is tied to multiple factors, such as size, proximity to natural land cover, and presence of invasive species.

The wetlands in the PA scored Moderate, on average for Wetland Risk (see Appendix B), meaning they are generally exposed to pre-existing stressors and/or may be less resilient and susceptible to change. As discussed above, these scores are likely related to the presence of existing roads, historically forested areas, and associated stressors. Wetlands that scored Lower are assessed to have greater resilience; only wetlands 30, 58, and 69 scored Lower.

### 3.4 Wetland Hydrology

In summary, all water within the PA eventually flows into the Gays River. In the southwestern corner, Watercourse 1 (WC1) flows into Far Brook, which flows north into the South Branch of the Gays River. Wetland hydrology in the western portion of the PA flows into Annand Brook, and then north to the Gays River. Wetland hydrology in the eastern portion of the PA flows directly into the Gays River, a tributary to South Branch Gays River (see Figure 5, Appendix A).

Hydrological flow into Far Brook is predominantly influenced by the headwater wetland, WL1, the throughflow wetland, WL9, and other small tributaries. WC1 has steep slopes on either side once it exits the PA, which likely contributes surface water flow to this system.

The largest wetlands in the PA – WL6 and WL41 – are both fen swamp complexes that contribute to hydrological flow into Annand Brook see (Figure 4, Appendix A). Although water movement through both complexes is discontinuous, water is still moving to the west-northwest via watercourses 3, 11, 12, 40, and other smaller tributaries. Annand Brook also receives flow further downstream from the following outflow and throughflow wetlands: 18, 35, 67 and 72.

Hydrologic flow paths on the eastern side of the PA are directed through watercourses 24, 26, and 56 directly in the Gays River. Wetlands 54 and 62 act as throughflow wetlands; WL60 is a headwater wetland.

In summary, wetland hydrology within the PA is driven by linear water movement in the form of linear wetlands, drainage flow paths, and watercourses. Water on the landscape is moving, which is why there is a lack of any ombrotrophic peatlands. Wetland hydrology is highly connected with wetland type and wetland position on the landscape. Within the PA, three classes of wetland were observed: marsh, fen, swamp, and complexes made up of a combination of these types. Some wetlands include small open water components.

Marshes are mineral wetlands that have little accumulation of organic materials and shallow surface water which fluctuates dramatically (Warner & Rubec, 1997). Marshes receive their water from surrounding catchments such as surface stream inflow, runoff, and storm surges. The hydrology of marshes varies seasonally and can fluctuate from periods of being saturated to semi- permanently flooded (Warner & Rubec, 1997).

Fens are a form of minerotrophic peatland, characterized by surface water and/or groundwater inputs. As a result, fens typically have shallower peat deposits and fluctuating water tables at or just above/below the ground surface (Warner & Rubec, 1997). Fens commonly function as flowthrough wetlands, shuttling surface water or groundwater horizontally across the landscape. Fens are often groundwater discharge areas that also receive surface water inflow from watercourses (Siegel & Glaser, 1987).

Swamps may be classified as peatlands (organic) or mineral wetlands depending on their substrate. Water table fluctuations in swamps are often greater than that of other wetlands, particularly if there is a watercourse connection, such as wetland 8. Isolated swamps are on average drier than most other wetland types, with a water table below the surface for the majority of the year (Warner & Rubec, 1997). Swamps may function as groundwater recharge or discharge systems depending on their position in the landscape and association with other hydrologic features (e.g., watercourses).

## 3.5 Wetlands of Special Significance

As part of the qualitative wetland field assessments, along with a review of the current (June 2020) NSECC predictive WSS layer (pers. comm., Ian Bryson, previous NSECC Wetland Specialist), each wetland was reviewed to assess potential for WSS designation. MEL presents their WSS assessment below, in consideration of the desktop and field assessments, the Wetland Conservation Policy (NSE, 2019) and NSECC guidance received to date. However, this presents proposed WSS designations only and ultimately WSS determination lies with NSECC.

The PA does not interact with any Ramsar sites, Provincial Wildlife Management Areas, Provincial Parks, Nature Reserves, Wilderness Areas, known lands owned or legally protected by non-governmental charitable conservation land trusts, intact or restored wetlands under the North American Waterfowl Management Plan, or protected water areas. No wetlands within the PA are present within any of these above defined areas. The nearest protected area is the Lake Egmont Nature Reserve, approximately 3 km to the east of the PA. Lake Egmont Significant Ecological Area (SES) is located 750 m east of the PA; this area is not legally protected.

### 3.5.1 NSECC Predicted Wetlands of Special Significance

The NSECC predictive WSS layer did not identify any potential WSS wetlands within the PA. The closest WSS is located outside of Cooks Brook, approximately 1.5 kilometres away.

### 3.5.2 Wetlands with Observed SAR

Twelve wetlands within the PA had field observations of threatened or endangered SAR (listed under SARA and/or NSESA), within the wetland boundaries or in close proximity. When a SAR species was observed in close proximity to a wetland, surveyors took extra time to discern if the individual was likely to be utilizing the nearby wetland; this was only the case with wetland reliant avian SAR. Signs that a bird are using the wetland include territorial singing, bringing nest-building materials towards the direction of the wetland, aggression towards the same species, and foraging behavior. Only individuals in close proximity to wetlands and with confirmed wetland usage were carried forward in the consideration of WSS. Of those, 10 wetlands are proposed as potential WSS, as they were found to support habitat for critical life functions of the SAR observed. As a result, they are presented as potential WSS herein and in the EARD (Figure 6, Appendix A).

Table 3-4 below presents the wetland-associated SAR observations and a description of species-specific suitable breeding or dwelling habitat. Suitable habitat does not include broader supporting habitat used by the species for general life functions (such as foraging or movement). Further details are provided in the Flora, Fauna, and Habitat, Fish and Fish Habitat and the Avifauna Biophysical Reports.

**Table 3-4. Summary of Wetlands with Observed SAR**

| Wetland ID | Wetland & Habitat Available | Observed SAR | Suitable Breeding or Dwelling Habitat Present[1] (Y/N) |
|---|---|---|---|
| 1 | Swamp: Mixedwood tree swamp with discontinuous watercourse. Observation made adjacent to watercourse. | Black ash | Y |
| 6 | Complex: Mixedwood treed swamp and fen complex containing watercourse inflow and outflow. Abundant snags throughout, speckled alder is dominant in the shrub layer. | Canada warbler | Y |
| | | Olive-sided flycatcher | Y |
| 23 | Fen: graminoid fen with a watercourse. Snags present throughout. | Common nighthawk | N |
| 24 | Swamp: mixedwood shrub swamp surrounding an open water feature in the middle of wetland. The wood turtle was observed in the open water. No beach along the water's edge. | Wood turtle | N |
| 34 | Swamp: Mixedwood treed swamp with open water feature on southern edge of wetland. Speckled alder is dominant in the shrub layer. | Black ash | Y |
| | | Canada warbler | Y |
| 35 | Swamp: Mixedwood treed swamp with a watercourse and open water feature. Speckled alder is dominant in the shrub layer. | Black ash | Y |
| | | Canada warbler | Y |
| 41 | Complex: Mixedwood treed swamp and fen complex with red maple and snags throughout wetland. Speckled alder present in the shrub layer. | Canada warbler | Y |
| | | Olive-sided flycatcher | Y |
| 43 | Swamp: Hardwood shrub swamp | Black ash | Y |
| 44 | Swamp: Mixedwood treed swamp with red maple and yellow birch present throughout wetland. Speckled alder is dominant in the shrub layer. | Canada Warbler | Y |
| 51 | Complex: Mixedwood treed swamp and fen complex. Speckled alder is dominant in the shrub layer. | Barn swallow | N |
| | | Canada warbler | Y |
| | | Olive-sided flycatcher | Y |
| 67 | Swamp: Mixedwood Treed swamp with speckled alder dominant in the shrub layer. | Black ash | Y |
| | | Canada warbler | Y |
| 72 | Swamp: Shrub swamp with dominant alder | Black ash | Y |

[1] Habitat that supports specific breeding or necessary biological requirements, such as dwellings (e.g., nests, dens, overwintering, hibernacula). This does not include broader supporting habitat used by the species for general life functions (e.g., foraging, movement).

Barn swallows' (*Hirundo rustica,* SARA Threatened, COSEWIC Special Concern, NSESA Endangered, ACCDC S3B) preferred nesting habitat is in human-made structures such as barns, houses, sheds, and bridges. Foraging habitat includes grasslands, farm fields, shores of waterbodies, forest clearings, wetlands, sandy areas, and roadsides (COSEWIC, 2021). Human-occupied areas with nearby aquatic features for foraging flying insects provide optimal habitat for this species (Stewart et al., 2015). Barn swallows build their nests out of mud, so proximity to moist muddy areas is important (Brown and Brown, 2020). The portion of PA located north of Lake Egmont Road has some agricultural land (approximately 12.8 hectares), however there are no human-made structures for barn swallows to build their nests on/in within the PA. The observed barn swallow was seen near this agricultural field during breeding bird surveys. It was thought to be using buildings on adjacent properties that may provide nesting habitat. The PA does not contain suitable nesting habitat for this species.

Black ash (*Fraxinus nigra*, SARA/COSEWIC/NSESA Threatened, ACCDC S1S2) is a broad-leaved deciduous tree typically found in poorly drained swamps within Nova Scotia. Black ash trees were observed within wetlands 1, 34, 35, 43, 67 and 72. Suitable habitat for this species is predominately within shrub or tree swamps in the northern portion of the PA. A total of 100 black ash observations were found (Figure 6, Appendix A). For more information on black ash findings, refer to the Flora, Fauna and Habitat Report.

The Canada warbler's (*Cardellina canadensis*, SARA Threatened, COSEWIC Special Concern, NSESA Endangered, ACCDC S3B) preferred breeding habitat is found in moist streamside forests and forested wetlands. Important habitat features for this species include complex understories with dense shrubs, ferns (e.g., cinnamon fern [*Osmundastrum cinnamomeum*]), and forest floors with extensive hummocks and downed wood (NSDLF, 2021a). Canada warbler observations were made across the PA, mainly in tree swamps or complexes that contain suitable habitat (Figure 6, Appendix A). Wetlands 6, 34, 35, 41, 44, 51 and 67 all had Canada warbler observations. Wetlands 34, 35, and 67 are tree swamps that contain a dense shrub layer of speckled alder and red maple. Wetlands 6, 41, and 51 are wetland complexes and the Canada warbler observations were made in the treed swamp sections of the wetlands, where a dense shrub layer was noted.

Common nighthawks (*Chordeiles minor*, SARA/ COSEWIC Special Concern, NSESA Threatened, ACCDC S3B) use a wide variety of open habitats for nesting and foraging (NSDLF, 2021b). This species nests on the ground in open areas such as bogs, marshes, dunes, pastures, clearcuts and open forests. Nighthawks forage for insects in open areas such as over waterways and waterbodies (EC, 2016a). A common nighthawk was observed within wetland 23 but found to not be using the habitat. Wetland 23 is a tree swamp and does not contain suitable nesting or foraging habitat for this species. Nearby properties with dwellings and other buildings provide suitable nesting habitat for the common nighthawk

Olive-sided flycatchers (*Contopus cooperi*, SARA/COSEWIC Special Concern, NSESA Threatened, ACCDC S3B) are typically found in coniferous forests, and nest near open areas such as open bogs and other wetlands, waterbodies, and cut-blocks, with the presence of tall snags and/or trees that flycatchers use to forage, watch for predators, and advertise territory (NSDLF, 2021c). Wetland complexes consisting of riparian features with coniferous stands and adjacent open wetland, or cutover areas next to wetlands, such as what was observed in wetlands 6, 41 and 51 may provide suitable olive-sided flycatcher breeding habitat. Though these wetlands are considered mixedwood, pockets of coniferous dominated areas were observed along the riparian edges, thus providing suitable nesting habitat for this species. Four observations of olive-sided flycatchers were made within wetland 41, where individuals were heard calling near the edge of the tree swamp complex. Observations were also made in wetlands 6 and 51, where the species was observed in the tree line on the edge of the tree swamp-fen complexes.

Wood turtles (*Glyptemys insculpta*, SARA/COSEWIC/NSESA Threatened, ACCDC S2) are generally found in clear freshwater riparian areas or floodplains. They hibernate in deep pools in well-oxygenated throughflow watercourses. Wood turtles require well-drained gravely or sandy soil on banks of watercourse for nesting (EC, 2016b). One wood turtle was observed basking on a log in the open water feature within wetland 24 (Figure 6, Appendix A). Wetland 24 is a shrub swamp that surrounds a large pond with an outlet; the wetland lacks beaches or banks along the waters edge. WL24 does not contain suitable overwintering or breeding habitat for this species.

All wetlands in Table 3-4 contain observations of sessile (non-mobile) or mobile threatened or endangered SAR. It is anticipated that those with sessile species will be classified as WSS, and as a result are presented as potential WSS herein and in the EARD. All wetlands with confirmed SAR (mobile or sessile) within the wetland area will be reviewed with NSECC. Final WSS designations are made by NSECC.

### 3.6 Summary

This Wetland Report was prepared in anticipation of the submission of an EARD for the Antrim Gypsum Project. The purpose of this report was to describe baseline conditions of wetland habitat within the PA. The report presents details of desktop and field studies conducted and analyses of the resulting data collected. It is anticipated that this information will support the registering of a provincial EARD by understanding the potential project interactions with wetland habitat.

In total, 79 wetlands were identified within the PA. Wetland types consisted of fen, swamp, and marsh, as well as complexes with fen and swamp characteristics. The total wetland area is 64.1639 hectares. The majority of wetlands are swamps (n=73) and make up 92% of all wetlands within the PA. Forty of these swamps can be classified as hydrological isolated and do not have defined surface water connections. The majority of swamps within the PA were under 1 hectare in size.

One fen and one marsh wetland are present within the PA. No bog wetland habitat types were observed. Four wetland complexes were identified, with all of them containing fen and swamp components. All complexes are hydrologically connected via continuous and discontinuous watercourses.

Twelve wetlands contain field observations of threatened or endangered SAR (listed under SARA and/or NSESA); eleven of these are proposed as potential WSS as they were found to support habitat for critical life functions of the species observed. All wetlands with confirmed SAR (mobile or sessile) within the wetland area will be reviewed with NSECC. Final WSS designation will be made by NSECC.

WESP-AC results present that the averaged Grouped function scores for wetlands in the PA range from Moderate to Higher. Benefits averaged Lower in the Hydrologic group and the Aquatic Support group; this may be a result of the relative remoteness of the PA and the fact that these wetlands are not playing a unique role on the landscape. The Transitional Habitat group is the highest functioning group on average, with both function and benefits scoring high. This is likely result of multiple priority species and suitable habitat being observed within the PA. Benefit ranks varied from Lower, Moderate and Higher scores. Overall, moderate to higher function and benefit scores demonstrate that the wetlands within the PA play an important role in supporting the natural ecosystem functions and provide beneficial services to the surrounding area, however, they may not be unique in these functions compared to other wetlands across the landscape. No functional WSS were identified through the WESP-AC assessments.

## 4 LIMITATIONS

The following limitations regarding wetlands data collection and interpretation are acknowledge:

- Wetland delineation. classification and identification of soils, vegetation, wetland types, and general environmental characteristics have been completed by qualified professionals to accepted

industry standards. However, a single assessment may not define the absolute status of wetlands conditions. While wetlands will be further assessed at the permitting stage, conditions and characteristics may change over the lifetime of this Project, either naturally or through non-Project related anthropogenic influences (e.g., climate change). External influencing factors are considered in the Project's EARD.

- GPS coordinates taken in the field using handheld Garmin GPS units have inherent accuracy limitation between 3 to 5 m. Wetland boundaries and observation points identified in this document are based upon these GPS readings and limited by this positional accuracy.

- There is inherent subjectivity in wetland assessments (e.g., % vegetation cover), which may cause discrepancies between assessors. However, all Project assessors are qualified personnel trained in wetland delineation and assessment and thus minor differences should not influence conclusions and analysis based upon the collected information.

- All reasonable assessment programs will involve an inherent risk that some site conditions or characteristics may not be detected during surveys. While multi-faceted and targeted surveys are completed to mitigate this risk, reports and analysis on such investigations will be based on reasonable interpretation from representative field sample points, supporting desktop interpretation and professional judgment.

## 5 CLOSING

This report has been prepared to support the Project's development and to understand wetland presence and function across the PA. This report will support the necessary mitigation sequence to reduce and/or avoid impacts to wetlands or wetland functions where possible through the Project's EARD and future permitting processes.

This report has considered relevant factors and influences pertinent within the scope of the assessment and has completed and provided relevant information in accordance with the methodologies described herein.

