

Appendix H.3

Preliminary Wetland Compensation Plan – April 2021 Completed for the Updated 2021 Beaver Dam Mine EIS



Preliminary Wetland Compensation Plan Beaver Dam Mine Project

Beaver Dam Mine Project Marinette, Nova Scotia Atlantic Mining Nova Scotia Inc. 6749 Moose River Road, RR#2 Middle Musquodoboit, Nova Scotia B0N 1X0

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1.0 Preliminary Wetland Compensation Plan

Atlantic Mining NS Inc. (AMNS) is proposing the construction, operation, decommissioning, and reclamation of an open pit gold mine in Marinette, Nova Scotia. The Beaver Dam Mine Project (the Project) would have an ore production rate of approximately 6,000 tonnes per day, over a five-year period. Ore from the Project would be crushed and transported approximately 31 km by road to the Moose River (Touquoy) mine for processing. Components of the Project include an open pit, material storage facilities (i.e., waste rock, topsoil and organic materials), mine haul roads, mine infrastructure for crushing, water management, hauling, truck maintenance, administration, and road upgrades.

The Project is subject to federal environmental assessment review under the *Canadian Environmental Assessment Act* (CEAA 2012). Currently, AMNS is responding to Round 2, Information Requests (IR2) (CEAA 2019) in response from the Canadian Environmental Assessment Agency and Nova Scotia Environment (NSE) review of the Revised 2019 Environmental Impact Statement (EIS) for the proposed Project (AGC 2019)..

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 impacts to wetlands, 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, AMNS acknowledges a residual loss of wetland habitat and function as a result of the Project, including lost wetland function (habitat) for several SAR: landbird SAR, such as Canada warbler (*Cardellina canadensis*), olive-sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*); and, SAR reptiles, such as the snapping turtle (*Chelydra serpentina*). The Project predicts a residual total of approximately 36 ha of wetland habitat which will require compensation/offsetting.

This Preliminary Wetland Compensation Plan has been prepared to provide a conceptual approach to wetland restoration to offset wetland area and function lost as a result of the Project, and in response to IR2 CEAA 2-24 and CEAA 2-26 relating to conservation allowances for lost wetland function (habitat) for landbird SAR and snapping turtle (AMNS 2021a,b). This plan has been developed in consultation with NSE, Nova Scotia Lands and Forestry (NSLF) and Environment and Climate Change Canada (ECCC), as per meetings held on October 10, 2020 (NSE), December 2, 2020 (NSE and NSLF) and April 6, 2021 (ECCC, NSE and NSLF).

1.1 Regulatory Context

AMNS is committed to the implementation of wetland compensation project(s) to satisfy the Nova Scotia Wetland Conservation Policy's (NSE 2011) objective of preventing no net loss of wetland habitat and function. AMNS acknowledges that NSE considers restoration of wetland function as a focus of wetland compensation in Nova Scotia, and as such, this objective will be integral to wetland compensation efforts associated with this Project. AMNS is also committed to the principals outlined in the Operational Framework for the Use of Conservation Allowances (Environment Canada 2012), through the implementation of wetland restoration project(s) that include securement and preservation of high-quality replacement habitat to compensate for the loss of species' habitat due to the Project (Environment Canada 2012).

Based on consultation with NSE, AMNS understands that NSE's preferred method of compensation is restoration of highly degraded wetland habitats or wetlands previously lost to historic conversion in proximity to the wetland losses (within the same or adjacent watersheds) at a minimum 2:1 ratio (area) with careful consideration of replacement of lost function. Furthermore, the province expects compensation projects to be completed in advance of wetland alteration, or directly following wetland alteration (no time lag) and expects the compensation project be self-sustaining and permanent. AMNS will endeavor to ensure that these restoration objectives are upheld as part of the wetland compensation project(s). These



provincially mandated restoration objectives are also recommended by ECCC to satisfy the objectives of conservation allowances including equivalency, additionality, location, timing, duration, and accountability (Environment Canada 2012).

