



## **Appendix E.9**

Draft Historic Tailings and Waste Rock Management Plan –  
May 2021  
Completed for the Updated 2021 Beaver Dam Mine EIS



**Beaver Dam Mine Project**

**Appendix E.9  
DRAFT Historic Tailings and  
Waste Rock Management Plan**

**May 2021**

**Atlantic Mining NS Inc.**

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# 1 HISTORICAL TAILINGS AND WASTE ROCK MANAGEMENT PLAN

## 1.1 Purpose

The Beaver Dam Mine (the Project) is a proposed open pit mine located in an historical gold mining district located approximately 30 km from the Touquoy mine. As a result, Historical Tailings and Waste Rock Management Plan (the Plan) are known to be present at the proposed Project site due to the existence of historical mine workings, waste rock piles, dam structures and access roads. Environmental Site Assessment (ESA) studies conducted at the Beaver Dam Mine Site delineated where proposed Project infrastructure related to the mine re-development are located with respect to historic tailings and waste rock areas, and chemically characterized historic tailings and waste rock areas (Beaver Dam Mine Project Extended Phase II ESA, Stantec 2021 and included in Appendix E.8 of the Updated 2021 EIS [AMNS 2021]). Specifically, suspected tailings and waste rock as well as un-reclaimed tailings appear to be concentrated in the area of the Austen shaft, the settlement pond area, in the northern area of Crusher Lake, and around the Forge Hill area (Stantec 2019a and Stantec 2019b [Appendix A, Figure 1]). The Project is proposing to temporarily store historic tailings and waste rock on the potential acid generating (PAG) stockpile and permanent disposal is planned to be in the mined out Touquoy pit.

The Plan has been developed to minimizing potential effects to local soils, sediments, and waters, as well as metal leaching/acid rock drainage (ML/ARD) prevention. Mitigation and management are important components of environmental protection and management strategies for the Project. The purpose of this Plan is to describe accepted best management practices and approaches to avoid and minimize potential for ML/ARD and reduce the long-term risks.

The Plan is in consideration of and will be performed in conjunction with the following related environmental management plans developed for the Project:

- draft Mine Water Management Plan (AMNS 2021, Appendix Q.1);
- draft ML/ARD Management Plan (AMNS 2021, Appendix E.5); and
- draft Aquatic Effects Management and Monitoring Plan (AMNS 2021, Appendix Q).

Standard operating procedures, method statements, and specific work instructions will be submitted as part of the Industrial Approval Application. Project development and timing relative to ML/ARD management is summarized in AMNS (2021, Section 2.4.2 of the Project Description). An assessment of historic tailings and waste rock is presented in Section 6.5 and baseline data collected to date is provided in Appendix E.6 to E.8 of the Updated 2021 EIS (AMNS 2021). Additional monitoring to determine depths of historic tailings is planned to be undertaken prior to construction.

### 1.1.1 Strategy

The overall strategy to manage historic tailing and waste rock includes:

1. Delineate areas of historic tailing and waste rock (presented in Appendix E.6 to E.8 of AMNS 2021);
2. Chemical characterization of historic tailing and waste rock (presented in Appendix E.6 to E.8 of AMNS 2021);
3. Reporting; and
4. Follow-up monitoring.

The Project is in the early stages of development and as such, historic tailings and waste rock identification, delineation, and characterization are ongoing. The following sections of this Plan describe proposed procedures and methodologies on how this

material will be managed, assessed, delineated, and remediated. As further information becomes available, the Plan may be amended and improved to include additional items.

### 1.1.2 Regulatory and Policy Framework

This Plan was developed in accordance with applicable legislation, regulations and guidelines.

At the provincial level, development of a formal tailings, contaminated sites, or ML/ARD Management Plan for mining projects is required by Nova Scotia Environment (NSE). Federally, the release of ML/ARD products into fish-bearing waters may constitute deposition of a deleterious substance, as defined in the *Fisheries Act*. Mine effluent is strictly regulated by the Metal and Diamond Mining Effluent Regulations.

In addition to these, other guidelines and reports document accepted Best Management Practices (BMPs) with respect to ML/ARD prediction, prevention and mitigation. These include papers published by the Mine Environment Neutral Drainage (MEND) Program, the Canadian partner in the International Network for Acid Prevention (INAP), and the Global Acid Rock Drainage (GARD) Guide (INAP 2009).

The Project's facilities for the management of waste rock and tailings were designed and will be constructed, operated, and closed in a manner consistent with these standards and legislation.

### 1.1.3 Performance Objectives

The performance objectives with respect to historic tailings and waste rock, and ML/ARD management are to:

- mitigate health, safety, and environmental risks;
- ensure compliance with regulatory requirements, or other relevant environmental management guidelines;
- track environmental performance and evaluate mitigation measures for adaptive follow-up programs as needed;
- avoid and minimize disturbance where possible;
- minimize the volume, and manage water that comes into contact with these materials to avoid and manage potential water quality effects; and
- confirm and document geochemical characteristics, disposal fate and quantities of these materials and exposed rock.

This Plan provides a basis to achieve these performance objectives. The performance objectives are inherent in the technical assumptions that informed the design of the mine waste management system throughout the construction, operations, active-closure, and post-closure phases of the Project (Appendix Q.1 and E.5 of the Updated 2021 EIS [AMNS 2021]).

### 1.1.4 Delineation and Characterization Methodology

A combination of physical visual identification (where possible) and chemical analysis methods are used for delineating is provided in Appendix E.6 to E.8 of AMNS (2021).