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Christina Daffre, BSSc.
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# APPENDIX A. FIGURES

Prepared For:

GHD

# FIGURE 1

## Antrim Gypsum Project

## Project Location

## Antrim, NS

Milford
Shubenacadie River
Hwy 224
Gays River
Hwy 224
Gays River
Lake Egmont
Antrim

- Project Location
- Roads
- Mapped Watercourse (NSTDB)
- Mapped Waterbody (NSTDB)
- Project Area


Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 0.5 1 2 km

1:50,000 Scale when printed @ 11" x 17"

Drawn By: MD
Reviewed By: MJ

Project #: 22-630
Date: 2024-01-22

McCallum Environmental Ltd.

Document Name: 240122_Antrim_ProjectLocation_WL

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4978000

465000 466500 468000 469500 471000 472500 474000 475500 477000 478500 480000 481500

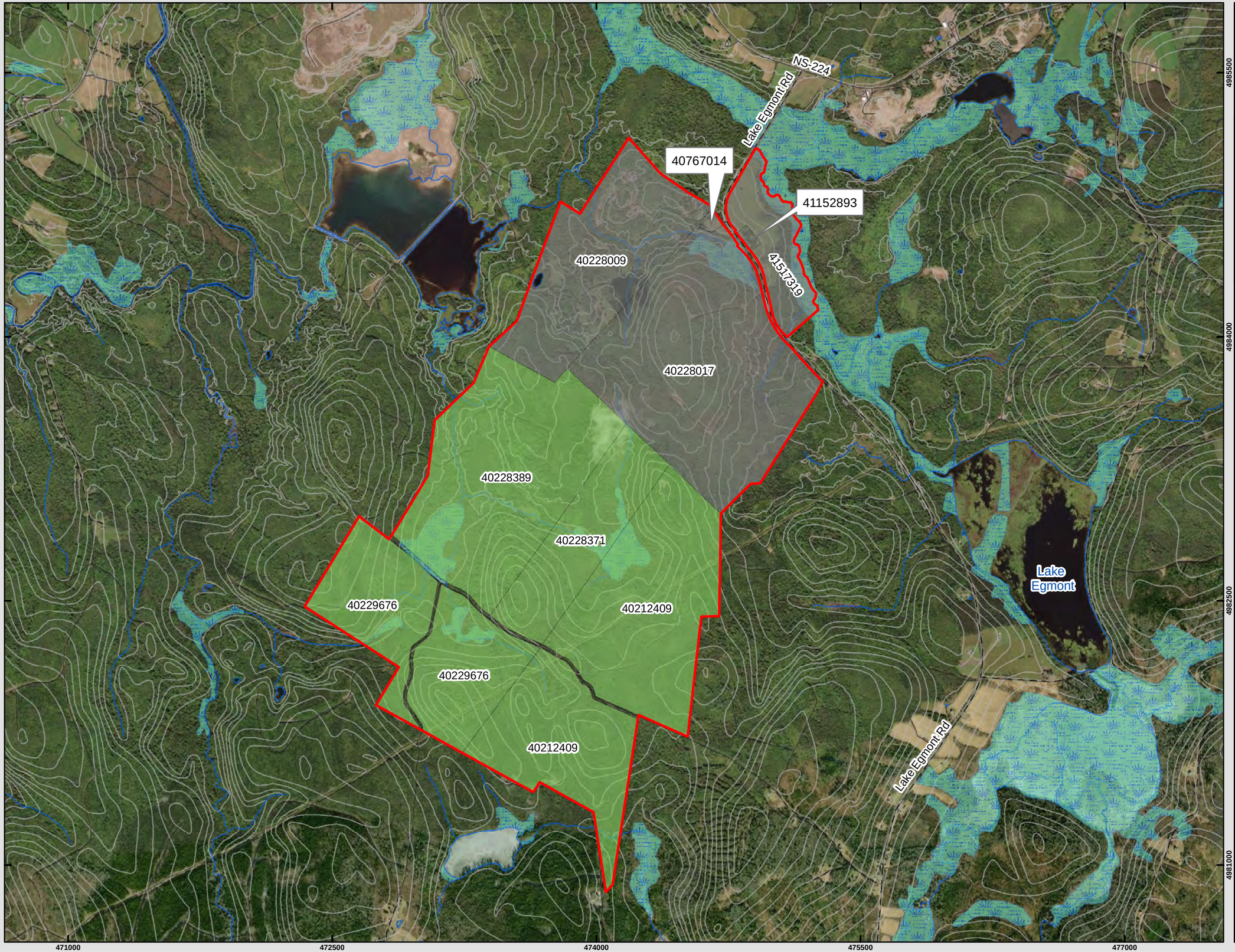


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**FIGURE 2**

**Antrim Gypsum Project**

**Study Areas**

**Antrim, NS**

- Project Location
- Mapped Watercourse (NSTDB)
- Roads
- Crown Land
- Private Land
- NSECC Wetland Inventory
- Project Area


Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 0.25 0.5 1 km

1:20,000 Scale when printed @ 11" x 17"

Drawn By: MD
Reviewed By: MJ

Project #: 22-630
Date: 2024-01-22

McCallum Environmental Ltd.

Document Name: 240122_Antrim_StudyArea_PIDs_WL

Prepared For:

GHD

# FIGURE 3

## Antrim Gypsum Mine Site Sensitivity

## Antrim, NS

Thyme-Leaved Speedwell
Woodland Strawberry
Eastern Wood-Pewee
American Beech
Woodland Strawberry
Eastern Wood-Pewee
Eastern Wood-Pewee
alder-leaved buckthorn
Canada Wood Nettle
Deer-tongue Panic Grass
Round-lobed Hepatica
Deer-tongue Panic Grass
White Elm
Hop Sedge
alder-leaved buckthorn
Triangle Floater
Hop Sedge
Monarch
Common Nighthawk
Dark-green Bulrush
Barn Swallow
Killdeer
Barn Swallow
Bank Swallow
Soil Tarpaper Lichen
Long-eared Owl
Loesel's Twayblade
Turkey Vulture
Common Nighthawk
Barn Swallow
Olive-sided Flycatcher
Barn Swallow
Curly Jellyskin Lichen
Appressed Jellyskin Lichen
Killdeer
Killdeer
Chimney Swift
Blue Vervain
Canada Wood Nettle
Rusty Blackbird
Killdeer
Hop Sedge
Hop Sedge
Olive-sided Flycatcher
alder-leaved buckthorn
Bobolink
Blue Vervain
Woodland Strawberry
Blue Vervain
Woodland Strawberry
Downy Rattlesnake-Plantain
Canada Lily
Eastern Kingbird
Intermediate Mermaidweed
Triangle Floater
Woodland Strawberry
Woodland Strawberry
Nelson's Sparrow
American Bittern
Eastern Wood-Pewee
Lake Egmont SES
Lake Egmont Nature Reserve
American Beech
Snapping Turtle
American Beech

Building (NSTDB)
Vertebrate (ACCDC observation)
Invertebrate (ACCDC observation)
Non-vascular Plant (ACCDC observation)
Vascular Plant (ACCDC observation)
Mapped Watercourses (NSTDB)
Wood Turtle SMP buffer (200 m)
Managed and Significant Areas (ACCDC)
Mapped Wetland (NSECC)
Boreal Felt Lichen Predictive Habitat Polygon
Potential Wetland of Special Significance
Nature Reserve
Crown Land
Project Area

Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 500 1,000 2,000 m

1:35,000

Scale when printed @ 11" x 17"

Drawn By: EH
Reviewed By: EP

Project #: 22-630
Date: 2024-01-16

McCallum Environmental Ltd.

468000 468500 469000 469500 470000 470500 471000 471500 472000 472500 473000 473500 474000 474500 475000 475500 476000 476500 477000 477500 478000 478500 479000 479500

4987500 4987000 4986500 4986000 4985500 4985000 4984500 4984000 4983500 4983000 4982500 4982000 4981500 4981000 4980500 4980000 4979500 4979000 4978500

Document Name: 240110_AntrimSiteSensitivity

Prepared For:

GHD

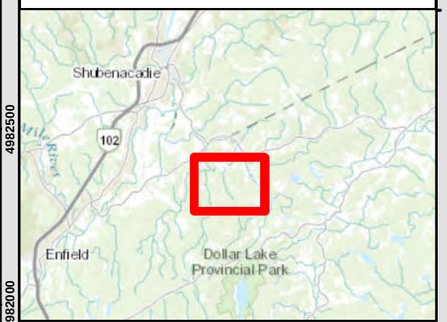
**Figure 4**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 125 250 500 m

1:17,000 Scale when printed @ 11" x 17"

Drawn By: MD
Reviewed By:

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240122_Antrim_WL_WC_Results_Overview

Prepared For:

GHD

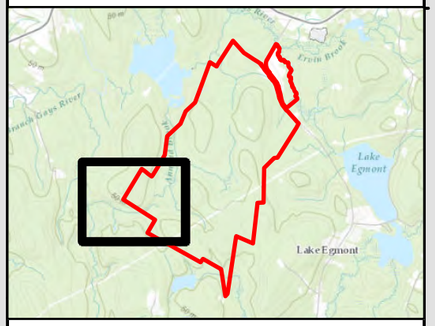
**Figure 4A**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results

472000 472500 473000

4983000 4982500 4982000

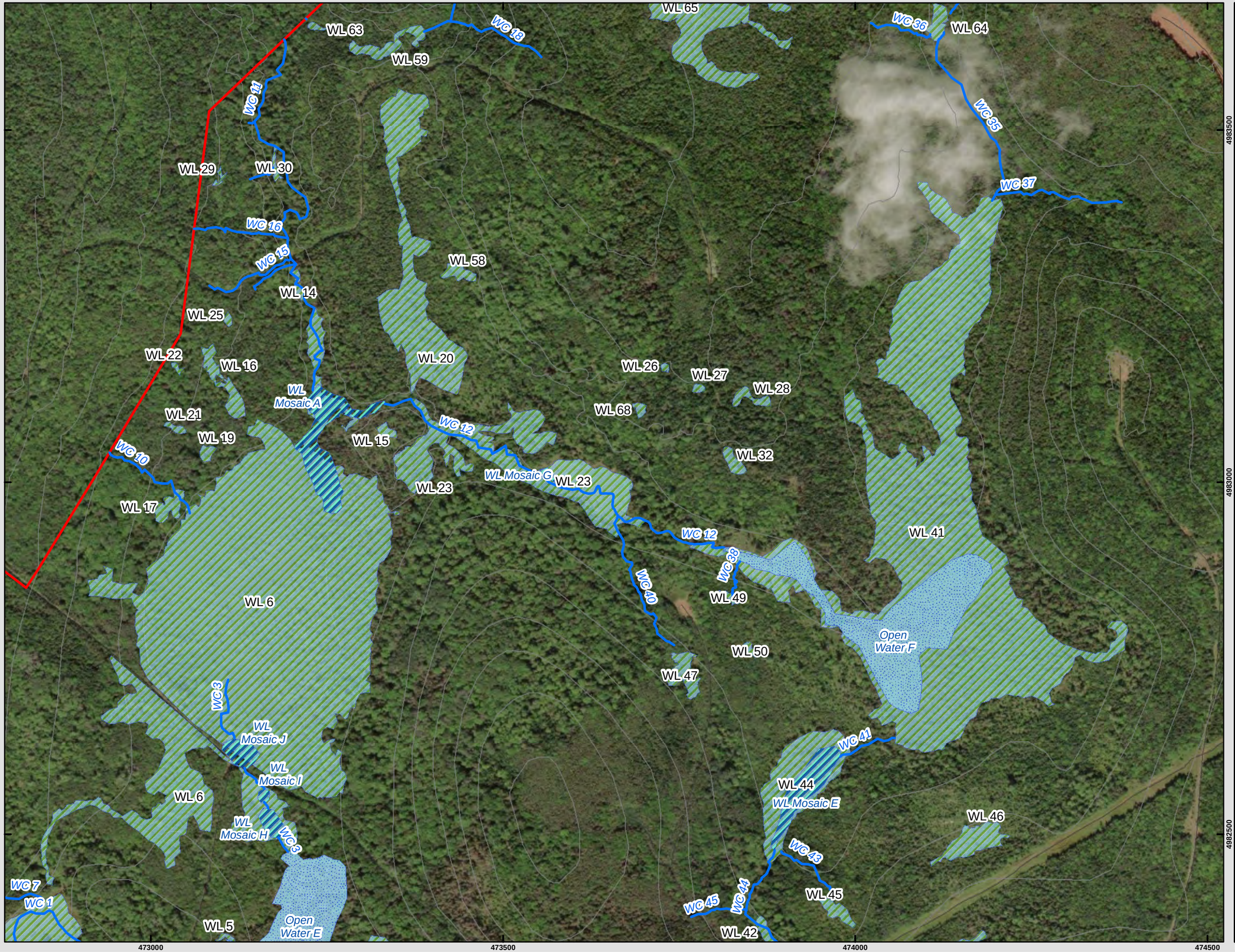



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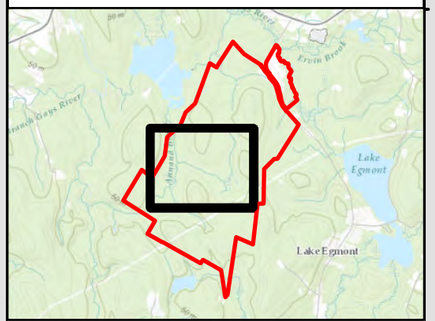
**Figure 4B**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results

Prepared For:

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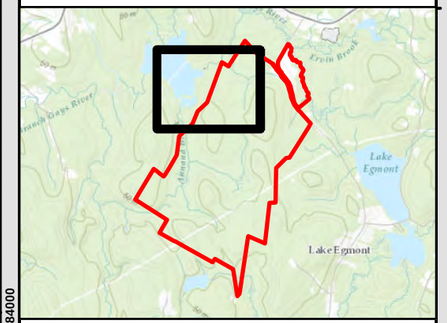
**Figure 4C**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**


- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

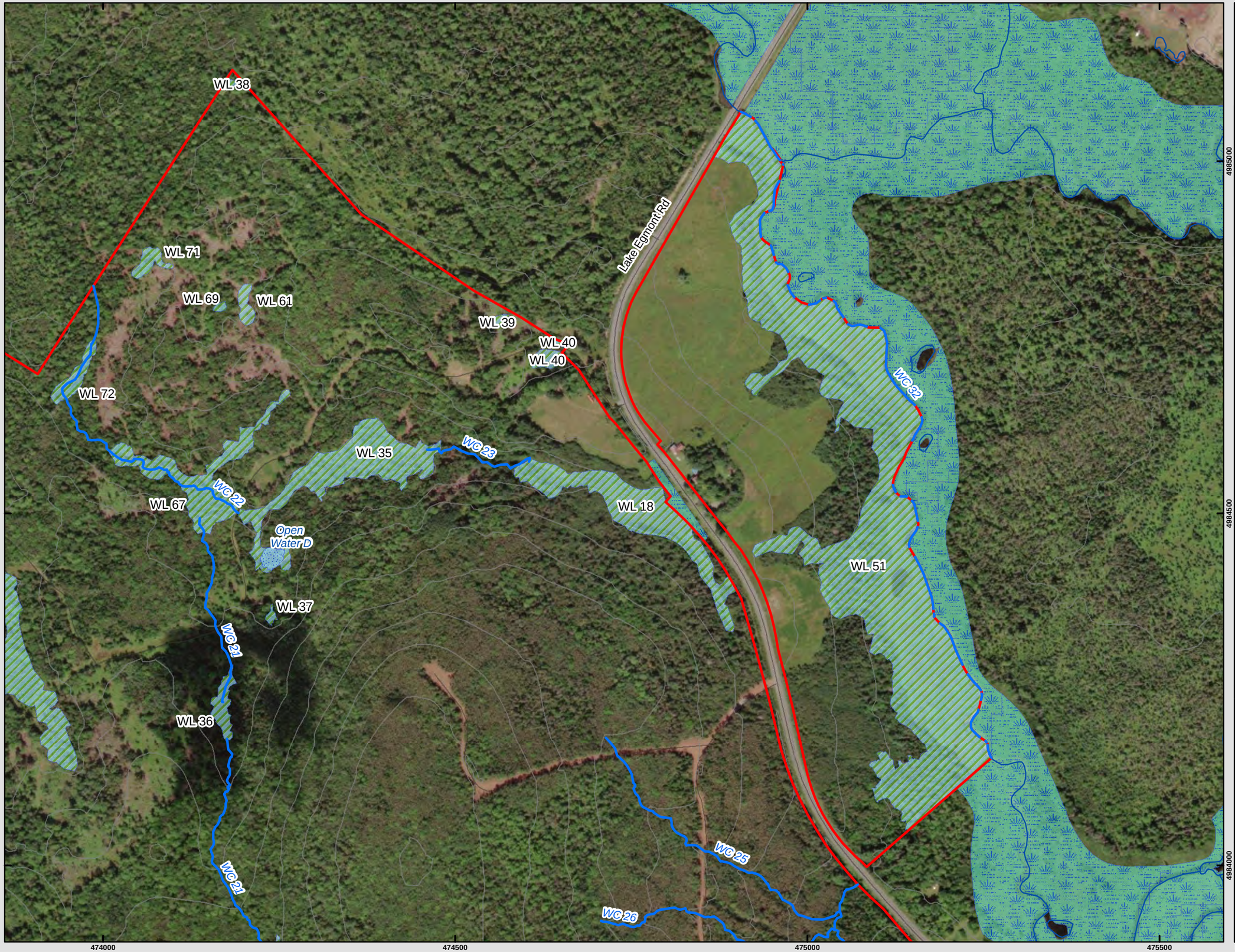
1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By:MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results