AMNS is committed to implementing valuable, and functionally significant wetland restoration opportunities which meet the expectations of NSE Wetland Conservation Policy (NSE 2011) and the expectations of Operational Framework for the Use of Conservation Allowances (Environment Canada 2012). The objective of the restoration site selection process will be to secure valuable wetland compensation project(s), which aim to replace wetland area and function including the establishment of habitat for landbird SAR and snapping turtle.

1.1.1 Replacement of Lost Function for Landbird SAR and Snapping Turtle

The residual loss of wetland habitat as a result of the Project reduces local breeding habitat for landbird SAR; Canada warbler, olive-sided flycatcher, and rusty blackbird that utilize this habitat. Potential habitat (overwintering habitat) is also lost for SAR reptiles as a result of the residual loss of wetland habitat, such as the snapping turtle (AMNS 2021).

The wetland restoration project(s) targets the creation of landbird SAR breeding habitat because breeding habitat is expected to be lost as a result of wetland alteration, and land conversion of breeding habitat is a primary threat to these species (unknown if this is the cause of decline in olive-sided flycatcher) (Environment Canada 2015a; Environment Canada 2016). These landbird SAR also forage within their breeding habitat, therefore, by creating breeding habitat, foraging habitat is also created.

The breeding habitat requirements for the three migratory landbird SAR and overwintering habitat for snapping turtle are described.

Canada warbler (Species at Risk Act [SARA] Threatened; Nova Scotia Endangered Species Act [NSESA] Endangered, Atlantic Canada Conservation Data Centre [ACCDC] S3B)

The Canada warbler has a wide range of suitable habitats, including deciduous, coniferous, and mixed forests, with a welldeveloped shrub layer. Their preferred habitat is moist mixed forests (COSEWIC 2008). Primary breeding habitat is the dense shrub understory in wetlands or old-growth forests (Environment Canada 2016).

Rusty blackbird (SARA Special Concern; NSESA Endangered, ACCDC S2B)

Rusty blackbird breeding habitat is forested wetlands, including peat bogs, sedge meadows, marshes, swamp, beaver ponds, slow moving streams, and pasture edges (COSEWIC 2006). Breeding sites typically contain shallow open water with emergent vegetation adjacent to conifer or tall shrub wetlands (Environment Canada 2015a). Powell et al. (2014) found that wetlands with non-fish bearing shallow open water, beaver activity, and >70% coniferous cover along the upland edge were often occupied by breeding rusty blackbird.

Olive-sided flycatcher (SARA Threatened; NSESA; Threatened ACCDC S2B)

Suitable habitat for the olive-sided flycatcher includes open areas with tall trees or snags, forest openings, forest edges near natural openings, or human-made openings. Suitable breeding habitat also includes coniferous or mixed coniferous forests, likely near water or wetlands (Environment Canada 2015b).



Snapping turtle (SARA Special Concern; NSESA Vulnerable; ACCDC S3)

Hibernation sites for snapping turtle are aquatic environments (e.g., lentic, lotic, and mud) where water will not freeze to the bottom, the substrate is a thick layer of mud, and other cover (e.g., large woody debris) is present (ECCC 2020).

2.0 Wetland Restoration Process

Wetland restoration project(s) will be identified as early in Project as early as possible, with the goal of identifying these restoration opportunities prior to Project construction. Several steps are involved in the selection of a wetland restoration project including engagement with the Mi'kmaq of Nova Scotia and key stakeholders, site identification, project design, reporting, and identification of monitoring commitments. These steps are described in this section.

2.1 Engagement

As part of the wetland restoration process, AMNS will engage early with key rightsholders (Mi'kmaq of Nova Scotia) and stakeholders, including regulatory agencies, to ensure all possible avenues for restoration have been explored in the site identification process. Engagement allows AMNS 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 restoration. Engagement will involve the following types of groups and organizations:

- Nova Scotia Environment (NSE);
- Nova Scotia Department of Lands and Forestry (NSL&F);
- Environment and Climate Change Canada (ECCC);
- Mi'kmaq of Nova Scotia communities and organizations;
- Private Forestry Lands Groups and Co-operatives;
- Local Municipalities; and
- Non-Governmental Organizations such as:
 - o Eastern Shore Forest Watch;
 - Nova Scotia Nature Trust;
 - o Nature Conservancy of Canada;
 - Ecology Action Centre; and
 - Others as determined through engagement efforts.