The following is the methodology that has and continued to be used to identify historic tailings and waste rock:

1. visual identification;
2. material sampling; and

3. chemical analysis techniques.

### **Visual identification**

A review of MEND, the Canadian partner in the INAP, and the GARD Guide (INAP 2009) have been reviewed to develop the visual identification and characterization of tailings which include:

- tailings are a sand-like material, generally with no rocks mixed in;
- the color of them can vary between light brown and dark grey;
- tailings often look like a 'fine sand beach' but inland without the water;
- undisturbed tailings are sand-like material, generally with no rocks mixed in;
- the color of them can vary between light brown and dark grey; and
- some tailings were deposited over waste rock piles where the fine sand like material resulted in a poorly graded material of tailings and cobble size waste rock mix.

Physical identification is the primary method to initially ascertain whether an area contains historical tailings. Due to the primary method of processing used historically (stamp mills), there are physical characteristics common to tailings deposited in the late-19<sup>th</sup> to early-20<sup>th</sup> century. Physical samples are compared to the following general physical criteria:

- Fine grained sand-like, well sorted material, generally less than 1 millimetre (mm) in size. Few or no large cobbles (or clasts) present.
- Highly bedded deposition, with visually identified depositional layers. Some areas may not display this layering depending on how the stamp mill and tailings deposition occurred.
- Color ranging from light grey, through to a brownish red. The characteristics of the local ore body should be considered in this evaluation.

### **Chemical Characterization**

The chemical characterization in conjunction with the physical identification is also required. The following analysis has been and will continue to be undertaken to define the historic tailings and waste rock:

- Total metals analysis;
- Acid base accounting (ABA); and
- Shake flask extraction tests.

Background samples have been collected at the Beaver Dam Mine Site for benchmarking and comparison purposes. There are several considerations that have been observed when selecting the background locations, including:

- Selecting a location that overlays the same host rock as the area of potential tailings deposition.
- Background samples have been collected in undisturbed areas that have not been recently worked or show signs of historical activities.
- Collection of samples at a similar depth to the tailings impact delineation samples, to account for historical weathering and the potential for arsenic transport.

The background samples have been collected and analyzed for chemical characteristics, an appropriate value for background parameters of interest will be selected to reflect risk exposures (e.g., human health and ecological) that exist at site. For example, there can be naturally elevated arsenic in soils that overlie or are adjacent to an ore deposit that is enriched in arsenic.

### **Reporting**

Information regarding the known locations, chemical makeup and extent of historic tailings and waste rock at the site are described in Appendix E.6 to E.8 of AMNS (2021). Additional monitoring will be undertaken prior to construction. Collectively, this information along with mitigations and adaptive management will be included in an updated Plan that will be submitted as part of the Industrial Approval Application. Reports will be submitted to NSE for review.

It is proposed that the following information will be documented:

- Confirmatory sampling results and laboratory certificates.
- The surveyed delineated extents of the historic tailings and waste rock excavation.
- Photos of the excavation, placement and transport of the material.
- Groundwater sampling results and water levels, both preliminary and ongoing results.
- Volumes of removed material, and placement locations.
- Any contractor disposal certificates for off-site remediation.
- Reprocessed tailings quality results, if re-processing is undertaken.

The external reporting requirements to NSE will be outlined in an updated Plan that will be submitted as part of the Industrial Approval Application. The reporting information will include:

- Confirmatory sampling results and laboratory certificates.
- Surveyed delineated extents of the excavation.
- Groundwater sampling results and water levels, both preliminary and ongoing results.
- Volumes of removed material, and placement locations (on and off-site).
- Contractors' disposal certificates for off-site remediation.
- Reprocessed tailings quality results.
- Design of a containment cell, if necessary.

### **1.1.5 Remedial Options**

The Beaver Dam Mine Project is proposing to temporarily store historic tailings and waste rock on the PAG stockpile and permanent disposal is planned to be in the mined out Touquoy pit.

### **1.1.6 Follow-up Monitoring**

A detailed follow-up monitoring plan, including remedial verification, will be submitted as part of the Industrial Approval Application. An Annual Reclamation and Closure Report will include the results of this Plan. A monitoring program will be undertaken during construction, operations, and active closure to identify effects from historic tailings and waste rock at the Beaver Dam Mine Site.

### **1.1.7 Closure**

This Plan is a high-level overview for the purposes of the Updated 2021 EIS submission. A detailed Plan containing standard operating procedures, method statements, and specific work instructions will be submitted as part of the Industrial Approval Application and once approved will be implemented at the Beaver Dam Mine Site.



## 2 REFERENCES

- AMNS (Atlantic Mining NS Inc.). 2021. Updated Environmental Impact Statement. Beaver Dam Mine Project. Submitted to the Impact Assessment Agency of Canada and Nova Scotia Environment. May 2021. Middle Musquodoboit, NS.
- INAP (International Network for Acid Prevention). 2009. The Global Acid Rock Drainage Guide (GARD Guide). *Mine Water Environment* (2009) 28:305-310. DOI 10.1007/s10230-009-0078-4. Technical Communication. Verbug R., N. Bezuidenhout, T. Chatwin, and K. Ferguson. Received: 21 May 2009 / Accepted: 28 May 2009 / Published online: 10 September 2009. Springer-Verlag 2009.
- Stantec (Stantec Consulting Ltd.). 2019a. Final - Phase I Environmental Site Assessment - Beaver Dam Property. Submitted as part of the Beaver Dam Mine Project Updated 2021 EIS, included as Appendix E.6. Prepared for Atlantic Mining NS Inc. File: 121619250.2500.955. August 23, 2019. Dartmouth, NS.
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