Prepared For:

GHD

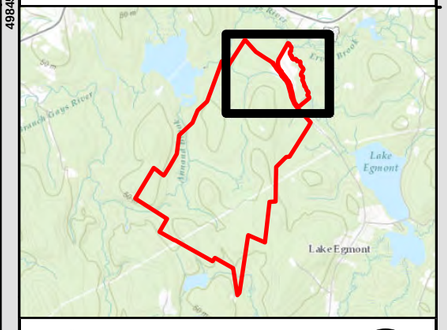
**Figure 4D**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results


Prepared For:

GHD

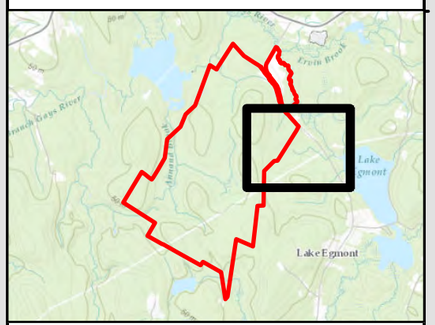
**Figure 4E**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

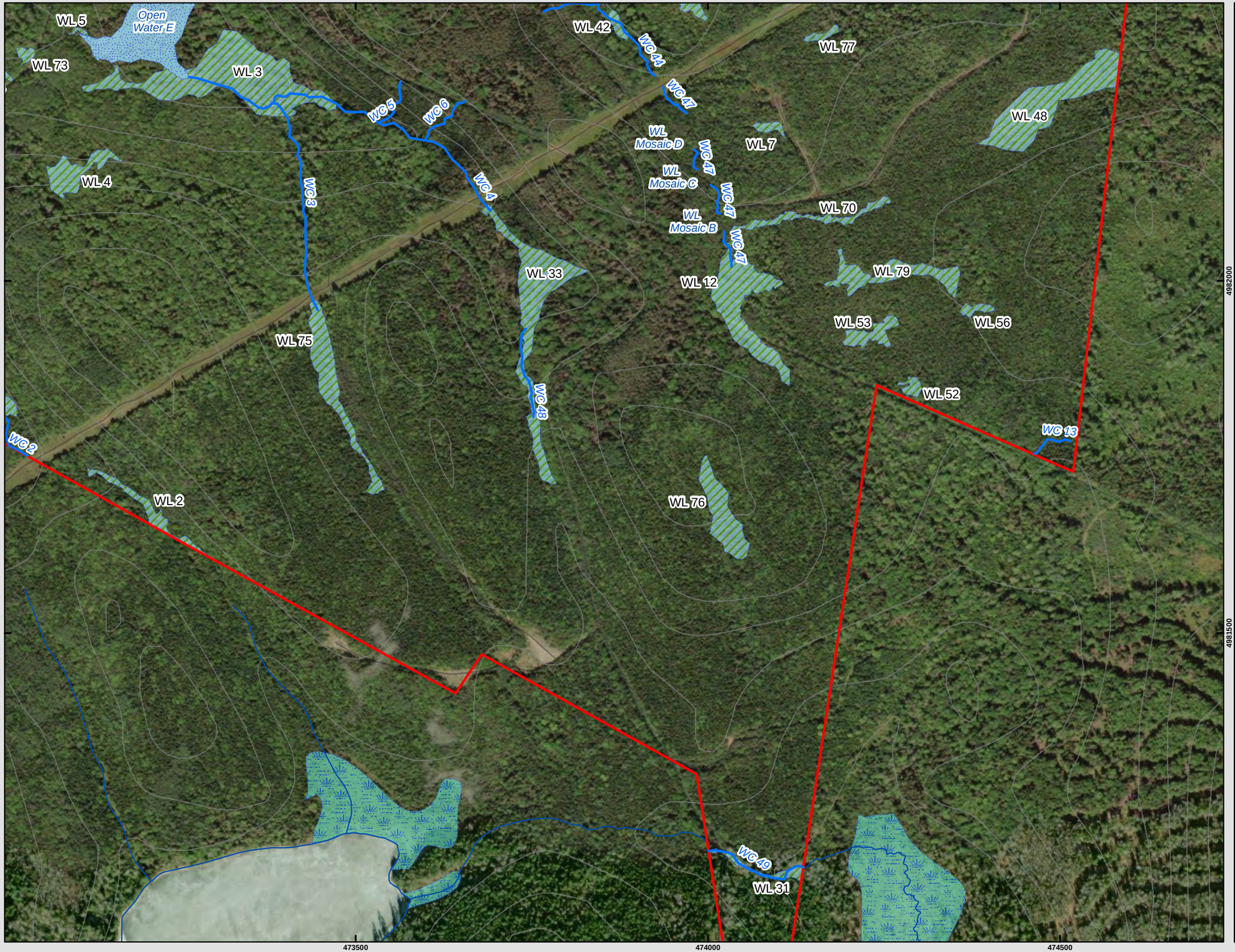
1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results




Prepared For:

GHD

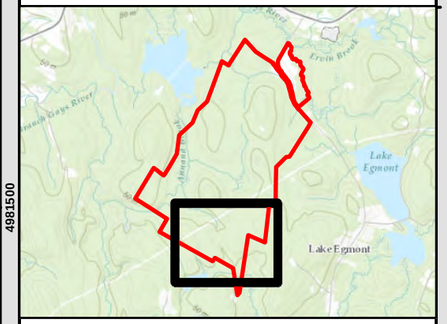
**Figure 4F**

**Antrim Gypsum Project**

**Wetland and Watercourse Field Results**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Open Water
- Wetland Mosaic
- Field Delineated Wetland
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 50 100 200 m

1:5,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_WL_WC_Results

Prepared For:

GHD

**Figure 5**

**Antrim Gypsum Project**

**Desktop Hydrology Review**

**Antrim, NS**

- Roads
- Flow Accumulation
- NSTDB Mapped Watercourse
- NSTDB Wetlands of Special Significance
- NSECC Wetland Inventory
- NSTDB Mapped Waterbody

**Depth to Water Table**

- 0 - 0.10m
- 0.11 - 0.50m
- 0.51 - 2.00m
- Project Area


Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 0.25 0.5 1 km

1:25,000 Scale when printed @ 11" x 17"

Drawn By: EP
Reviewed By: MJ

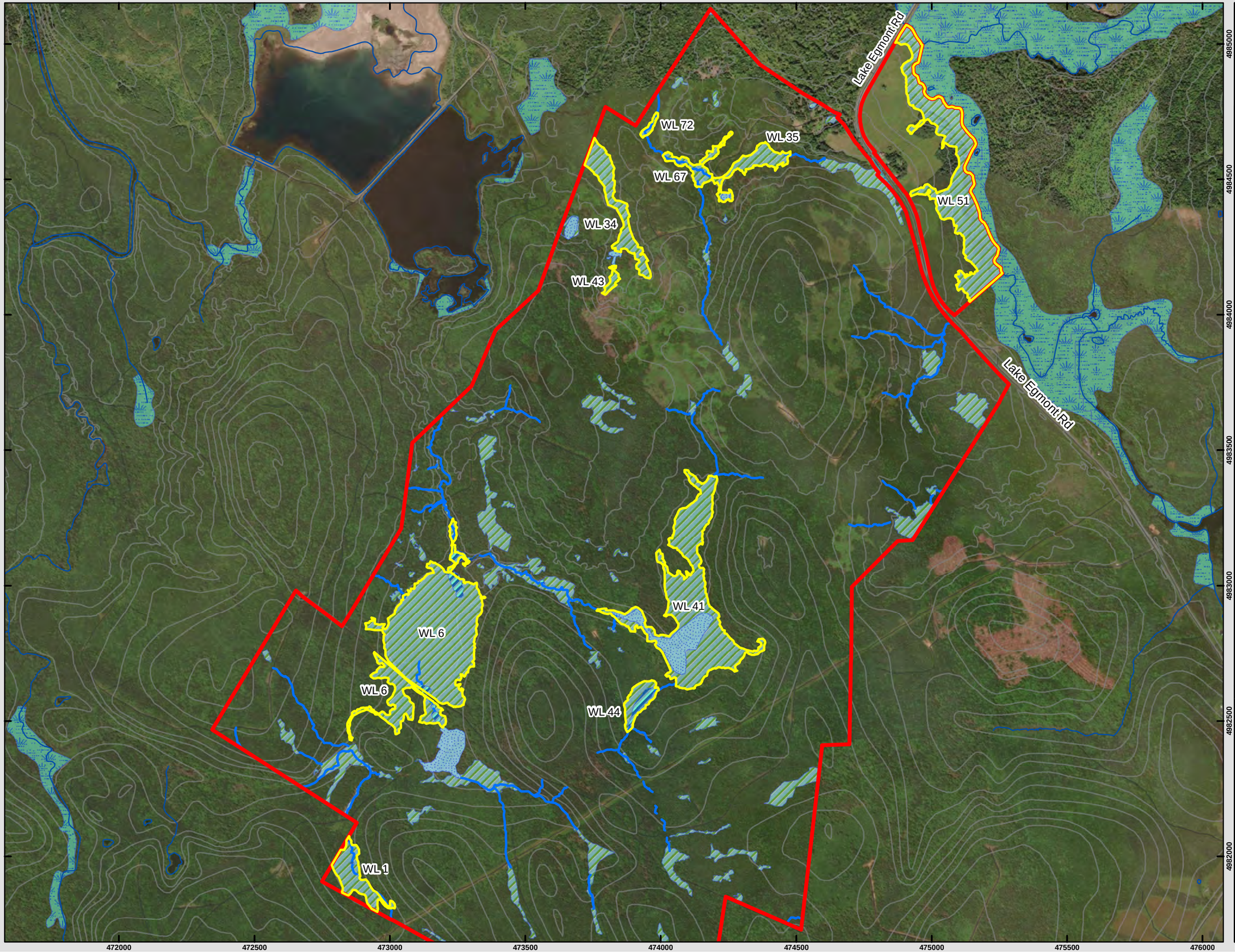
Project #: 22-630
Date: 2024-03-01

McCallum Environmental Ltd.

Document Name: 240117_Antrim_DesktopHydrology

4985500
4984000
4982500
4981000

471000 472500 474000 475500 477000




Prepared For:

GHD

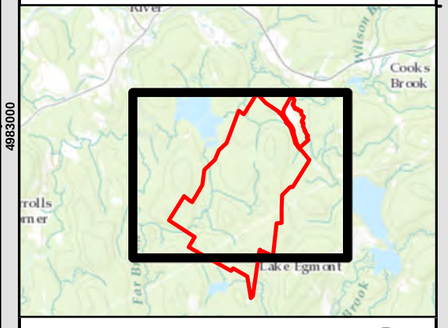
**Figure 6**

**Antrim Gypsum Project**

**Wetlands of Special Significance and SAR Observations**

**Antrim, NS**

- Roads
- NSTDB Mapped Watercourse
- Field Delineated Watercourse
- Potential WSS
- Field Delineated Wetland
- NSECC Wetland Inventory
- Open Water
- Wetland Mosaic
- NSTDB Mapped Waterbody
- Project Area




Coordinate System: NAD 1983 CSRS UTM Zone 20N
Projection: Transverse Mercator
Datum: North American 1983 CSRS
Units: Meter

0 125 250 500 m

1:13,000 Scale when printed @ 11" x 17"

Drawn By: MD
Reviewed By: MJ

Project #: 22-630
Date: 7/12/2024

McCallum Environmental Ltd.