2.2 Site Identification Process

The process to select suitable wetland restoration project site(s) will initiate during the environmental assessment and provincial alteration permitting process. With the support of a Wetland Restoration Professional (WRP), AMNS will complete feasibility studies and preliminary design concepts to determine the scope of work, and specific wetland compensation objectives. An evaluation of the value of the Project will be determined by comparing the proposed outcomes of the Project



to the broader objectives of the Nova Scotia Wetland Conservation Policy (NSE 2011) and the Operational Framework for Use of Conservation Allowances (Environment Canada 2012), as well as local watershed benefits and support of any initiatives that the Project would provide to the Mi'kmaq of Nova Scotia, stakeholders and local communities.

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

AMNS will prioritize identification of functionally valuable wetland restoration projects within the affected watershed. Ideally, wetland restoration would occur within the spatial boundaries of the Project. However, the nature of the wetland alteration at the Beaver Dam Mine Site (e.g., open pit and stockpiles) may limit the overall opportunity for on-site restoration, given the footprint area of some of the stockpiles and the open pit at closure will remain. On-site options for wetland restoration will be considered during the reclamation process, acknowledging the time lag associated with this option, and could include restoration of wetlands once infilled by temporary stockpile locations or other ancillary locations. Other opportunities within the Project Area could include expansion of unaltered, existing wetlands, which could aim to detain water previously stored by wetlands and since lost (altered) by Project activities. This process would satisfy restoring wetland function.

Most wetlands proposed for alteration within the Beaver Dam Mine Site drain into Cameron Flowage (Killag River) and smaller tertiary watersheds. Restoration of wetlands will be explored along these aquatic features, including their tributaries and wetlands which drain into them. Much of the surrounding landscape comprises undeveloped forested land, and it appears that most landscape degradation has likely occurred as a result of timber harvesting activities. Wetland degradation as a result of tree harvesting occurs by disturbing soils, vegetation, and altering hydrological inflows, outflows and wetland hydrological surface conditions. AMNS will determine whether instances such as described above have occurred, and any restoration opportunities that appear feasible within or in close proximity to the Project will be investigated.

Should it be determined that valuable wetland restoration opportunities do not exist within the affected watersheds, with support of the WRP and in consultation with NSE and ECCC, AMNS will identify other areas within the province where wetland restoration opportunities are present. Historical water management and wetland degradation within agricultural areas have contributed to watershed health issues in rural areas of Nova Scotia. AMNS will investigate restoration opportunities in the Musquodoboit River Secondary watershed (approximately 20 km from the Project) as well as other watersheds with a high proportion of degraded wetland habitat as a result of agricultural practices, such as the Shubenacadie Secondary Watershed in lands adjacent the Stewiacke River.

2.3 Project Design

Preliminary project design 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 project, project design will advance into a more detailed stage. During wetland restoration site identification, the ability to restore wetland function (habitat) for landbird SAR and snapping turtle habitat will be evaluated as part of the design criteria.

2.3.1 Preliminary Design

A desktop review process will be initiated on potential 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 which, ideally, also includes landbird SAR and/or snapping turtle 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 is also evaluated. In addition, information regarding adjacent land use and its potential interaction with a restoration project is obtained.

Baseline monitoring is typically completed between spring and late fall to support the design process. As well, baseline monitoring is completed to 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 through plot installations. Wetland functional assessment is also completed at this stage: a repeat of this process post project completion is performed to determine if functional characteristics have been modified to meet project objectives. Hydrology data from loggers is converted into a hydrograph so that baseline hydrological characteristics are understood to inform the detailed design process.

As well as evaluating the proposed project site for characteristics as described above, details relating to baseline vegetative composition, suitable SAR habitat, adjacent habitat, and SAR (landbird and snapping turtle) presence will be evaluated (the selected site will prioritize proximity to known SAR occurrences to increase the potential for success).