Document Name: 240118_Antrim_WL_WSS

# APPENDIX B. WESP-AC SUMMARY

**Table 1: WESP-AC Results - Grouped Function Scores for All Wetlands in the Project Area**

| WL ID | Hydrological Group | | WATER Quality Group | | AQUATIC SUPPORT Group | | AQUATIC Habitat Group | | TRANSITIONAL Habitat Group | | WETLAND CONDITION | | WETLAND RISK | | Functional WSS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Function | Benefits | Function | Benefits | Function | Benefits | Function | Benefits | Function | Benefits | Benefit Score | Benefit Rating | Benefit Score | Benefit Rating | |
| 1 | 6.52 | 8.29 | 8.13 | 9.4 | 4.16 | 3.47 | 5.40 | 8.00 | 8.14 | 10.00 | 6.52 | Higher | 8.00 | Higher | No |
| 2 | 6.52 | 4.51 | 8.15 | 9.40 | 6.37 | 4.67 | 7.14 | 5.23 | 8.11 | 7.12 | 6.52 | Higher | 7.90 | Higher | No |
| 3 | 1.85 | 1.07 | 3.78 | 9.48 | 8.24 | 7.20 | 8.11 | 8.31 | 8.11 | 9.66 | 10.00 | Higher | 7.20 | Higher | No |
| 4 | 6.19 | 1.47 | 9.16 | 2.20 | 3.41 | 2.73 | 4.46 | 5.22 | 7.72 | 6.98 | 6.52 | Higher | 7.76 | Higher | No |
| 5 | 7.55 | 3.83 | 9.39 | 2.26 | 6.27 | 3.98 | 6.37 | 8.24 | 8.02 | 9.70 | 6.52 | Higher | 7.17 | Higher | No |
| 6 | 1.85 | 0.90 | 4.02 | 9.48 | 8.25 | 7.15 | 8.11 | 8.31 | 7.46 | 10.00 | 10.00 | Higher | 5.57 | Higher | No |
| 7 | 1.94 | 1.58 | 2.81 | 3.75 | 7.86 | 2.60 | 7.86 | 2.60 | 4.01 | 3.04 | 0.00 | Lower | 9.70 | Higher | No |
| 8 | 1.91 | 1.24 | 2.88 | 2.92 | 8.53 | 7.15 | 8.67 | 8.20 | 7.23 | 9.58 | 3.91 | Moderate | 4.75 | Moderate | No |
| 9 | 2.07 | 1.80 | 2.77 | 2.61 | 8.65 | 7.44 | 8.98 | 8.80 | 6.42 | 9.53 | 2.17 | Lower | 4.57 | Moderate | No |
| 10 | 2.27 | 1.24 | 2.19 | 4.30 | 5.93 | 3.19 | 5.58 | 7.63 | 5.90 | 9.54 | 2.17 | Lower | 5.33 | Moderate | No |
| 11 | 6.44 | 0.88 | 9.12 | 2.73 | 4.08 | 3.65 | 5.82 | 8.71 | 7.51 | 10.00 | 8.52 | Higher | 7.84 | Higher | No |
| 12 | 2.33 | 1.35 | 2.81 | 7.28 | 5.25 | 2.95 | 4.81 | 7.60 | 6.06 | 9.54 | 4.78 | Moderate | 6.15 | Moderate | No |
| 13 | 2.17 | 1.64 | 1.60 | 2.76 | 5.33 | 3.14 | 4.41 | 7.65 | 7.50 | 9.69 | 6.52 | Higher | 5.06 | Moderate | No |
| 14 | 0.88 | 1.15 | 1.65 | 9.17 | 4.06 | 5.36 | 6.51 | 9.01 | 8.24 | 10.00 | 0.72 | Lower | 7.34 | Higher | No |
| 15 | 8.92 | 1.80 | 8.55 | 3.08 | 5.54 | 0.32 | 0.22 | 6.00 | 6.82 | 10.00 | 7.39 | Higher | 8.89 | Higher | No |
| 16 | 5.22 | 2.01 | 7.89 | 1.78 | 5.90 | 3.07 | 5.31 | 8.00 | 7.61 | 10.00 | 3.62 | Lower | 7.21 | Higher | No |
| 17 | 0.83 | 1.13 | 1.33 | 6.80 | 4.85 | 2.44 | 3.17 | 8.00 | 7.56 | 10.00 | 8.84 | Higher | 6.15 | Moderate | No |
| 18 | 1.43 | 0.73 | 3.23 | 7.25 | 7.37 | 2.07 | 2.92 | 6.00 | 6.61 | 10.00 | 8.26 | Higher | 6.12 | Moderate | No |
| 19 | 4.99 | 0.49 | 5.97 | 6.85 | 5.25 | 1.33 | 2.85 | 6.00 | 6.33 | 10.00 | 9.44 | Higher | 3.72 | Higher | No |
| 20 | 1.83 | 1.07 | 4.58 | 9.40 | 7.96 | 4.47 | 5.36 | 8.08 | 8.34 | 10.00 | 3.62 | Lower | 6.54 | Moderate | No |
| 21 | 2.50 | 1.96 | 3.62 | 2.01 | 5.91 | 3.81 | 5.06 | 8.00 | 8.22 | 10.00 | 3.62 | Lower | 7.13 | Higher | No |
| 22 | 0.67 | 1.35 | 1.12 | 3.60 | 4.59 | 2.22 | 1.55 | 7.48 | 6.80 | 9.59 | 5.36 | Moderate | 7.15 | Higher | No |
| 23 | 3.19 | 1.00 | 3.93 | 5.25 | 7.97 | 7.09 | 9.13 | 8.76 | 7.31 | 10.00 | 6.53 | Higher | 6.16 | Moderate | No |
| 24 | 3.25 | 1.18 | 4.64 | 2.16 | 7.16 | 3.08 | 6.89 | 8.00 | 2.75 | 2.22 | 2.61 | Lower | 6.21 | Moderate | No |
| 25 | 8.46 | 1.30 | 9.07 | 1.83 | 3.59 | 2.14 | 4.16 | 7.58 | 8.10 | 9.72 | 8.84 | Higher | 5.72 | Moderate | No |
| 26 | 4.62 | 1.90 | 6.59 | 3.14 | 4.86 | 3.82 | 5.03 | 7.69 | 6.30 | 10.00 | 5.56 | Lower | 3.58 | Moderate | No |
| 27 | 3.91 | 1.83 | 6.59 | 2.52 | 4.88 | 3.78 | 5.26 | 7.69 | 6.40 | 9.56 | 6.94 | Lower | 3.63 | Higher | No |
| 28 | 3.69 | 1.73 | 6.18 | 2.52 | 4.37 | 3.66 | 5.13 | 7.73 | 7.09 | 9.68 | 7.78 | Moderate | 3.42 | Moderate | No |
| 29 | 1.61 | 7.22 | 0.32 | 4.01 | 5.04 | 2.75 | 4.19 | 8.00 | 7.42 | 10.00 | 1.59 | Lower | 7.63 | Higher | No |
| 30 | 5.07 | 7.22 | 3.55 | 9.75 | 5.42 | 3.29 | 5.23 | 8.00 | 7.95 | 10.00 | 3.04 | Lower | 4.03 | Lower | No |
| 31 | 1.17 | 1.24 | 3.00 | 7.18 | 7.89 | 5.35 | 7.23 | 8.04 | 7.22 | 9.61 | 3.62 | Lower | 6.62 | Moderate | No |
| 32 | 3.91 | 1.50 | 6.53 | 2.52 | 4.93 | 3.51 | 4.91 | 7.77 | 7.26 | 9.69 | 6.94 | Lower | 3.62 | Higher | No |
| 33 | 0.08 | 1.30 | 2.08 | 5.27 | 8.06 | 4.95 | 6.42 | 8.52 | 8.30 | 10.00 | 7.10 | Higher | 5.96 | Moderate | No |
| 34 | 7.97 | 1.69 | 7.15 | 1.92 | 8.14 | 0.75 | 1.95 | 6.00 | 8.12 | 10.00 | 5.80 | Moderate | 7.86 | Higher | No |
| 35 | 7.33 | 1.64 | 8.10 | 5.21 | 3.86 | 3.90 | 6.48 | 8.64 | 7.00 | 10.00 | 3.04 | Lower | 7.93 | Moderate | No |
| 36 | 3.44 | 0.96 | 3.82 | 9.17 | 6.65 | 2.09 | 1.93 | 6.00 | 7.44 | 10.00 | 8.26 | Higher | 6.08 | Moderate | No |
| 37 | 4.62 | 1.02 | 3.11 | 3.81 | 5.56 | 3.69 | 5.38 | 7.70 | 7.46 | 9.67 | 5.36 | Moderate | 4.81 | Moderate | No |
| 38 | 8.22 | 0.56 | 7.48 | 3.77 | 4.66 | 0.66 | 1.60 | 6.00 | 7.78 | 10.00 | 5.36 | Moderate | 7.21 | Higher | No |
| 39 | 5.12 | 0.96 | 4.31 | 3.77 | 4.45 | 1.81 | 1.32 | 6.00 | 6.61 | 10.00 | 5.36 | Moderate | 6.12 | Moderate | No |
| 40 | 2.30 | 4.06 | 2.67 | 5.27 | 5.19 | 3.98 | 6.95 | 7.92 | 6.80 | 9.53 | 1.30 | Lower | 5.08 | Moderate | No |
| 41 | 1.80 | 1.02 | 3.61 | 9.36 | 7.61 | 4.17 | 5.57 | 7.74 | 9.34 | 10.00 | 5.36 | Moderate | 7.60 | Higher | No |
| 42 | 1.21 | 1.58 | 1.88 | 1.75 | 5.24 | 2.85 | 3.40 | 7.57 | 7.46 | 9.65 | 0.00 | Lower | 7.32 | Higher | No |
| 43 | 1.77 | 1.52 | 3.27 | 2.07 | 8.84 | 2.70 | 3.15 | 6.00 | 7.80 | 10.00 | 2.32 | Lower | 0.60 | Moderate | No |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 44 | 8.86 | 1.35 | 7.94 | 7.61 | 7.60 | 0.00 | 0.18 | 2.16 | 5.74 | 9.44 | 5.65 | Moderate | 9.62 | Higher | No |
| 45 | 6.52 | 1.35 | 9.17 | 2.20 | 4.09 | 3.11 | 4.64 | 8.24 | 9.71 | 9.71 | 6.52 | Higher | 7.56 | higher | No |
| 46 | 6.35 | 1.35 | 9.16 | 2.76 | 3.79 | 2.66 | 4.41 | 7.68 | 7.63 | 9.69 | 6.52 | Higher | 6.78 | Higher | No |
| 47 | 5.68 | 1.35 | 8.88 | 3.88 | 7.08 | 1.98 | 3.32 | 7.61 | 8.18 | 9.70 | 5.36 | Moderate | 7.82 | Higher | No |
| 48 | 8.36 | 1.86 | 8.18 | 2.66 | 5.84 | 0.59 | 1.55 | 2.56 | 6.39 | 9.52 | 8.26 | Higher | 6.58 | Moderate | No |
| 49 | 6.06 | 1.07 | 9.32 | 5.27 | 4.97 | 2.48 | 4.05 | 7.66 | 7.91 | 9.71 | 1.01 | Lower | 7.14 | Higher | No |
| 50 | 6.06 | 4.00 | 9.32 | 5.90 | 4.93 | 2.44 | 3.90 | 7.65 | 7.91 | 9.71 | 1.01 | Lower | 7.03 | Higher | No |
| 51 | 1.85 | 10.00 | 7.29 | 9.58 | 8.21 | 9.44 | 6.88 | 7.98 | 8.46 | 9.69 | 10.00 | Higher | 7.50 | Higher | No |
| 52 | 7.60 | 1.86 | 7.99 | 2.66 | 4.38 | 0.60 | 1.63 | 2.56 | 7.57 | 9.61 | 3.62 | Lower | 5.42 | Moderate | No |
| 53 | 7.60 | 1.86 | 8.05 | 2.66 | 4.96 | 0.65 | 1.63 | 2.62 | 6.38 | 9.51 | 4.78 | Moderate | 7.03 | Higher | No |
| 54 | 8.44 | 0.85 | 8.23 | 3.98 | 4.93 | 0.54 | 1.60 | 2.50 | 5.77 | 9.46 | 3.04 | Lower | 7.86 | Higher | No |
| 55 | 8.36 | 0.73 | 7.95 | 2.66 | 4.56 | 0.65 | 1.77 | 2.58 | 6.37 | 9.51 | 1.88 | Lower | 7.21 | Higher | No |
| 56 | 8.08 | 1.86 | 7.90 | 2.66 | 4.39 | 0.53 | 1.34 | 2.54 | 7.24 | 9.58 | 1.88 | Lower | 7.21 | Higher | No |
| 57 | 8.75 | 3.83 | 8.04 | 3.71 | 6.24 | 0.44 | 1.55 | 2.39 | 7.00 | 9.56 | 10.00 | Higher | 8.00 | Higher | No |
| 58 | 4.05 | 1.03 | 4.38 | 1.94 | 5.45 | 3.59 | 4.97 | 7.68 | 7.95 | 9.71 | 3.62 | Lower | 3.86 | Lower | No |
| 59 | 1.00 | 0.73 | 3.44 | 1.96 | 6.17 | 5.18 | 5.87 | 8.56 | 7.56 | 10.00 | 3.62 | Lower | 7.00 | Higher | No |
| 60 | 3.28 | 3.67 | 4.66 | 5.51 | 5.83 | 1.88 | 1.54 | 2.58 | 6.18 | 9.49 | 3.04 | Lower | 4.81 | Moderate | No |
| 61 | 3.17 | 0.00 | 2.58 | 2.70 | 7.60 | 3.74 | 6.04 | 7.71 | 7.71 | 10.00 | 7.10 | Higher | 6.05 | Moderate | No |
| 62 | 5.01 | 3.78 | 6.26 | 3.70 | 5.38 | 2.00 | 1.67 | 2.59 | 6.33 | 9.52 | 4.78 | Moderate | 7.08 | Higher | No |
| 63 | 0.88 | 1.35 | 2.82 | 1.78 | 5.87 | 5.47 | 6.12 | 8.60 | 8.10 | 10.00 | 7.10 | Higher | 5.93 | Moderate | No |
| 64 | 4.03 | 1.64 | 4.27 | 2.66 | 4.51 | 2.52 | 1.66 | 2.60 | 6.64 | 9.55 | 4.78 | Moderate | 5.08 | Moderate | No |
| 65 | 2.48 | 1.52 | 3.30 | 1.88 | 7.16 | 3.63 | 4.79 | 7.66 | 8.52 | 9.74 | 7.10 | Higher | 6.10 | Moderate | No |
| 66 | 7.72 | 1.64 | 7.48 | 5.44 | 4.28 | 0.45 | 1.33 | 2.45 | 5.47 | 9.46 | 3.04 | Lower | 6.10 | Moderate | No |
| 67 | 0.86 | 0.85 | 3.20 | 1.96 | 6.31 | 3.50 | 4.96 | 7.67 | 8.43 | 10.00 | 7.10 | Higher | 6.56 | Moderate | No |
| 68 | 8.08 | 1.86 | 7.97 | 3.77 | 5.61 | 0.60 | 2.85 | 1.08 | 4.90 | 3.84 | 3.04 | Lower | 5.25 | Moderate | No |
| 69 | 2.60 | 0.00 | 3.53 | 0.95 | 6.69 | 3.61 | 5.27 | 7.69 | 7.48 | 10.00 | 6.52 | Higher | 4.10 | Lower | No |
| 70 | 8.08 | 1.86 | 7.97 | 2.66 | 4.67 | 0.56 | 1.53 | 2.53 | 6.15 | 9.51 | 3.04 | Lower | 7.29 | Higher | No |
| 71 | 3.42 | 0.73 | 3.18 | 2.05 | 5.89 | 3.85 | 6.78 | 7.65 | 6.54 | 10.00 | 5.36 | Moderate | 4.56 | Moderate | No |
| 72 | 2.49 | 0.73 | 2.89 | 2.05 | 6.29 | 3.38 | 5.11 | 7.64 | 7.98 | 10.00 | 5.94 | Moderate | 5.93 | Moderate | No |
| 73 | 6.03 | 1.13 | 9.45 | 2.94 | 3.76 | 1.92 | 3.63 | 8.00 | 6.95 | 10.00 | 3.04 | Lower | 7.04 | higher | No |
| 74 | 6.03 | 1.13 | 9.45 | 2.94 | 3.76 | 1.92 | 3.63 | 8.00 | 6.95 | 10.00 | 3.04 | Lower | 7.04 | higher | No |
| 75 | 5.63 | 1.30 | 9.45 | 1.75 | 2.95 | 2.14 | 3.92 | 8.00 | 7.15 | 10.00 | 3.04 | Lower | 6.79 | higher | No |
| 76 | 4.31 | 1.69 | 5.15 | 1.78 | 6.64 | 2.38 | 0.67 | 6.00 | 7.24 | 10.00 | 4.78 | Moderate | 5.79 | Moderate | No |
| 77 | 8.22 | 1.52 | 8.09 | 2.66 | 5.00 | 0.33 | 0.31 | 2.52 | 5.96 | 9.50 | 3.04 | Lower | 6.78 | Higher | No |
| 78 | 7.88 | 1.52 | 7.84 | 1.96 | 4.71 | 0.59 | 2.72 | 6.00 | 7.11 | 10.00 | 5.36 | Moderate | 7.15 | higher | No |
| 79 | 8.22 | 1.86 | 7.56 | 2.66 | 4.56 | 0.64 | 1.71 | 2.58 | 6.37 | 9.51 | 1.88 | Lower | 7.21 | Higher | No |
| **Average Score** | 4.58 | 1.88 | 5.63 | 4.13 | 5.74 | 2.97 | 4.25 | 6.47 | 7.17 | 9.46 | 5.02 | - | 6.34 | - | |
| **Average Rating*** | Moderate | Lower | Higher | Moderate | Higher | Lower | Moderate | Higher | Higher | Higher | Moderate | - | Moderate | - | |

**Table 2: WESP-AC Results - Specific Function Scores for All Wetlands within the Project Area**

| Wetland ID | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score |
| Water Storage & Delay (WS) | 6.52 | 8.29 | 6.52 | 4.51 | 1.85 | 1.07 | 6.19 | 1.47 | 7.55 | 3.83 | 1.85 | 0.90 | 1.94 | 1.58 | 1.91 | 1.24 |
| Stream Flow Support (SFS) | 0.71 | 0.00 | 1.40 | 3.99 | 6.97 | 5.44 | 0.00 | 0.00 | 0.00 | 0.00 | 6.97 | 5.23 | 5.38 | 3.27 | 8.90 | 5.93 |
| Water Cooling (WC) | 1.00 | 0.00 | 1.00 | 0.00 | 5.17 | 5.97 | 0.50 | 0.00 | 4.63 | 0.00 | 5.17 | 5.92 | 5.38 | 0.36 | 8.08 | 6.22 |
| Sediment & Toxicant Retention & Stabilization (SR) | 10.00 | 10.00 | 10.00 | 10.00 | 2.56 | 10.00 | 10.00 | 0.89 | 10.00 | 1.40 | 2.56 | 10.00 | 1.76 | 1.54 | 3.00 | 1.64 |
| Phosphorus Retention (PR) | 1.62 | 6.43 | 2.10 | 6.43 | 0.21 | 6.86 | 10.00 | 0.98 | 10.00 | 1.07 | 1.58 | 6.86 | 0.80 | 2.95 | 0.33 | 1.88 |
| Nitrate Removal & Retention (NR) | 10.00 | 10.00 | 10.00 | 10.00 | 3.07 | 10.00 | 10.00 | 2.83 | 10.00 | 2.78 | 2.76 | 10.00 | 1.76 | 4.50 | 3.74 | 3.50 |
| Carbon Sequestration (CS) | 3.42 | NA | 3.09 | NA | 4.89 | NA | 3.26 | NA | 5.11 | NA | 5.04 | NA | 3.62 | NA | 1.01 | NA |
| Organic Nutrient Export (OE) | 5.62 | NA | 6.39 | NA | 9.55 | NA | 4.95 | NA | 7.02 | NA | 9.55 | NA | 9.86 | NA | 9.09 | NA |
| Anadromous Fish Habitat (FA) | 0.00 | 0.00 | 0.00 | 0.00 | 8.94 | 3.28 | 0.00 | 0.00 | 0.00 | 0.00 | 8.96 | 3.28 | 0.00 | 0.00 | 9.01 | 3.14 |
| Resident & Other Fish Habitat (FR) | 3.27 | 2.90 | 0.00 | 0.00 | 7.79 | 3.01 | 0.00 | 0.00 | 3.40 | 2.38 | 7.79 | 3.01 | 0.00 | 0.00 | 9.79 | 2.87 |
| Aquatic Invertebrate Habitat (INV) | 3.50 | 5.21 | 8.43 | 6.01 | 5.99 | 7.94 | 2.02 | 4.10 | 7.70 | 5.97 | 6.13 | 7.94 | 2.82 | 2.16 | 5.79 | 7.69 |
| Amphibian & Turtle Habitat (AM) | 6.11 | 7.06 | 10.00 | 5.63 | 6.08 | 6.79 | 5.11 | 5.51 | 5.88 | 10.00 | 6.05 | 6.78 | 6.68 | 5.07 | 6.03 | 6.02 |
| Waterbird Feeding Habitat (WBF) | 6.65 | 10.00 | 6.38 | 6.67 | 7.09 | 10.00 | 5.96 | 6.67 | 7.12 | 10.00 | 7.09 | 10.00 | 0.00 | 0.00 | 6.53 | 10.00 |
| Waterbird Nesting Habitat (WBN) | 4.78 | 10.00 | 5.01 | 6.67 | 6.44 | 10.00 | 3.66 | 6.67 | 7.88 | 10.00 | 6.48 | 10.00 | 0.00 | 0.00 | 6.41 | 10.00 |
| Songbird, Raptor, & Mammal Habitat (SBM) | 8.82 | 10.00 | 8.81 | 6.67 | 7.65 | 10.00 | 8.85 | 6.67 | 8.70 | 10.00 | 7.63 | 10.00 | 8.98 | 10.00 | 5.98 | 10.00 |
| Pollinator Habitat (POL) | 9.35 | 10.00 | 9.29 | 6.67 | 8.67 | 10.00 | 8.50 | 6.67 | 8.55 | 10.00 | 7.63 | 10.00 | 8.33 | 10.00 | 8.63 | 10.00 |
| Native Plant Habitat (PH) | 2.63 | 10.00 | 2.66 | 7.35 | 6.35 | 7.95 | 2.44 | 7.14 | 4.80 | 8.22 | 6.59 | 10.00 | 2.24 | 8.24 | 2.87 | 7.45 |
| Public Use & Recognition (PU) | NA | 0.51 | NA | 2.13 | NA | 0.51 | NA | 0.51 | NA | 0.91 | NA | 0.51 | NA | 0.68 | NA | 0.51 |
| Wetland Sensitivity (Sens) | NA | 10.00 | NA | 10.00 | NA | 10.00 | NA | 9.81 | NA | 9.92 | NA | 6.74 | NA | 10.00 | NA | 3.79 |
| Wetland Ecological Condition (EC) | NA | 6.52 | NA | 6.52 | NA | 10.00 | NA | 6.52 | NA | 6.52 | NA | 10.00 | NA | 0.00 | NA | 3.91 |
| Wetland Stressors (STR) (higher score means more) | NA | 6.00 | NA | 5.79 | NA | 4.40 | NA | 5.71 | NA | 4.42 | NA | 4.40 | NA | 9.40 | NA | 5.71 |
| **Average Function/Benefit** | 4.94 | 6.50 | 5.36 | 5.51 | 5.84 | 7.16 | 4.79 | 3.69 | 6.37 | 5.17 | 5.87 | 7.07 | 3.50 | 3.35 | 5.71 | 5.32 |

| 9 | | 10 | | 11 | | 12 | | 13 | | 14 | | 15 | | 16 | | 17 | | 18 | | 19 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score |
| 2.07 | 1.80 | 2.27 | 1.24 | 6.44 | 0.88 | 2.33 | 1.35 | 2.17 | 1.64 | 0.88 | 1.15 | 8.92 | 1.80 | 5.22 | 2.01 | 0.83 | 1.13 | 1.43 | 0.73 | 4.09 | 1.10 |
| 9.24 | 5.42 | 2.28 | 2.79 | 0.00 | 0.00 | 1.24 | 3.04 | 1.24 | 3.35 | 2.00 | 4.16 | 0.97 | 0.00 | 0.55 | 0.00 | 1.52 | 2.68 | 3.52 | 2.82 | 1.17 | 0.00 |
| 9.00 | 6.25 | 4.46 | 0.15 | 1.63 | 0.00 | 2.13 | 0.16 | 1.50 | 0.19 | 2.38 | 1.72 | 0.00 | 0.00 | 3.60 | 0.00 | 2.40 | 0.75 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3.42 | 2.04 | 0.70 | 2.36 | 10.00 | 1.05 | 1.04 | 1.80 | 0.56 | 1.23 | 0.00 | 7.71 | 6.44 | 1.61 | 10.00 | 0.91 | 0.01 | 0.38 | 4.30 | 1.80 | 4.73 | 0.91 |
| 0.88 | 1.61 | 0.70 | 2.77 | 10.00 | 1.34 | 1.66 | 1.88 | 1.50 | 1.34 | 0.00 | 7.29 | 3.52 | 1.52 | 0.84 | 0.86 | 1.78 | 0.43 | 0.53 | 1.70 | 2.11 | 0.86 |
| 3.10 | 3.00 | 3.05 | 5.17 | 10.00 | 3.50 | 3.78 | 10.00 | 1.93 | 3.50 | 2.32 | 10.00 | 10.00 | 3.83 | 10.00 | 2.22 | 1.75 | 10.00 | 2.45 | 10.00 | 3.35 | 10.00 |
| 1.10 | NA | 0.87 | NA | 2.96 | NA | 0.89 | NA | 1.10 | NA | 1.64 | NA | 8.41 | NA | 2.28 | NA | 0.00 | NA | 1.31 | NA | 2.39 | NA |
| 9.05 | NA | 7.63 | NA | 5.47 | NA | 7.02 | NA | 7.41 | NA | 5.25 | NA | 7.42 | NA | 7.57 | NA | 6.37 | NA | 8.25 | NA | 7.70 | NA |
| 8.94 | 4.13 | 0.00 | 0.00 | 1.78 | 5.04 | 0.00 | 0.00 | 0.00 | 0.00 | 6.15 | 5.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 3.88 | 0.00 | 0.00 | 2.35 | 4.96 | 0.00 | 0.00 | 0.00 | 0.00 | 4.11 | 5.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.91 | 8.24 | 2.59 | 4.04 | 3.69 | 5.47 | 3.50 | 3.63 | 2.86 | 3.83 | 1.82 | 6.57 | 6.28 | 0.48 | 5.18 | 4.60 | 2.99 | 2.80 | 9.43 | 1.14 | 9.10 | 1.10 |
| 5.59 | 10.00 | 7.64 | 6.27 | 6.13 | 7.12 | 6.52 | 6.02 | 5.95 | 6.46 | 5.22 | 10.00 | 0.37 | 10.00 | 5.48 | 10.00 | 1.53 | 10.00 | 4.86 | 10.00 | 3.09 | 10.00 |
| 8.01 | 10.00 | 6.36 | 10.00 | 7.19 | 10.00 | 5.51 | 10.00 | 5.15 | 10.00 | 7.50 | 10.00 | 0.00 | 0.00 | 7.16 | 10.00 | 4.32 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7.28 | 10.00 | 3.62 | 10.00 | 4.81 | 10.00 | 3.44 | 10.00 | 3.23 | 10.00 | 4.65 | 10.00 | 0.00 | 0.00 | 4.67 | 10.00 | 4.26 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6.09 | 10.00 | 6.81 | 10.00 | 8.51 | 10.00 | 6.85 | 10.00 | 8.42 | 10.00 | 8.60 | 10.00 | 6.54 | 10.00 | 8.63 | 10.00 | 7.12 | 10.00 | 6.28 | 10.00 | 7.20 | 10.00 |
| 7.62 | 10.00 | 7.07 | 10.00 | 8.06 | 10.00 | 6.84 | 10.00 | 8.51 | 10.00 | 9.51 | 10.00 | 7.26 | 10.00 | 8.95 | 10.00 | 8.77 | 10.00 | 7.31 | 10.00 | 7.85 | 10.00 |
| 1.92 | 7.21 | 0.33 | 7.26 | 2.96 | 10.00 | 2.10 | 7.21 | 2.55 | 8.13 | 2.80 | 10.00 | 5.30 | 10.00 | 1.22 | 10.00 | 3.19 | 10.00 | 4.13 | 10.00 | 4.47 | 10.00 |
| NA | 0.60 | NA | 0.60 | NA | 2.45 | NA | 0.60 | NA | 0.77 | NA | 2.45 | NA | 2.19 | NA | 2.14 | NA | 0.57 | NA | 0.83 | NA | 2.31 |
| NA | 3.36 | NA | 2.70 | NA | 9.70 | NA | 4.34 | NA | 4.27 | NA | 10.00 | NA | 10.00 | NA | 10.00 | NA | 7.90 | NA | 4.88 | NA | 10.00 |
| NA | 2.17 | NA | 2.17 | NA | 6.52 | NA | 4.78 | NA | 6.52 | NA | 0.72 | NA | 7.39 | NA | 3.62 | NA | 8.84 | NA | 8.26 | NA | 8.84 |
| NA | 5.77 | NA | 7.95 | NA | 5.99 | NA | 7.95 | NA | 5.84 | NA | 4.68 | NA | 7.97 | NA | 4.42 | NA | 4.40 | NA | 7.36 | NA | 4.48 |
| 5.78 | 5.54 | 3.32 | 4.31 | 5.41 | 5.45 | 3.23 | 4.71 | 3.18 | 4.51 | 3.81 | 6.77 | 4.20 | 3.82 | 4.79 | 4.80 | 2.76 | 5.30 | 3.16 | 4.01 | 3.37 | 4.17 |

| 20 | | 21 | | 22 | | 23 | | 24 | | 25 | | 26 | | 27 | | 28 | | 29 | | 30 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** |
| 1.83 | 1.07 | 2.50 | 1.96 | 0.67 | 1.35 | 3.19 | 1.00 | 3.25 | 1.18 | 8.46 | 1.30 | 3.59 | 4.29 | 2.63 | 4.12 | 2.34 | 10.00 | 1.61 | 7.22 | 5.07 | 7.22 |
| 5.79 | 3.51 | 2.03 | 3.66 | 1.86 | 2.85 | 3.14 | 5.24 | 6.21 | 2.98 | 0.00 | 0.00 | 2.79 | 6.88 | 2.62 | 6.75 | 2.07 | 0.00 | 1.38 | 2.87 | 1.01 | 0.00 |
| 7.63 | 0.70 | 6.00 | 0.89 | 2.40 | 0.33 | 3.17 | 2.43 | 5.38 | 0.75 | 3.38 | 0.00 | 5.92 | 1.73 | 4.88 | 1.70 | 6.00 | 0.00 | 2.00 | 0.41 | 3.00 | 0.33 |
| 4.22 | 10.00 | 3.67 | 1.21 | 0.00 | 0.76 | 4.38 | 1.06 | 5.73 | 1.44 | 10.00 | 1.21 | 4.45 | 1.77 | 3.43 | 1.59 | 3.55 | 10.00 | 0.00 | 1.94 | 4.10 | 9.53 |
| 1.54 | 6.43 | 1.81 | 0.86 | 0.71 | 0.86 | 1.75 | 0.43 | 3.55 | 0.86 | 10.00 | 0.86 | 1.66 | 1.7 | 1.42 | 1.29 | 0.46 | 0.00 | 0.49 | 2.14 | 1.71 | 9.00 |
| 2.70 | 10.00 | 3.84 | 2.50 | 1.65 | 5.00 | 4.48 | 7.50 | 4.03 | 2.67 | 10.00 | 2.22 | 4.51 | 4.17 | 4.97 | 3.33 | 4.33 | 1.79 | 0.09 | 5.00 | 4.05 | 10.00 |
| 5.63 | NA | 3.93 | NA | 0.00 | NA | 2.91 | NA | 0.89 | NA | 2.55 | NA | 4.34 | NA | 4.59 | NA | 3.61 | NA | 9.00 | NA | 2.16 | NA |
| 9.17 | NA | 7.49 | NA | 6.16 | NA | 9.87 | NA | 8.11 | NA | 4.37 | NA | 8.56 | NA | 8.76 | NA | 7.38 | NA | 7.39 | NA | 7.21 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.01 | 3.83 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 5.52 | 3.93 | 0.00 | 0.00 | 0.00 | 0.00 | 7.74 | 3.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.45 | 5.65 | 1.79 | 4.58 | 1.67 | 1.62 | 8.09 | 8.72 | 5.16 | 3.69 | 3.54 | 3.22 | 2.87 | 4.55 | 3.84 | 4.71 | 3.44 | 5.14 | 0.00 | 3.31 | 3.26 | 4.85 |
| 6.10 | 6.83 | 4.16 | 10.00 | 1.67 | 4.82 | 6.93 | 10.00 | 7.66 | 10.00 | 5.95 | 5.82 | 7.02 | 6.26 | 7.43 | 6.22 | 6.92 | 6.76 | 2.17 | 10.00 | 6.52 | 10.00 |
| 5.61 | 10.00 | 6.80 | 10.00 | 1.56 | 10.00 | 10.00 | 10.00 | 8.96 | 10.00 | 3.25 | 10.00 | 6.38 | 10.00 | 7.22 | 10.00 | 7.14 | 10.00 | 6.06 | 10.00 | 6.72 | 10.00 |
| 5.85 | 10.00 | 5.63 | 10.00 | 2.04 | 10.00 | 9.59 | 10.00 | 7.48 | 10.00 | 2.68 | 10.00 | 6.38 | 10.00 | 6.88 | 10.00 | 7.34 | 10.00 | 3.33 | 10.00 | 5.50 | 10.00 |
| 9.05 | 10.00 | 8.85 | 10.00 | 6.91 | 10.00 | 6.30 | 10.00 | 0.00 | 0.00 | 8.27 | 10.00 | 6.77 | 10.00 | 5.93 | 10.00 | 7.52 | 10.00 | 7.89 | 10.00 | 8.61 | 10.00 |
| 8.85 | 10.00 | 8.85 | 10.00 | 7.90 | 10.00 | 8.02 | 10.00 | 0.00 | 0.00 | 9.32 | 10.00 | 8 | 10.00 | 8.25 | 10.00 | 9.23 | 10.00 | 8.46 | 10.00 | 8.70 | 10.00 |
| 4.95 | 10.00 | 5.04 | 10.00 | 2.30 | 7.52 | 5.46 | 10.00 | 4.12 | 3.33 | 3.05 | 8.31 | 3.68 | 10.00 | 4.95 | 7.33 | 3.81 | 8.07 | 2.76 | 10.00 | 4.30 | 10.00 |
| NA | 0.68 | NA | 1.25 | NA | 3.57 | NA | 0.57 | NA | 4.27 | NA | 3.57 | NA | 0.62 | NA | 0.49 | NA | 0.49 | NA | 3.15 | NA | 2.19 |
| NA | 8.61 | NA | 9.71 | NA | 9.43 | NA | 7.92 | NA | 6.43 | NA | 6.56 | NA | 7.23 | NA | 9.91 | NA | 8.42 | NA | 7.10 | NA | 3.57 |
| NA | 3.62 | NA | 3.62 | NA | 5.36 | NA | 6.52 | NA | 2.61 | NA | 8.84 | NA | 0.72 | NA | 3.62 | NA | 5.36 | NA | 1.59 | NA | 3.04 |
| NA | 4.47 | NA | 4.55 | NA | 4.87 | NA | 4.40 | NA | 6.00 | NA | 4.87 | NA | 5.71 | NA | 4.34 | NA | 4.34 | NA | 8.36 | NA | 4.48 |
| 5.23 | 6.17 | 4.26 | 5.01 | 2.21 | 4.64 | 6.00 | 6.05 | 4.15 | 3.35 | 4.99 | 4.55 | 4.52 | 5.00 | 4.58 | 5.06 | 4.42 | 5.33 | 3.10 | 5.26 | 4.23 | 6.10 |