Having a proper understanding of site conditions and adjacent site conditions (reference site) is paramount to meeting the goals of the wetland restoration project. For example, if site conditions cannot support (at baseline or through restoration) a vegetative community or hydrological environment required to support wetland habitat and breeding habitat for landbird SAR or overwintering habitat for snapping turtle, the site may not be feasible to support the broad conservation allowance goals and other potential sites should be investigated.

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 restoration 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 restoration site. Water should be managed on the site to restore conditions that resemble pre-degraded conditions as demonstrated in the available reference site, and to meet design objectives including restoration of SAR habitat (i.e., site contouring to create certain microhabitats and maintain appropriate hydrological conditions).

Certain hydrological conditions are required to support specific vegetative communities and provide open water, a requirement of rusty blackbird breeding and forging habitat and snapping turtle overwintering habitat. The detailed design process will outline the location and positioning of certain habitats. For example, habitat for rusty blackbird will be developed in proximity to the habitat created for Canada warbler because rusty blackbird requires open water habitat adjacent to shrub swamps, a habitat requirement of Canada warbler. Additionally, flora species required for planting or transplantation (and locations) will be determined (if natural revegetation is not feasible) as part of the detailed design. Refer to Table 1 for restoration actions and descriptions.



Common Name	Scientific Name	Action #	Action Description
Canada warbler	Cardellina canadensis	1	Site contouring to create uneven ground.
		2	Planting and/or natural revegetation of speckled alder (<i>Alnus incana</i>) and other deciduous shrubs (2.5 to 3.5 m tall, when fully grown) ¹ .
			Shrub cover should average 79%.
		3	Planting and/or natural revegetation of ferns (e.g., <i>Osmundastrum cinnamomea</i>) in the herbaceous layer ¹ .
Rusty blackbird	Euphagus carolinus	4	Shallow open water, at depths to support emergent vegetation (<30 cm).
		5	Open water situated adjacent shrub swamp (i.e., Canada warbler habitat).
		6	Site contouring to create depressions able to hold additional small pools/puddles.
		7	Coniferous upland edge to wetland ² . Supplemental planting of spruce (<i>Picea</i> sp.) and/or balsam fir (<i>Abies balsamea</i>) along upland edge of wetland, if planting increases connectivity to intact forest.
Olive-sided	Contopus cooperi	8	Open areas
flycatcher		9	Near water (to provide high densities of insects for foraging).
		10	Retain snags and tall trees
		11	Tall artificial snags erected from wooden poles or logs ³ . Density of snags should meet a minimum of 13/ha ⁴ .
Snapping turtle	Chelydra serpentina	12	Open water (lentic or lotic) ~1 to 2 m deep. Deep enough to not freeze to the bottom but <2 m.
		13	Substrate - thick layer of mud.
		14	Large woody debris and other cover built into substrate.

Table 1: Restoration Actions to Provide Habitat for Species at Risk

¹ Availability of certain seeds/spores at time of restoration unknown.

² Site dependant on surrounding landscape/forest community.

³ Artificial snag specifications and installation is described in detail in Eaton et al., 2014. Generally, snags should be installed using the same methods and equipment as those used to install powerline poles. Inverting snags with root balls can provide enhanced perching opportunities.

⁴ Robertson et al., 2007; Eaton et al., 2014

More specific details/drawings of the restoration project(s) will be included in the Annual Wetland Compensation Plan, once the aforementioned tasks are completed. The exact scope required for the detailed design process will be determined in consultation with NSE and ECCC.



2.3.3 Reporting

AMNS proposes that annual wetland alteration and compensation report be provided to NSE throughout the lifetime of the Project. The annual report will include 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 will be provided;
- Wetland Compensation Plan (WCP): The WCP will exist as a living document and will be updated annually. In its infancy (i.e., years 1 to 2), the WCP will focus on identification of suitable wetland restoration activities, and project design. Implementation of the wetland restoration projects will be initiated on the ground within three years, sooner if possible, of the first wetland alteration activity occurring on the site;
- The WCP will provide a detailed monitoring plan to confirm and document objectives based on performance indicators as determined by the iterative approach of the WCP and annual reporting; and
- AMNS is committed to engaging one (or more) wetland restoration professionals (WRP) to support them in fulfilling the wetland restoration tasks associated with this Project. Details related to the agreements between AMNS and the WRP will be provided in the annual update.