| 31 | | 32 | | 33 | | 34 | | 35 | | 36 | | 37 | | 38 | | 39 | | 40 | | 41 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** |
| 1.17 | 1.24 | 2.63 | 3.38 | 0.08 | 1.30 | 7.97 | 1.69 | 7.33 | 1.64 | 3.44 | 0.96 | 4.62 | 1.02 | 8.22 | 0.56 | 5.12 | 0.96 | 2.30 | 4.06 | 1.80 | 1.02 |
| 6.48 | 4.16 | 2.62 | 5.69 | 3.03 | 4.13 | 0.00 | 0.00 | 0.68 | 0.00 | 2.38 | 2.89 | 1.26 | 2.44 | 0.00 | 0.00 | 1.72 | 2.60 | 1.59 | 2.85 | 4.90 | 2.80 |
| 8.80 | 0.77 | 6.00 | 1.58 | 6.90 | 1.95 | 10.00 | 0.00 | 4.67 | 0.00 | 0.00 | 0.00 | 2.17 | 0.60 | 0.00 | 0.00 | 0.00 | 0.00 | 2.67 | 0.77 | 4.92 | 0.54 |
| 3.27 | 1.81 | 3.43 | 1.59 | 2.22 | 0.76 | 5.44 | 0.45 | 10.00 | 0.83 | 4.30 | 7.71 | 3.09 | 1.59 | 4.02 | 1.36 | 4.02 | 1.36 | 2.26 | 2.67 | 3.77 | 8.41 |
| 1.97 | 1.29 | 1.94 | 1.29 | 1.81 | 0.86 | 0.95 | 1.07 | 0.57 | 0.43 | 1.89 | 7.29 | 1.82 | 1.29 | 0.70 | 1.29 | 1.23 | 1.29 | 0.58 | 2.95 | 2.34 | 7.77 |
| 3.10 | 10.00 | 3.82 | 3.33 | 2.26 | 7.50 | 10.00 | 2.50 | 10.00 | 7.50 | 3.29 | 10.00 | 2.61 | 5.00 | 10.00 | 5.00 | 2.15 | 5.00 | 2.87 | 6.50 | 3.05 | 10.00 |
| 2.61 | NA | 4.61 | NA | 1.30 | NA | 0.84 | NA | 4.23 | NA | 3.85 | NA | 3.47 | NA | 5.11 | NA | 5.41 | NA | 3.12 | NA | 3.94 | NA |
| 7.80 | NA | 8.76 | NA | 9.14 | NA | 8.03 | NA | 3.82 | NA | 8.72 | NA | 7.78 | NA | 6.26 | NA | 5.90 | NA | 6.83 | NA | 9.09 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.02 | 3.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 8.38 | 3.27 | 0.00 | 0.00 | 4.58 | 5.18 | 0.00 | 0.00 | 4.77 | 3.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.83 | 6.80 | 3.05 | 5.32 | 8.84 | 5.91 | 7.12 | 1.12 | 3.08 | 5.84 | 7.19 | 1.01 | 2.11 | 4.78 | 6.00 | 0.99 | 4.42 | 0.43 | 3.14 | 5.07 | 5.63 | 5.42 |
| 5.48 | 7.09 | 6.29 | 7.21 | 4.99 | 10.00 | 3.25 | 10.00 | 6.43 | 10.00 | 3.22 | 10.00 | 6.63 | 6.98 | 2.66 | 10.00 | 2.20 | 10.00 | 9.13 | 6.24 | 6.06 | 7.37 |
| 8.16 | 10.00 | 7.14 | 10.00 | 8.10 | 10.00 | 0.00 | 0.00 | 7.73 | 10.00 | 0.00 | 0.00 | 7.00 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.52 | 10.00 | 6.75 | 10.00 |
| 8.38 | 10.00 | 7.08 | 10.00 | 6.09 | 10.00 | 0.00 | 0.00 | 5.16 | 10.00 | 0.00 | 0.00 | 5.20 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.20 | 10.00 | 7.14 | 10.00 |
| 7.57 | 10.00 | 8.80 | 10.00 | 8.91 | 10.00 | 7.20 | 10.00 | 7.25 | 10.00 | 6.82 | 10.00 | 8.27 | 10.00 | 7.05 | 10.00 | 5.26 | 10.00 | 5.72 | 10.00 | 9.62 | 10.00 |
| 7.72 | 10.00 | 8.22 | 10.00 | 8.94 | 10.00 | 8.91 | 10.00 | 7.97 | 10.00 | 7.77 | 10.00 | 8.29 | 10.00 | 8.66 | 10.00 | 7.91 | 10.00 | 7.92 | 10.00 | 8.82 | 10.00 |
| 4.90 | 7.66 | 5.57 | 8.16 | 5.13 | 10.00 | 5.85 | 10.00 | 2.90 | 10.00 | 6.75 | 10.00 | 3.35 | 8.02 | 5.01 | 10.00 | 2.76 | 10.00 | 3.41 | 7.18 | 8.71 | 10.00 |
| NA | 0.51 | NA | 0.49 | NA | 0.83 | NA | 0.57 | NA | 0.57 | NA | 2.10 | NA | 2.36 | NA | 2.10 | NA | 0.71 | NA | 2.91 | NA | 1.99 |
| NA | 8.84 | NA | 9.79 | NA | 7.33 | NA | 9.87 | NA | 10.00 | NA | 7.09 | NA | 5.08 | NA | 10.00 | NA | 7.60 | NA | 3.98 | NA | 9.48 |
| NA | 3.62 | NA | 3.62 | NA | 7.10 | NA | 5.80 | NA | 3.04 | NA | 8.26 | NA | 5.36 | NA | 5.36 | NA | 5.36 | NA | 1.30 | NA | 5.36 |
| NA | 4.40 | NA | 4.34 | NA | 4.60 | NA | 5.85 | NA | 5.85 | NA | 5.07 | NA | 4.55 | NA | 4.42 | NA | 4.63 | NA | 6.18 | NA | 5.73 |
| 5.33 | 5.39 | 4.70 | 5.08 | 4.84 | 5.71 | 4.45 | 3.50 | 5.21 | 5.35 | 3.51 | 4.85 | 3.98 | 4.70 | 3.75 | 3.70 | 2.83 | 3.63 | 3.90 | 4.80 | 5.09 | 6.12 |

| 42 | | 43 | | 44 | | 45 | | 46 | | 47 | | 48 | | 49 | | 50 | | 51 | | 52 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** |
| 1.21 | 1.58 | 1.77 | 1.52 | 8.86 | 1.35 | 6.52 | 1.35 | 6.35 | 1.35 | 5.68 | 1.35 | 8.36 | 1.86 | 6.06 | 1.07 | 6.06 | 4.00 | 1.85 | 10.00 | 7.60 | 4.68 |
| 1.45 | 3.12 | 6.28 | 3.48 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.93 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.97 | 10.00 | 0.00 | 0.00 |
| 4.65 | 1.29 | 10.00 | 0.89 | 10.00 | 0.00 | 1.50 | 0.00 | 0.50 | 0.00 | 6.75 | 0.00 | 0.00 | 0.00 | 2.63 | 0.00 | 2.63 | 0.00 | 5.17 | 10.00 | 0.00 | 0.00 |
| 0.34 | 0.76 | 4.02 | 0.91 | 6.16 | 2.65 | 10.00 | 0.89 | 10.00 | 1.22 | 10.00 | 1.86 | 5.02 | 1.36 | 10.00 | 2.67 | 10.00 | 2.84 | 2.56 | 10.00 | 4.73 | 2.04 |
| 0.69 | 0.86 | 1.82 | 1.50 | 0.31 | 3.04 | 10.00 | 0.98 | 10.00 | 1.34 | 5.27 | 2.05 | 3.33 | 1.29 | 10.00 | 2.95 | 10.00 | 3.13 | 1.58 | 7.50 | 2.06 | 1.93 |
| 1.45 | 2.22 | 2.39 | 2.50 | 10.00 | 10.00 | 10.00 | 2.83 | 10.00 | 3.50 | 10.00 | 4.83 | 10.00 | 3.33 | 10.00 | 6.50 | 10.00 | 7.36 | 10.00 | 10.00 | 10.00 | 5.00 |
| 2.52 | NA | 1.85 | NA | 7.10 | NA | 3.35 | NA | 3.26 | NA | 5.77 | NA | 7.12 | NA | 4.55 | NA | 4.55 | NA | 4.18 | NA | 7.12 | NA |
| 6.88 | NA | 8.82 | NA | 6.73 | NA | 5.75 | NA | 5.43 | NA | 8.72 | NA | 7.63 | NA | 7.35 | NA | 7.35 | NA | 9.55 | NA | 6.11 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.08 | 2.95 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.13 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.84 | 2.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 7.79 | 3.00 | 0.00 | 0.00 |
| 1.44 | 3.17 | 5.60 | 1.41 | 4.05 | 0.00 | 2.50 | 4.66 | 2.70 | 3.99 | 5.37 | 2.97 | 7.82 | 0.88 | 0.36 | 3.72 | 0.08 | 3.66 | 5.76 | 6.63 | 4.48 | 0.90 |
| 4.28 | 5.74 | 5.25 | 10.00 | 0.29 | 3.60 | 4.00 | 6.77 | 4.77 | 6.84 | 1.86 | 6.07 | 2.59 | 4.27 | 3.77 | 6.58 | 3.77 | 6.51 | 7.26 | 6.85 | 2.71 | 4.26 |
| 4.29 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.71 | 10.00 | 5.96 | 10.00 | 4.61 | 10.00 | 0.00 | 0.00 | 5.47 | 10.00 | 5.23 | 10.00 | 7.05 | 10.00 | 0.00 | 0.00 |
| 3.93 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.28 | 10.00 | 3.52 | 10.00 | 3.69 | 10.00 | 0.00 | 0.00 | 3.88 | 10.00 | 3.88 | 10.00 | 6.60 | 10.00 | 0.00 | 0.00 |
| 7.14 | 10.00 | 7.05 | 10.00 | 4.81 | 10.00 | 8.83 | 10.00 | 8.78 | 10.00 | 7.79 | 10.00 | 6.71 | 10.00 | 8.49 | 10.00 | 8.49 | 10.00 | 7.86 | 10.00 | 6.68 | 10.00 |
| 9.04 | 10.00 | 8.46 | 10.00 | 6.84 | 10.00 | 8.46 | 10.00 | 8.22 | 10.00 | 9.50 | 10.00 | 6.56 | 10.00 | 8.86 | 10.00 | 8.86 | 10.00 | 9.25 | 10.00 | 8.61 | 10.00 |
| 1.49 | 7.90 | 2.79 | 10.00 | 2.30 | 6.62 | 3.30 | 8.23 | 2.44 | 8.15 | 3.29 | 8.22 | 4.98 | 7.09 | 3.56 | 8.24 | 3.56 | 8.24 | 5.89 | 8.17 | 4.31 | 7.65 |
| NA | 1.69 | NA | 0.57 | NA | 1.69 | NA | 0.51 | NA | 1.94 | NA | 0.32 | NA | 0.91 | NA | 1.03 | NA | 0.68 | NA | 2.47 | NA | 1.99 |
| NA | 8.31 | NA | 3.90 | NA | 10.00 | NA | 9.41 | NA | 7.83 | NA | 10.00 | NA | 8.73 | NA | 6.32 | NA | 6.10 | NA | 10.00 | NA | 6.42 |
| NA | 0.00 | NA | 2.32 | NA | 5.65 | NA | 6.52 | NA | 6.52 | NA | 5.36 | NA | 8.26 | NA | 1.01 | NA | 1.01 | NA | 10.00 | NA | 3.62 |
| NA | 6.33 | NA | 7.31 | NA | 9.23 | NA | 5.71 | NA | 5.73 | NA | 5.64 | NA | 4.42 | NA | 7.95 | NA | 7.95 | NA | 5.00 | NA | 4.42 |
| 2.99 | 4.26 | 3.89 | 3.28 | 3.97 | 3.59 | 5.18 | 4.88 | 4.82 | 4.59 | 5.25 | 4.61 | 4.12 | 3.22 | 5.00 | 4.45 | 4.97 | 4.64 | 5.91 | 8.03 | 3.79 | 3.25 |

| 53 | | 54 | | 55 | | 56 | | 57 | | 58 | | 59 | | 60 | | 61 | | 62 | | 63 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** |
| 7.60 | 1.86 | 8.44 | 0.85 | 8.36 | 0.73 | 8.08 | 1.86 | 8.75 | 3.83 | 4.05 | 1.02 | 1.00 | 0.73 | 3.28 | 3.67 | 3.17 | 0.00 | 5.01 | 3.78 | 0.88 | 1.35 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.41 | 2.47 | 3.48 | 3.61 | 2.28 | 2.59 | 0.94 | 0.00 | 1.86 | 2.77 | 2.79 | 4.29 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.04 | 0.14 | 2.17 | 1.57 | 0.00 | 0.00 | 3.60 | 0.28 | 0.00 | 0.00 | 2.79 | 2.35 |
| 5.02 | 1.36 | 7.15 | 1.61 | 4.02 | 1.36 | 4.02 | 1.36 | 6.44 | 1.42 | 3.27 | 0.76 | 0.12 | 0.91 | 5.73 | 1.59 | 2.47 | 1.59 | 7.86 | 1.13 | 0.00 | 0.91 |
| 2.26 | 1.29 | 2.36 | 1.70 | 2.83 | 1.29 | 2.83 | 1.29 | 3.57 | 1.52 | 2.76 | 0.86 | 1.18 | 0.86 | 0.56 | 1.50 | 2.70 | 1.29 | 2.54 | 1.07 | 0.75 | 0.86 |
| 10.00 | 3.33 | 10.00 | 5.14 | 10.00 | 3.33 | 10.00 | 3.33 | 10.00 | 4.83 | 3.08 | 2.50 | 2.83 | 2.50 | 2.95 | 7.50 | 2.59 | 3.33 | 3.85 | 5.00 | 2.93 | 2.22 |
| 7.12 | NA | 6.34 | NA | 6.78 | NA | 6.34 | NA | 4.30 | NA | 5.19 | NA | 4.67 | NA | 5.16 | NA | 2.13 | NA | 4.37 | NA | 3.78 | NA |
| 6.68 | NA | 6.68 | NA | 6.30 | NA | 6.30 | NA | 8.69 | NA | 7.36 | NA | 8.15 | NA | 7.74 | NA | 9.66 | NA | 7.02 | NA | 7.56 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.56 | 2.88 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4.55 | 3.04 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.98 | 2.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.67 | 2.93 |
| 6.29 | 0.97 | 6.03 | 1.02 | 4.94 | 0.97 | 3.59 | 0.80 | 6.43 | 0.66 | 2.35 | 4.73 | 2.95 | 6.47 | 5.71 | 0.91 | 7.94 | 5.54 | 6.04 | 0.95 | 3.61 | 6.54 |
| 2.72 | 4.36 | 2.66 | 4.35 | 2.95 | 4.31 | 2.24 | 4.23 | 2.58 | 3.98 | 6.30 | 6.85 | 6.44 | 10.00 | 2.57 | 4.30 | 7.52 | 7.07 | 2.79 | 4.31 | 6.62 | 10.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 6.24 | 10.00 | 6.07 | 10.00 | 0.00 | 0.00 | 6.89 | 10.00 | 0.00 | 0.00 | 6.75 | 10.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 5.67 | 10.00 | 5.39 | 10.00 | 0.00 | 0.00 | 7.67 | 10.00 | 0.00 | 0.00 | 5.88 | 10.00 |
| 6.97 | 10.00 | 6.40 | 10.00 | 6.81 | 10.00 | 6.61 | 10.00 | 5.89 | 10.00 | 8.57 | 10.00 | 8.65 | 10.00 | 6.81 | 10.00 | 8.62 | 10.00 | 6.83 | 10.00 | 8.76 | 10.00 |
| 6.17 | 10.00 | 5.74 | 10.00 | 6.30 | 10.00 | 8.06 | 10.00 | 8.31 | 10.00 | 8.80 | 10.00 | 8.45 | 10.00 | 5.87 | 10.00 | 8.09 | 10.00 | 6.49 | 10.00 | 9.13 | 10.00 |
| 4.21 | 7.06 | 3.26 | 6.93 | 4.66 | 7.05 | 4.58 | 7.48 | 2.86 | 7.34 | 3.90 | 8.25 | 2.28 | 10.00 | 3.98 | 6.93 | 3.73 | 10.00 | 4.19 | 7.11 | 3.36 | 10.00 |
| NA | 1.99 | NA | 1.99 | NA | 1.99 | NA | 1.99 | NA | 2.08 | NA | 1.94 | NA | 2.19 | NA | 1.94 | NA | 1.25 | NA | 2.08 | NA | 2.19 |
| NA | 9.65 | NA | 10.00 | NA | 10.00 | NA | 10.00 | NA | 10.00 | NA | 3.31 | NA | 9.52 | NA | 5.21 | NA | 7.56 | NA | 9.68 | NA | 7.38 |
| NA | 4.78 | NA | 3.04 | NA | 1.88 | NA | 1.88 | NA | 10.00 | NA | 3.62 | NA | 3.62 | NA | 3.04 | NA | 7.10 | NA | 4.78 | NA | 7.10 |
| NA | 4.42 | NA | 5.73 | NA | 4.42 | NA | 4.42 | NA | 6.01 | NA | 4.42 | NA | 4.48 | NA | 4.42 | NA | 4.55 | NA | 4.48 | NA | 4.48 |
| 3.83 | 3.15 | 3.83 | 3.15 | 3.76 | 2.94 | 3.69 | 3.01 | 3.99 | 3.65 | 4.23 | 4.25 | 4.32 | 5.42 | 3.10 | 3.29 | 4.57 | 4.72 | 3.46 | 3.48 | 4.34 | 5.62 |

| 64 | | 65 | | 66 | | 67 | | 68 | | 69 | | 70 | | 71 | | 72 | | 73 | | 74 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score | Function Score | Benefits Score |
| 4.03 | 1.64 | 2.48 | 1.52 | 7.72 | 1.64 | 0.86 | 0.85 | 8.08 | 1.86 | 2.60 | 0.00 | 8.08 | 1.86 | 3.42 | 0.73 | 2.49 | 0.73 | 6.03 | 1.13 | 6.03 | 1.13 |
| 2.38 | 3.54 | 3.31 | 3.22 | 0.00 | 0.00 | 3.48 | 2.38 | 0.00 | 0.00 | 2.97 | 1.16 | 0.00 | 0.00 | 1.59 | 2.33 | 3.48 | 2.18 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 2.88 | 0.35 | 0.00 | 0.00 | 3.42 | 0.24 | 0.00 | 0.00 | 1.75 | 0.57 | 0.00 | 0.00 | 0.92 | 0.00 | 4.04 | 0.23 | 2.40 | 0.00 | 2.40 | 0.00 |
| 5.02 | 1.36 | 2.00 | 0.83 | 4.30 | 1.36 | 0.00 | 0.91 | 4.30 | 1.36 | 2.10 | 0.83 | 4.30 | 1.36 | 3.44 | 1.44 | 1.87 | 1.44 | 10.00 | 0.76 | 10.00 | 0.76 |
| 2.14 | 1.29 | 1.66 | 0.43 | 0.00 | 1.29 | 0.97 | 0.86 | 3.03 | 1.29 | 1.79 | 0.43 | 3.03 | 1.29 | 1.66 | 0.86 | 0.70 | 0.86 | 10.00 | 0.86 | 10.00 | 0.86 |
| 2.27 | 3.33 | 2.06 | 2.50 | 10.00 | 7.50 | 2.85 | 2.50 | 10.00 | 5.00 | 2.10 | 1.11 | 10.00 | 3.33 | 3.87 | 2.50 | 3.02 | 2.50 | 10.00 | 4.00 | 10.00 | 4.00 |
| 4.67 | NA | 4.14 | NA | 5.50 | NA | 4.36 | NA | 6.41 | NA | 4.44 | NA | 6.43 | NA | 1.02 | NA | 3.51 | NA | 5.61 | NA | 5.61 | NA |
| 5.79 | NA | 9.60 | NA | 5.76 | NA | 7.97 | NA | 7.63 | NA | 9.20 | NA | 6.61 | NA | 8.00 | NA | 7.92 | NA | 5.44 | NA | 5.44 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.76 | 0.96 | 3.10 | 4.55 | 5.40 | 0.68 | 3.68 | 4.59 | 6.69 | 0.90 | 2.82 | 4.98 | 4.33 | 0.84 | 4.67 | 5.19 | 3.20 | 4.47 | 0.51 | 2.87 | 0.51 | 2.87 |
| 2.77 | 4.33 | 6.09 | 6.62 | 2.21 | 4.08 | 6.40 | 6.67 | 4.75 | 1.81 | 6.44 | 6.90 | 2.56 | 4.22 | 9.01 | 6.49 | 6.45 | 6.41 | 1.10 | 10.00 | 1.10 | 10.00 |
| 0.00 | 0.00 | 5.55 | 10.00 | 0.00 | 0.00 | 5.65 | 10.00 | 0.00 | 0.00 | 6.63 | 10.00 | 0.00 | 0.00 | 6.76 | 10.00 | 6.45 | 10.00 | 5.19 | 10.00 | 5.19 | 10.00 |
| 0.00 | 0.00 | 5.81 | 10.00 | 0.00 | 0.00 | 5.59 | 10.00 | 0.00 | 0.00 | 6.51 | 10.00 | 0.00 | 0.00 | 7.01 | 10.00 | 5.90 | 10.00 | 4.08 | 10.00 | 4.08 | 10.00 |
| 6.88 | 10.00 | 8.53 | 10.00 | 6.16 | 10.00 | 8.58 | 10.00 | 5.45 | 5.00 | 8.38 | 10.00 | 6.58 | 10.00 | 7.08 | 10.00 | 7.15 | 10.00 | 7.06 | 10.00 | 7.06 | 10.00 |
| 7.22 | 10.00 | 9.47 | 10.00 | 5.84 | 10.00 | 9.53 | 10.00 | 5.23 | 0.00 | 8.54 | 10.00 | 6.49 | 10.00 | 7.24 | 10.00 | 9.03 | 10.00 | 8.16 | 10.00 | 8.16 | 10.00 |
| 4.07 | 7.33 | 4.68 | 8.42 | 2.33 | 6.73 | 3.87 | 10.00 | 2.34 | 3.03 | 2.33 | 10.00 | 4.09 | 7.03 | 3.20 | 10.00 | 4.62 | 10.00 | 2.01 | 10.00 | 2.01 | 10.00 |
| NA | 1.99 | NA | 1.05 | NA | 1.99 | NA | 1.19 | NA | 1.85 | NA | 1.99 | NA | 2.34 | NA | 2.10 | NA | 1.94 | NA | 1.44 | NA | 1.44 |
| NA | 5.73 | NA | 7.71 | NA | 7.78 | NA | 8.57 | NA | 6.15 | NA | 4.79 | NA | 10.00 | NA | 4.71 | NA | 7.45 | NA | 9.20 | NA | 9.20 |
| NA | 4.78 | NA | 7.10 | NA | 3.04 | NA | 7.10 | NA | 3.04 | NA | 6.52 | NA | 3.04 | NA | 5.36 | NA | 5.94 | NA | 3.04 | NA | 3.04 |
| NA | 4.42 | NA | 4.48 | NA | 4.42 | NA | 4.55 | NA | 4.35 | NA | 4.42 | NA | 4.58 | NA | 4.42 | NA | 4.42 | NA | 4.87 | NA | 4.87 |
| 3.06 | 3.13 | 4.20 | 4.68 | 3.25 | 3.12 | 3.95 | 4.77 | 3.76 | 1.74 | 4.04 | 4.40 | 3.68 | 3.07 | 4.05 | 4.54 | 4.11 | 4.68 | 4.56 | 4.63 | 4.56 | 4.63 |

| 74 | | 75 | | 76 | | 77 | | 78 | | 79 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** | **Function Score** | **Benefits Score** |
| 6.03 | 1.13 | 5.63 | 1.30 | 4.31 | 1.69 | 8.22 | 1.52 | 7.88 | 1.52 | 8.22 | 1.86 |
| 0.00 | 0.00 | 0.00 | 0.00 | 1.79 | 3.39 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 2.40 | 0.00 | 2.40 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10.00 | 0.76 | 10.00 | 0.76 | 4.30 | 0.91 | 4.30 | 1.36 | 5.44 | 0.91 | 4.02 | 1.36 |
| 10.00 | 0.86 | 10.00 | 0.86 | 0.95 | 0.86 | 3.03 | 1.29 | 1.96 | 0.86 | 2.83 | 1.29 |
| 10.00 | 4.00 | 10.00 | 2.22 | 3.28 | 2.22 | 10.00 | 3.33 | 10.00 | 2.50 | 10.00 | 3.33 |
| 5.61 | NA | 5.61 | NA | 6.53 | NA | 7.37 | NA | 5.31 | NA | 6.78 | NA |
| 5.44 | NA | 4.07 | NA | 9.76 | NA | 7.21 | NA | 6.32 | NA | 6.30 | NA |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.00 | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.51 | 2.87 | 0.82 | 3.21 | 2.53 | 0.70 | 3.96 | 0.49 | 6.10 | 0.88 | 4.94 | 0.95 |
| 1.10 | 10.00 | 1.48 | 10.00 | 1.12 | 10.00 | 0.52 | 4.20 | 4.54 | 10.00 | 2.85 | 4.31 |
| 5.19 | 10.00 | 5.50 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 4.08 | 10.00 | 4.43 | 10.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 7.06 | 10.00 | 7.34 | 10.00 | 6.92 | 10.00 | 6.51 | 10.00 | 5.54 | 10.00 | 6.81 | 10.00 |
| 8.16 | 10.00 | 8.16 | 10.00 | 8.30 | 10.00 | 6.47 | 10.00 | 8.41 | 10.00 | 6.30 | 10.00 |
| 2.01 | 10.00 | 2.94 | 10.00 | 3.30 | 10.00 | 3.28 | 7.01 | 3.47 | 10.00 | 4.66 | 7.05 |
| NA | 1.44 | NA | 1.06 | NA | 2.19 | NA | 1.85 | NA | 1.24 | NA | 1.99 |
| NA | 9.20 | NA | 9.08 | NA | 7.09 | NA | 9.20 | NA | 9.57 | NA | 10.00 |
| NA | 3.04 | NA | 3.04 | NA | 4.78 | NA | 3.04 | NA | 5.36 | NA | 1.88 |
| NA | 4.87 | NA | 4.50 | NA | 4.48 | NA | 4.35 | NA | 4.73 | NA | 4.42 |
| 4.56 | 4.63 | 4.63 | 4.53 | 3.12 | 3.55 | 3.58 | 2.96 | 3.82 | 3.49 | 3.75 | 3.00 |

# Appendix G.2

## Preliminary Wetland Compensation Plan

**ANTRIM GYPSUM MINE PROJECT**

# Preliminary Wetland Compensation Plan

**PREPARED FOR**

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July 2024

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## EXECUTIVE SUMMARY

The Antrim Gypsum Project (the Project) is located approximately 50 km from Halifax, Nova Scotia (NS), near Gays River, along Lake Egmont Road in the community of Cooks Brook, NS. CertainTeed Canada Inc. (CertainTeed) proposes to develop the Project as a conventional gypsum mining operation including an open pit quarry, till and organic stockpiles, overburden storage area, rock processing plant, as well as water management infrastructure. The scope of the Project includes activities associated with construction, operation, and closure.

Through the Environmental Assessment Registration Document (EARD) process, the Project has been designed to avoid wetland habitat wherever possible. Once all avoidance, minimization, and mitigation techniques were considered, CertainTeed acknowledges a residual loss of wetland habitat and function as a result of the Project. This Preliminary Wetland Compensation Plan has been prepared to provide a conceptual approach to wetland compensation to offset the predicted wetland impacts as a result of the Project.

In total approximately 13.25 ha of wetland area is expected to be altered by the Project through direct impacts, which will require compensation. Three of the wetlands proposed for alteration exist as potential Wetlands of Special Significance (WSS). In consideration of industry standards and previously applied compensation ratios (i.e., 2:1 for non-WSS, 4:1 for WSS), it is expected that the Project will result in approximately 37.56 ha of wetland compensation requirements.

CertainTeed has begun preliminary identification of Primary and Secondary options for wetland compensation. Project identification, design, monitoring and reporting requirements are outlined herein, as well as potential compensation options based on past compensation experiences, NSECC consultation, and known opportunities in NS.

Conceptual opportunities discussed herein will be further investigated at the time of detailed Project design and permitting.

## TABLE OF CONTENTS

# List of Acronyms

| | |
|---|---|
| EARD | Environmental Assessment Registration Document |
| ECCC | Environment and Climate Change Canada |
| KMKNO | Kwilmu'kw Maw-klusuaqn Negotiation Office |
| NS | Nova Scotia |
| NSECC | Nova Scotia Environment and Climate Change |
| NSDNRR | Nova Scotia Department of Natural Resources and Renewables |
| PA | Project Area |
| ROM | Run of mine |
| SAR | Species at Risk |
| UINR | Unama'ki Institute of Natural Recourses |
| WRP | Wetland Restoration Professional |

# 1 INTRODUCTION

The Antrim Gypsum Project (the Project) is located approximately 50 km from Halifax, Nova Scotia (NS), near Gays River, along Lake Egmont Road in the community of Cooks Brook, NS. For the purpose of this environmental assessment, a Project Area (PA) was defined as the footprint of Project related infrastructure and includes the following parcels of land (PID 40228389, 40228371, 40212409, 40229676, 40228009 and 40228017). CertainTeed Canada Inc. (CertainTeed) proposes to develop the Project as a conventional gypsum mining operation including an open pit quarry, till and organic stockpiles, overburden storage area, rock processing plant, as well as water management infrastructure. The Project will produce marketable gypsum and anhydrate at an estimated average rate of production of 1.5 million tonnes per year. The gypsum and anhydrate products will be transported via trucks to a port facility in Sheet Harbour, NS, approximately 82 km from the Project Area, for shipment to manufacturing facilities either in Canada or the United States. The life of Project is proposed to be 20-years.

The scope of the Project includes activities associated with construction, operation, and closure. Project construction activities will include clearing and grubbing the topsoil stockpiles, overburden, and waste rock stockpile, mine pit, run-of-mine (ROM) stockpile, construction of the processing facility l (i.e. sizer buildings, conveyor, screening building, etc.,) access roads, fueling infrastructure, surface water management and other Project infrastructure. The operation phase will include extraction (surface miner, loading, and hauling), processing, and waste management. Blasting may be used for extraction if required. Gypsum will be screened while stockpiled. Waste rock, not used for construction or backfill, will be stockpiled. The closure phase will include earthworks and demolition required to return the Project Area to a safe, stable, and vegetated state, and all monitoring and treatment, if required. Reclamation and Closure Plan requirements are governed by the *Nova Scotia Mineral Resources Act*.

Through the Environmental Assessment Registration Document (EARD) process, the Project has been designed to avoid wetland habitat wherever possible. Several iterations of Project design have been considered, with wetland avoidance as a key consideration for adjustment of infrastructure to reduce both direct and indirect impacts to wetlands, particularly that associated fish habitat and habitat which supports potential species at risk (SAR). Where wetlands could not be avoided, minimization of impacts and mitigation measures were prioritized. Once all avoidance, minimization, and mitigation techniques were considered, CertainTeed acknowledges a residual loss of wetland habitat and function as a result of the Project.

This Preliminary Wetland Compensation Plan has been prepared to provide a conceptual approach to wetland compensation to offset the predicted wetland impacts as a result of the Project. In total approximately 13.25 ha of wetland area is expected to be altered by the Project through direct impacts, which will require compensation (Table 1). Three of the wetlands proposed for alteration exist as potential Wetlands of Special Significance (WSS). These wetlands are described in the Project's Wetland Baseline Report and wetland effects assessment prepared for the EARD. In consideration of industry standards and previously applied compensation ratios (i.e., 2:1 for non-WSS, 4:1 for WSS), it is expected that the Project will result in approximately 37.56 ha of wetland compensation requirements (Table 1). Final alteration areas and compensation requirements will be determined through detailed Project design, permitting, monitoring programs and in consultation with NSECC. The Project's proposed wetland monitoring program will track and define potential indirect effects to wetlands, which will be scoped into Project alteration areas and compensation requirements as needed.

**Table 1 - Project wetland impacts and compensation requirements**

| Wetland ID | Proposed Ratio | Estimated Direct Impact Area ($m^2$) | Compensation Area ($m^2$) | Alteration Type[1] |
|---|---|---|---|---|
| WL6 (WSS) | 4:1 | 45211 | 180844 | P |
| WL14 | 2:1 | 352 | 704 | C |
| WL15 | 2:1 | 338 | 676 | C |
| WL16 | 2:1 | 1850 | 3700 | C |
| WL17 | 2:1 | 1146 | 2292 | C |
| WL18 | 2:1 | 3039 | 6078 | P |
| WL19 | 2:1 | 368 | 736 | C |
| WL20 | 2:1 | 18501 | 37002 | C |
| WL21 | 2:1 | 248 | 496 | C |
| WL22 | 2:1 | 124 | 248 | C |
| WL23 | 2:1 | 19988 | 39976 | C |
| WL24 | 2:1 | 236 | 472 | P |
| WL25 | 2:1 | 161 | 322 | C |
| WL26 | 2:1 | 109 | 218 | C |
| WL27 | 2:1 | 172 | 344 | C |
| WL28 | 2:1 | 675 | 1350 | C |
| WL29 | 2:1 | 148 | 296 | C |
| WL30 | 2:1 | 254 | 508 | C |
| WL34 (WSS) | 4:1 | 7770 | 31080 | P |
| WL36 | 2:1 | 207 | 414 | P |
| WL43 (WSS) | 4:1 | 2335 | 9340 | C |

| | | | | |
|---|---|---|---|---|
| WL58 | 2:1 | 764 | 1528 | C |
| WL59 | 2:1 | 1696 | 3392 | C |
| WL60 | 2:1 | 1621 | 3242 | C |
| WL62 | 2:1 | 5458 | 10916 | C |
| WL64 | 2:1 | 1026 | 2052 | C |
| WL65 | 2:1 | 12821 | 25642 | C |
| WL66 | 2:1 | 2762 | 5524 | C |
| WL68 | 2:1 | 263 | 526 | C |
| WL78 | 2:1 | 2851 | 5702 | C |
| Totals | | 132,494 $m^2$<br>13.2494 ha | 375,630 $m^2$<br>37.5620 ha | |

[1] P – Partial wetland alteration, C – Complete wetland alteration

## 1.1 Regulatory Context

CertainTeed is committed to the implementation of wetland compensation project(s) to satisfy the Nova Scotia Wetland Conservation Policy's (NSECC, 2019)[1] objective of preventing no net loss of wetland area and/or function. CertainTeed acknowledges that Nova Scotia Environment and Climate Change (NSECC) considers restoration of wetland function as a key component of wetland compensation in Nova Scotia, and as such, this objective will be considered, as is possible, in wetland compensation efforts associated with the Project.