2.4 Wetland Restoration Monitoring

Wetland monitoring is proposed to include visual surveys, hydrology, and vegetation plots. Monitoring will be completed to determine:

- 1. Confirmation of restoration of wetland area and function.
- Success of restoring habitat to meet suitable habitat conditions specific to each species (e.g., appropriate water levels and substrate to support overwintering habitat for snapping turtle, or appropriate shrub cover to support Canada Warbler).

The following subsections outline the surveys proposed. The final scope and scale (i.e., timing and number of surveys) of monitoring will be outlined in the final version of the WCP. Monitoring timelines will be based on known performance indicators and extended as necessary, based on results of annual reporting and development of adaptive management strategies as needed.

2.4.1 Visual Habitat Surveys

General visual surveys will be conducted to determine the success of restoring habitat to pre-defined parameters. The assessment will take place during a seasonally appropriate time. Visual surveys will assess the following:

All Species

- Area restored meets 2:1 ratio of wetland habitat lost; and
- Wetland hydrological indicators and general observations.

Landbird SAR



- Vegetation community structure;
- Site contouring;
- Area of open water and water depth; and
- Snag height and densities.

Snapping Turtle

- Area of open water and water depth; and
- Open water substrate.

2.4.2 Vegetation Plots

Detailed 5 m x 5 m vegetation plots are proposed within the created habitat for Canada warbler. Plots will be staked along their perimeter to ensure consistency during future sampling events. Absolute percent cover estimates will be completed within the vegetation plot for the herbaceous, shrub and tree stratums. Photographs will be taken to document vegetation cover in, and immediately around the vegetation plot.

The average absolute cover of the shrub stratum in Canada warbler habitat should be >79%.

2.4.3 Monitoring Summary and Adaptive Management

If monitoring determines that the wetland restoration project was not successful in creating suitable breeding habitat for the landbird SAR or suitable overwintering habitat for snapping turtle, additional activities will be completed to meet the project objectives. For example, if vegetation plots within Canada warbler habitat determine absolute cover <79%, supplemental planting will be completed to achieve the desired cover.

2.5 Wetland Restoration Summary and Contribution to Species Recovery

AMNS is committed to implementing valuable, and functionally significant wetland restoration opportunities which met the expectations of NSE through the Wetland Conservation Policy and the expectations of ECCC through the Operational Framework for the Use of Conservation Allowances. AMNS will secure valuable wetland compensation project(s), which aim to replace wetland area and function including the establishment of habitat for landbird SAR and snapping turtle.

Offsetting of wetland area and function lost from Project development will be achieved through wetland habitat restoration. Habitat restoration is believed to offer the greatest benefit to the four SAR because habitat loss is a major threat to their persistence (ECCC 2020; Westwood 2016). The recovery strategies for these species support habitat restoration as a conservation method (ECCC 2020), deem habitat conservation as important to the species (Environment Canada 2015b; Environment Canada 2016), or have acknowledged examples of its success (Environment Canada 2015a).

2.6 Limitations

The following list outlines potential limitations of the proposed wetland restoration project(s):

- 1. Site selection to ensure appropriate hydrological inputs are available;
- 2. Landbird SAR and snapping turtle may never inhabit the site;



- 3. Unforeseen factors outside of AMNS control (e.g., drought, forest fire etc.) have the potential to impact the success of the wetland restoration project(s); and,
- 4. Certain seed/spore mixtures may not be available at the time of site restoration.

3.0 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,

<Original signed by>

<Original signed by>

Meghan Milloy, MES Vice President McCallum Environmental Ltd. Jeff Bonazza, M.Env.Sci Project Coordinator McCallum Environmental Ltd.



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