CertainTeed understands that NSECC's preferred methods of compensation are:

- Restoration of degraded wetland habitats or wetlands previously lost to historic alterations;
- Targeted compensation in proximity to the Project where wetland losses will occur (e.g., within the same or adjacent watersheds as is possible), and;
- Consideration of replacement of lost wetland type and function.

[1] https://novascotia.ca/nse/wetland/docs/Nova.Scotia.Wetland.Conservation.Policy.pdf

Current compensation standards require at a minimum 2:1 ratio (compensation:alteration area) for most restoration projects, within higher ratios for WSS (e.g., 4:1). Furthermore, the province expects compensation projects to be implemented parallel to or directly following wetland alteration (e.g., within a few years) and expects the compensation project to be self-sustaining and permanent. CertainTeed will endeavor to ensure that these objectives are upheld as part of the wetland compensation project(s). In collaboration with McCallum Environmental Ltd. (MEL; an NSECC recognized Wetland Restoration Professional (WRP)), CertainTeed has undertaken the identification of preliminary compensation approaches to support the Project's wetland compensation requirements as described herein.

### 1.2 Wetland Compensation Type

CertainTeed, with support from MEL, has begun preliminary identification of Primary and Secondary options for wetland compensation. Primary and Secondary methods of wetland compensation can be implemented in combination with each other to meet the objectives for wetland compensation requirements associated with the Project.

Primary and Secondary methods of compensation are outlined below:

- Primary Compensation: Physical, on the ground compensation via wetland restoration, creation, enhancement, or wetland expansion activities; and,
- Secondary Compensation: Methods include those that NSECC regards as important tools in support and development of the Wetland Conservation Policy, i.e., scientific research studies, watershed studies, wetland education (trails, signage, interpretive endeavors), and others. CertainTeed understands that secondary methods require consultation and negotiation with NSECC, and the scope of what classifies as a secondary option is continually evolving.

## 2 WETLAND COMPENSATION PROCESS

The preliminary wetland compensation plan aims to identify compensation options prior to Project construction. MEL will further investigate the conceptual opportunities discussed in the following sections at the time Project impacts are confirmed through detailed design and permitting.

There are several steps involved in the selection of a Primary or Secondary wetland compensation project including engagement with the Mi'kmaq of Nova Scotia and key stakeholders, site identification, study concept development, project design, reporting, permitting (as required), and identification of monitoring commitments.

### 2.1 Engagement

As part of the wetland compensation process, CertainTeed have and will continue to engage early with key Rightsholders (Mi'kmaq of Nova Scotia) and stakeholders, including regulatory agencies, to ensure a variety of possible avenues for wetland compensation have been explored. Engagement allows CertainTeed to understand what opportunities there may be in close proximity to the Project, and as well, to learn from communities and interest groups who may have concepts and objectives related to wetland compensation. Engagement has and will continue to involve the following types of groups and organizations:

- Nova Scotia Environment and Climate Change (NSECC);
- Nova Scotia Department of Natural Resources and Renewables (NSDNRR);
- Environment and Climate Change Canada (ECCC);

- Mi'kmaq of Nova Scotia communities and organizations (e.g., KMKNO, UINR);
- Private Forestry Lands Groups and Co-operatives;
- Local Municipalities; and
- Non-Governmental Organizations such as:
    - Local watershed associations (e.g., Shubenacadie Watershed Environmental Protection Society);
    - Nova Scotia Nature Trust;
    - Nature Conservancy of Canada;
    - Ecology Action Centre; and,
    - Others as determined through engagement efforts.

## 2.2 Compensation Project Identification Process

The process to select suitable wetland compensation projects has been initiated and will continue during the provincial environmental assessment and alteration permitting process. For Primary wetland compensation projects, with the support of a WRP, CertainTeed will complete feasibility studies and preliminary design concepts to determine the scope of work, and specific compensation objectives. For Secondary compensation projects, CertainTeed and the WRP will work with NSECC to identify potential opportunities for projects (i.e., studies, research, education etc.) that directly support the NSECC wetland program.

An evaluation of the value of the compensation project will be determined by comparing the proposed outcomes of the compensation project to the broader objectives of the Nova Scotia Wetland Conservation Policy (NSECC, 2011), as well as local watershed benefits and support of any initiatives that the compensation project would provide to the Mi'kmaq of Nova Scotia, stakeholders, and local communities.

Parallel to the definition of Primary compensation project concepts and objectives, collaboration and discussions with landowners of potential compensation sites will take place. This process is a critical step of determining the feasibility of a site for wetland compensation purposes. The process includes written agreements with landowners which outline compensation project goals and objectives, and in some cases, could include land purchase agreements.

CertainTeed will prioritize identification of functionally valuable wetland compensation projects within the secondary watershed where Project alterations will occur. The Shubenacadie River Watershed continues to experience notable development due to its proximity to larger population centers (e.g., Halifax, Bedford, Windsor, Truro). It's likely that suitable wetland compensation project(s) may be identified within this watershed. Ideally, wetland compensation would occur within the spatial boundaries of the Project. However, the life span of the Project and nature of the wetland alterations within the PA (e.g. open pit and other mine infrastructure) limits the overall opportunity for on-site compensation through site reclamation. On-site options for wetland compensation may be considered during the reclamation process, acknowledging the time lag associated with this option, and could include reclamation of partially impacted wetlands or riparian areas. Potential opportunities for on-site reclamation may be considered as part of the Project's Reclamation Plan, which will be iteratively updated through the life of the Project, in consultation with NSECC.

Section 3 described conceptual compensation options to support the Project.

## 2.3 Compensation Project Design

Preliminary project design for Primary wetland compensation projects will be initiated during the site selection process concurrent with engagement activities. However, as discussions with landowners advance, and securing of land appears feasible to implement the compensation project, project design will advance into a more detailed stage.

For Secondary wetland compensation projects, CertainTeed will work with the WRP to define a scope of work and objectives for submission and review by the provincial wetland specialist at NSECC. In collaboration with the wetland specialist, the WRP will refine and finalize the Secondary wetland compensation project including the wetland compensation credit value (i.e., comparative to on the ground area credit).

The following sections outline in detail the design process for Primary wetland compensation opportunities.

### 2.3.1 Preliminary Design

A desktop review process will be initiated on potential compensation sites to determine existing characteristics (i.e., level of historical disturbance), hydrological conditions (inflows and outflows of water), soil characteristics, and presence of a local reference site (undisturbed wetland habitat). The desktop review process will be followed by a field assessment and feasibility study to identify landscape characteristics, review potential reference site(s), and refine the preliminary design further. As well as evaluating the project site for characteristics discussed above, details relating to vegetative composition, habitat, species at risk presence and potential fish habitat are also evaluated. In addition, information regarding adjacent land use and its potential interaction with a compensation project will be obtained.

Baseline monitoring is typically completed during the growing season to support the design process and understand detailed conditions about the site which can be compared to post project completion conditions to determine the success of project objectives. Baseline monitoring typically involves monitoring of baseline hydrology through installation of water data loggers and the completion of detailed vegetation and habitat assessments. A wetland functional assessment is also completed at this stage and later repeated post project completion to determine if functional characteristics have been modified to meet project objectives.

Hydrological data from loggers is converted into a hydrograph so that baseline hydrological characteristics are understood to inform the detailed design process.

Having a proper understanding of site conditions and adjacent site conditions (reference site) is paramount to meeting the goals of the wetland compensation project. For example, if site conditions cannot support (at baseline or through restoration) a vegetative community or hydrological environment required to support wetland habitat, it may not be considered a viable option.

Based on these conditions, preliminary project design(s) can be put in place.

### 2.3.2 Detailed Design

The detailed design process includes the modelling of specific hydrological conditions and detailing the groundwork activities that are required to be implemented at the site to meet the objectives of the compensation project. Tasks completed as part of this process include confirmation of water budget and detailed design, surveying, construction methodology, seeding and planting techniques, management of herbivory challenges and monitoring requirements. Utilization of a hydrograph will aid this process by facilitating the determination of available water to the compensation site. Water should be managed on the site to meet compensation objectives (i.e., pre-degraded or enhanced conditions as demonstrated in the available reference site).

Specific details/drawings of the compensation project(s) will be developed and will be made available to NSECC for review in Annual Wetland Compensation Plans, Wetland Compensation Concept Plans or documentation to support regulatory permitting that the compensation project may require (i.e., wetland or watercourse alteration). The exact scope required for the detailed design process will be determined in consultation with NSECC.

## 2.4 Wetland Compensation Monitoring and Reporting

Wetland monitoring associated with Primary wetland compensation projects is defined on a project-specific basis through a dedicated Compensation Plan and associated approvals. Generally monitoring includes visual surveys, hydrological monitoring wells, and vegetation plots. Monitoring will be completed to determine if wetland compensation objectives, as defined in the Compensation Plan, (i.e., restoration, enhancement or creation of wetland area and function) are being achieved.

The following subsections generally outline base monitoring survey methods. The final scope and scale (i.e., timing and number of surveys) of monitoring will be outlined in the project-specific Compensation Plan and based on defined performance indicators. Monitoring may be adjusted based on annual reporting and development of adaptive management strategies as needed.

### 2.4.1 Visual Surveys

General visual surveys will be conducted to determine the success of restoring or enhancing habitat to pre-defined objectives. The assessment will take place during a seasonally appropriate times (June-September). Visual surveys generally assess the following:

- Evidence of Primary and Secondary indicators of wetland hydrology (e.g., water marks, drainage channels);
- Evidence of adverse concerns to wetland health (e.g., siltation/sedimentation, ground disturbance, vegetation die-back, invasive/ exotic species); and,
- Documentation of transitions in habitat and general vegetative composition. This can be completed via visual evidence observations made during site assessments and aerially via the use of a drone.

### 2.4.2 Hydrology

Monitoring wells are installed strategically across the project site to document changes in wetland hydrology and hydroperiods, to evaluate and compare post construction hydrological conditions to baseline conditions. All or some may have continuously logging data loggers. Expert analysis of hydrological changes (e.g., seasonal fluctuations, flooding, wetting and drying periods) will be performed to determine if hydrological objectives for the compensation project are being met.

### 2.4.3 Vegetation Plots

Detailed vegetation plots are installed and assessed during baseline conditions to compare to post-construction monitoring to assess potential vegetative transitions, changes in general habitat characteristics, and support the determination of whether the compensation plan objectives have been met. Absolute percent cover estimates are generally completed within the vegetation plot for the herbaceous, shrub and tree stratums. Photographs are taken to document vegetation cover in, and immediately around the vegetation plot.

Additional vegetation surveys and analysis (e.g., presence absence surveys, invasive species surveys, drone imagery) may be added to meet site objectives.

#### 2.4.4 Adaptive Management

Monitoring will support the determination of whether the wetland compensation project has met its objectives and performance criteria. Should results suggest that the compensation project is not functioning as it was predicted, monitoring results can be used to identify what modifications may be required within the compensation site to correct these issues.

#### 2.4.5 Reporting

Reporting requirements and schedules to track Project's wetland alteration status and associated compensation needs defined through the permitting process. An annual report typically includes the following information:

- An annual survey of the Project to identify the exact alteration footprint as a result of Project related activities completed that year;
- An updated schedule for the alteration areas expected for the forthcoming year;
- Revisions, as needed, to the Wetland Compensation Plan, which exists as a living throughout the lifetime of the Project. The WCP will detail wetland compensation efforts completed to date (including Secondary projects) and continue to document progress made with site identification and project design, and;
- Compensation project monitoring reports to confirm and document objectives based on performance indicators as determined by project-specific Compensation Plans.

## 3 PRELIMINARY WETLAND COMPENSATION OPTIONS

The following sections outline potential compensation options based on MEL's past compensation experiences, NSECC consultation, and known opportunities in NS.

MEL will further investigate the conceptual opportunities discussed in the following sections at the time of detailed Project design and permitting.

### 3.1 Primary Wetland Compensation

#### 3.1.1 Post-Farming Riparian Wetland Restoration

NS is 70% privately owned, of which much of that is farmland. Many farms exist within the floodplain of river systems and as a result are ditched to drain the land for farming activities. These areas are commonly used for haying or livestock grazing as they flood periodically.

Ditching resulting in the dewatering of the natural floodplain, which is commonly treed or shrub swamp or marshland (tidal ort freshwater). Natural wetland vegetation is subsequently removed, and the soil is altered through farming activities. Many of these areas may no longer present wetland conditions at all.

MEL has demonstrated experience in the restoration of a variety of these systems through hydrological engineering to rewet and detain water on-site, with the aim to promote historic, natural wetland hydrological conditions, vegetation, and at times, soil reestablishment. An example of this is the Otter Brook restoration project MEL executed in 2022 shown in Figures 1 (pre-restoration) and 2 (post -restoration) below. At the time of restoration design, Otter Brook no longer exhibited wetland conditions as a result of historic farming practices.

**Figure 1** – Otter Brook with active farming (2019).

**Figure 2** – Otter Brook post-restoration (2024) showing successful on-site water retention.

### 3.1.2 Impounded Wetland Restoration

Many impounded wetlands may appear to offer water storage solutions, however, many have lost their natural functions of slowing water movement and regulating flows, along with natural habitat provides for aquatic, semi-aquatic and avian species.

These alterations are primarily associated with old roads and forestry trails where there are issues with lateral drainage under the road and collapse or improperly sized culverts. Examples of these opportunities exist in the Project's watershed, the Shubenacadie River, due to a long history of development.

An example of one such project is the Gray Pond restoration project executed by MEL in 2022. Figures 3 and 4 below show a fen wetland before (Figure 3) and after (Figure 4) the impoundment was repaired (e.g., new culvert and road construction).

**Figure 3** – Gry Pond impounded fen wetland (2019)

**Figure 4** – Grey Pond post-restoration (2023) to restore natural fen function and historic watercourse alignment.

### 3.1.3 Harvested or Altered Peatlands

While the horticultural peat harvesting industry in NS is not large, the industry is active within the province. However, unlike other provinces where peat harvesting is more prominent (e.g., New Brunswick, Quebec, Manitoba), NS does not have peat harvesting specific restoration requirements at closure. Peatlands will not naturally regain their unique functions (e.g., peat forming species and accumulation, carbon sequestration) post-harvesting without specific, active restoration methods. As a result, many of these sites that are no longer viable for horticultural purposes may be left abandoned with limited restoration efforts. A limitation of these sites is the long-standing leases and a company's continued interest in retaining the rights to these properties.

An example of one such project is an abandoned harvesting operation on a bog near Kennetcook NS, shown in Figure 5 below.

**Figure 5** – Harvested peat bog, Kennecook, NS.

3.1.4 On-site Compensation

On-site options for wetland compensation may be considered during the progressive reclamation process, acknowledging the time lag associated with this option. Potential opportunities for on-site reclamation may be considered as part of the Project's Reclamation Plan, which will be iteratively updated through the life of the Project, in consultation with NSECC

## 3.2 Secondary Wetland Compensation

Based on the predicted project impacts, there is an opportunity for the Project to allocate up to 18.78 ha of its total wetland compensation requirements (up to 50%) to Secondary compensation projects.

MEL has experience successfully scoping and collaborating on Secondary compensation research studies approved by NSECC. MEL will continue to explore Secondary compensation opportunities through engagement with other wetland compensation practitioners, research professionals and local interest groups (e.g. watershed groups) to assess prospective research and study needs. MEL will evaluate local Secondary

opportunities through engagement with local community-based organizations, such as watershed groups. NSECC will be consulted on the scoping and development of any Secondary projects.

### 3.3 Wetland Compensation Summary

CertainTeed is committed to implementing valuable, and functionally significant wetland compensation opportunities which meet the Project's compensation requirement (37.56 ha) and the expectations of NSECC through the Wetland Conservation Policy. CertainTeed will secure viable wetland compensation project(s), which aim to replace wetland area and/or function or otherwise support the NS Wetland Conservation Policy (i.e., Secondary projects).

## 4 CLOSURE

We look forward to your attention to this Preliminary Wetland Compensation Plan. Please do not hesitate to contact the undersigned with any questions you might have.

Sincerely,

Sarah Scarlett, M.Sc.
Project Manager, Restoration Lead
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